SCIENCE & THE ALLIANCE

NATO's Third Dimension

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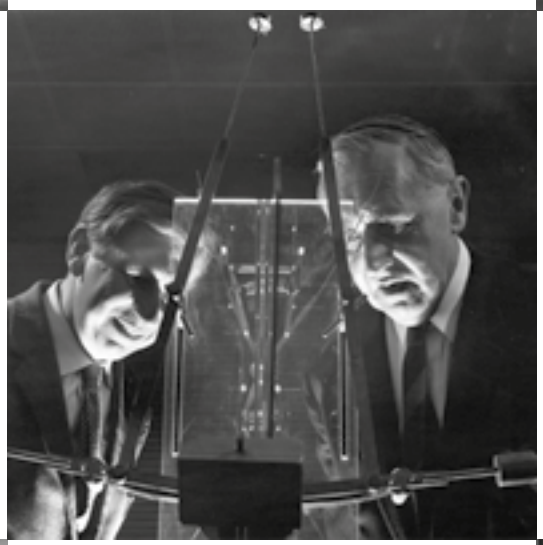

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After successfully graduating as a PhD in April 2014, Roberto Cantoni won the prestigious Levinson Prize, awarded by the Society for the History of Technology for his article, "What's in a pipe? Technopolitical Debate over the Ontology of Oil Pipes at NATO (1960–1962)", This paper looks at the proposal for an embargo of oil pipes and manufacturing equipment to the Soviet Union and explores the conflicts that ensued amongst NATO allies, arguing that even establishing what a pipeline was became contentious.

SCIENCE & THE ALLIANCE

view from the top simone turchetti

Nato: cold-warrior or eco-warrior?

In politics, a well-designed ploy matters much more than a sincerely held belief. Nobody knew this better than former United States president Richard Nixon. But it still comes as a surprise to learn that he was responsible for encouraging Nato to support pioneering studies on the environment.

Archive papers have now revealed the reasons for the sudden transformation of a cold-war fighter into an eco-warrior and they show just how important his political manoeuvring was in promoting research in the field.

Nato's contribution to climate-change research has often been overlooked. Yet, its involvement predates the growing awareness of ecological issues in the late 1960s. The alliance set up a science committee in 1958 bringing together US and European scientists across a number of disciplines. In particular, two sub-groups were established to study meteorology and oceanography.

The aim was to understand how the weather and the marine environment change with time, and how they interact. However, this information also had relevance to Nato's military role. Nato leaders were interested in the conditions that might occur following nuclear war, and how this would affect the deployment of submarines and missiles. So it was a need to map nuclear Armageddon rather than the impending peril of carbon emissions that kick-started environmental research in the post-Sputnik years.

In April 1969, Nixon greatly increased Nato's commitment to this work by encouraging the formation of the Committee on the Challenges of Modern Society. This organisation was born with a distinctly ecological mission encouraging research in areas such as environmental emergencies and clean engines. While it is hard to imagine Nixon with "flowers in his hair", his idea for an environmentally active defence alliance chimed with his domestic political goals. Previous historical research has shown his anxiety about the US's global reputation in the wake of the Vietnam war and his awareness of growing public concerns about the environment.

'The US began looking for an alternative strategy to breathe new life into the Atlantic alliance.'

We now know, however, that Nixon's environmental diplomacy was primarily a response to the first major crisis to hit the Nato science programme. From 1966, the US Department of State wanted solutions to issues potentially harmful to the goals of the alliance. Both the UK and France were unwilling to increase the budget for Nato's research and France was in the process of severing its military ties with the organisation. More worryingly, the Europeans were becoming resentful of the growing scientific and technological gap separating them from the US. Indeed, the Italian government conceived a 'Marshall Plan' for research in which the US would help fund European science.

The US government feared this plan was a dangerous departure from the principle of burden sharing and so began looking for an alternative strategy that would breathe new life into the Atlantic alliance. Around that time the OECD set up a committee to tackle problems such as pollution and environmental disasters. Soon Washington became convinced that a similar initiative could divert its allies from squabbling over budgets. This led directly to the formation of the CCMS a body requiring no specific financial commitments from any member state.

Although the wider public knew very little about the motivations behind US diplomacy, keen observers may have recognised that Nato's sudden interest in ecological issues also presented opportunities for solving non-environmental problems. It is not surprising that the reception from European partners was mixed, as they envisaged that the initiative could max east-west cooperation on environmental matters.

So the marriage between global politics and environmental research was largely one of convenience, deriving from contingent issues rather than strong environmental beliefs. Climate studies have a long history but it turns out that their growth from the 1960s was initially stimulated by specific military concerns associated with the cold war. Yet these preoccupations drove the collection of data that is still valuable in assessing anthropogenic climate effects.

As member states' financial commitments to Nato have shrunk, so has their shared research output, although the CCMS continued to operate until 2006. Looking back, the most significant legacy of Nato's environmental campaign was undoubtedly the 1972 International Environmental Conference in Stockholm. It resulted in the UN Environmental Programme, which played a key role in global environmental politics, from the ban on chlorofluorocarbons to setting up the Intergovernmental Panel on Climate Change.

While Nixon may have toyed with environmentalism in the hope of being re-elected, his initiative did have far-reaching implications. Certainly, it had repercussions which he could never have foreseen.

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Sword, Shield and Buoys: A History of the NATO Sub-Committee on Oceanographic Research, 1959–1973[1]

Simone Turchetti*

Abstract. In the late 1950s the North-Atlantic Treaty Organization (NATO) made a major effort to fund collaborative research between its member states. One of the first initiatives following the establishment of the alliance's Science Committee was the creation of a sub-group devoted to marine science: the Sub-committee on Oceanographic Research.This paper explores the history of this organization, charts its trajectory over the 13 years of its existence, and considers its activities in light of NATO's naval defence strategies. In particular it shows how the alliance's naval commands played a key role in the sub-committee's creation due to the importance of oceanographic research in the tracking of enemy submarines. The essay also scrutinizes the reasons behind the committee's dissolution, with a special focus on the changing landscape of scientific collaboration at NATO. The committee's fall maps onto a more profound shift in the alliance's research agenda, including the re-organization of defence research and the rise of environmentalism.

Keywords. Cold War, forecasting, NATO, nuclear submarines, oceanography, Soviet Union, surveillance

> The oceans are vast. The United States Navy cannot do all the work by itself. We need the help of all of our friends and allies to help solve the riddle of the oceans.[2]

During the Cold War the US investment in marine science surpassed that of any other country. But even this high level of research funding failed to reassure US administrators about what US oceanographers could accomplish without the support of international collaboration. The words proffered by the US Navy representative at the NATO forum for the alliance's naval commanders (see epigraph above) tell us much about this apprehension and the wish to obtain the assistance of the USA's closest allies in the pursuit of studying the sea. The administration's anxiety originated from the operations of nuclear weapons-carrying Soviet submarines and the realization that oceans, as operating environment, offered to these enemy vessels 'concealment that couldn't be obtained in any other medium.'[3] Charting this environment was no longer of importance only to the advancement of science; the definition of naval strategies and defence measures depended on it.

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It is thus no surprise that the US-led defence alliance NATO was active in the support of oceanography; a commitment that led, amongst other initiatives, to the setting up of a Sub-committee on Oceanographic Research (ORC). Established in 1959 by the NATO Science Committee (SC), the sub-committee's formation was rooted in post-Sputnik preoccupations about catching up with the Soviet Union in the promotion of science and technology. Consistent with the SC mission, the subcommittee encouraged fundamental research through the offer of research grants to prominent scholars. Yet its distinctive trait was that the basic knowedge produced should be made pliable to the needs of NATO naval commands, especially that of improving the detection of submarines.

That NATO fundamental oceanographic research had military implications has already been suggested in the existing historical literature. John Krige, for instance, has argued that the sub-committee was born in an effort to promote research that 'straddled the military/civilian divide' (Krige, 2006, p. 206). This essay, however, provides a more in depth account of how the need to enhance NATO's monitoring of enemy submarines informed the ORC's history. As environmental conditions (sea temperature, currents and salinity) affected the performance of surveillance devices like sonars; NATO mobilized the Western marine scientists to prioritize the charting of these environmental factors in sea areas suitable for submarine detection. It was thus a specific defence urgency that propelled the sub-committee's activities.

By associating the scientific production of basic marine science and monitoring operations, this study contributes to the growing literature emphasizing how intelligence and surveillance needs shaped Cold War science. Since Paul Forman's pioneering study on the sponsorship of quantum electronics in the USA, we have learnt that the military exercised enormous influence over both the direction of research and whether researchers could retain their intellectual agenda in national sponsorship schemes (for alternative viewpoints see Forman, 1985 and Kevles, 1990). We have not, however, sufficiently investigated the motives behind this patronage despite the growth of contributions emphasizing these links. Fundamental research was decisive in securing new methods for the monitoring of (and intelligence gathering on) enemy forces (for an overview: Doel, 1997). The study of seismic waves allowed the detection of Soviet nuclear tests (Barth, 2003). That of the ionosphere was critical (and at times offered cover) to telecommunications; including the interception and decoding of enemy signals (Van Keuren, 2001). Military funding invigorated oceanography too, especially in the USA, due to its role in naval operations and the tracking of enemy submarines (Mukerji, 1989, p. 43 and pp. 73–74; Oreskes, 2003).

This study fills an important gap in our knowledge of Cold War oceanography by focussing on its promotion in a transnational research framework like NATO. It suggests that important episodes of international scientific collaboration were in response to surveillance needs as much as national research programmes. It also offers an opportunity to re-think NATO's patronage strategies. Krige has extensively analysed its implications for US/Western Europe relations and yet, according to Ronald Doel, scientific intelligence

'lurks at the margins' of Krige's account (Doel, 2010, p. 311). The archival evidence disclosed herewith suggests that the defence intelligence agenda was not at all peripheral to NATO sponsorship strategies, even if it was made less apparent by the alliance's science administrators in their bid to prevent criticism from national representatives less eager to endorse it.

The essay also aims to fill a gap in the historical study of 20th century oceanography. This literature has expanded considerably in recent years (Rozwadowski and Van Keuren, 2004; Laughton *et al*., 2010), and there are studies that analyse cases of military patronage and international co-operation (Weir, 2001; Rozwadowski, 2002; Mills, 2009). But to date few of the authors have discussed the NATO sub-committee in sufficient detail. Jacob Hamblin is a notable exception. He claims that sub-committee's creation epitomized the disillusion of Western oceanographers with previous attempts at scientific collaboration (especially in the context of the International Geophysical Year, IGY, 1957–1958), and provided a collaborative context congenial to existing political alliances (Hamblin, 2005, p. xxi and pp. 231–236). Hamblin is correct in highlighting the tensions within the scientific community, but this paper shows that NATO's naval authorities exercised an equally significant influence.

The article is divided into three parts showing how the relationship between the production of oceanographic knowledge and the pursuit of surveillance of Soviet submarines evolved over time.[4] It starts by discussing how the SC administrators decided to prioritize oceanography and establish a sub-committee devoted to its development in light of secret NATO information on future Anti-Submarine Warfare (ASW from now on) strategies. Then it highlights how, from 1960 to 1965, the sub-committee's research activities accommodated the surveillance needs that these strategies entailed. The paper's final section focuses on how changes in NATO defence and defence research removed these urgencies. In particular, the re-organization of naval coordination within the alliance that took place from the mid-1960s resulted in an increase in the funding of military oceanography, thus undoing the ties between the sub-committee and its naval sponsors. This new funding regime forced the sub-committee to look for a new research focus. Meanwhile, the alliance's science administrators instigated new studies on environmental and global problems (following the rise of Richard Nixon's 'environmental diplomacy'). As the sub-committee had now to operate in a more competitive funding environment, these transitions anticipated its dissolution. Thus while looking primarily at the shaping of Cold War oceanography in connection with surveillance requirements; this paper also charts the transition from these needs to environmental analysis—at least within the NATO framework.

1. A Cosmic Top Secret

Why did the NATO Science Committee place oceanography as a priority item in its sponsorship agenda? We know now that in 1958 a representative of NATO's naval

commands informed its members about top secret strategies typifying the detection of enemy submarines. These revelations were relayed in order to stir the committee into action by promoting oceanographic work that could support the improvement of naval surveillance operations.

This initiative was taken in a period when NATO navies lacked coordination and did not routinely exchange oceanographic information; a circumstance that concerned its naval commanders. Following the signing of the North Atlantic Treaty, on 4 April 1949, NATO's member states agreed on the definition of a joint naval command structure through the creation of the Supreme Allied Commanders for Europe (SACEUR) and Atlantic (SACLANT). A newly-established NATO Naval Steering Group ensured co-ordination between these organizations and national commands. These arrangements, however, did not immediately remove differences between the allies. Some of the NATO's navies had fought against each other during WWII. This mapped onto a broader disagreement between US and British administrations on naval coordination as the British government did not want the SACLANT to be a US Navy officer (Maloney, 1995, pp. 86–137). Other allies maintained dissimilar and problematic views. France developed an independent nuclear deterrent. The Icelandic parliament disputed whether the alliance should have a naval base on the island. Norway and Denmark did not allow nuclear weapons on their soil.

These divisions ruled out all-encompassing forms of naval coordination, including the sharing of oceanographic data of military importance, which only occurred between trusted allies. In 1957 the French Navy and the British Admiralty established an Anglo-French Naval Mutual Collaboration Project.[5] In 1960 the US Navy agreed to share security-classified forecasting data for ASW purposes with Canadian and UK navies. From 1962 the USA, Britain and Norway collaborated on underwater research (Wright, 1999, p. 155).

But the information that Western intelligence agencies collected about the growth of Soviet oceanography suggested that these ad hoc alliances were inadequate. The lack of multilateral co-ordination was problematic. In 1952 US Navy reports revealed that the Soviets were about to develop a submarine-based nuclear deterrent. Their participation in the IGY, 1957–1958 confirmed that the Soviets had launched a major effort to chart the oceans, which heightened the Westerners' anxiety about the implications of this work, especially for submarine warfare. In 1959, the Directorate of Scientific Intelligence (British Ministry of Defence) published the confidential *Oceanography and Defence in the USSR, 1956–1958* revealing that Soviet oceanographers had initiated surveys in the Atlantic corridor and looked into its characteristics through systems of radio-controlled buoys. Although the intelligence officers downplayed the significance of what the Soviets had published ('little more than a repetition of what has been done in the West'), they also suggested that critical data were withheld from publication for operational reasons.[6] The SACLANT thus took responsibility for finding ways to co-ordinate oceanographic

research within the alliance in light of these security concerns and notwithstanding the resistance of some NATO allies to data sharing.

By the time the British intelligence report was published, the North Atlantic Council had already approved the establishment of a Science Committee. The 1956 *Three Wise Men* document that informed its creation had outlined how the advancement of science in allied countries could function as a means to enhance economic, political and social integration.[7] A 1957 US report titled 'Trained Manpower for Freedom' had also highlighted that Western Europe lacked programmes for the training of scientific personnel. The SC thus aimed to promote cultural integration and scientific training through a sponsorship programme that provided fellowships to individual researchers and support grants to research institutions. Its chairman acted as Science Adviser to the NATO Secretary General and its members represented either allied governments or military coordinating bodies, including the SACLANT (Krige, 2006, pp. 202–203).

While the SACLANT delegates viewed the SC mission in light of their current need to improve oceanographic co-ordination, the members of the new committee were divided the funding of research tied into defence problems. True as it is that defence research featured in the SC terms of reference, the committee experienced difficulties in taking forward a specific plan of action due to the objection of national representatives (Solly Zuckerman of Britain especially) worried about multilateral sharing of restricted data. Moreover, NATO science administrators had yet to make a decision about whether SC members could be granted the necessary security clearances. And finally a NATO group, the Defence Research Directors (DRD), already coordinated actions in this area. That said some national representatives in the committee, especially André Louis Danjon of France and Isidor I. Rabi of the USA, wanted to attune non-classified research to defence problems. In February 1958 a French proposal highlighted specific research areas, including oceanography, in need of support (Krige, 2000, pp. 98–99).

The following spring the debate on the SC research priorities came alive and US military authorities stated more openly their positions through the Standing Group (a sub-committee of the NATO Military Committee) and SACLANT delegates. They now advocated the promotion of fundamental research of use to defence problems, thus echoing the French and US delegates' viewpoint. During the first SC meeting of March 1958 the Standing Group representative, US Army General Theodore Parker, argued that notwithstanding the *Three Wise Men*'s recommendations SC activities 'should be additional to, and not at the expense of, the military effort.' The basis of the Alliance was 'the need for collective defence' and the military was 'the leading customers for the end product of scientific R&D.'[8] Parker thus wished that military problems found some space in the planning of NATO basic science.

During the second SC meeting (July 1958), the SACLANT representative produced a statement exemplifying Parker's viewpoint. US Navy Captain Kenneth M. Gentry (Deputy R&D Director for the US Chief of Naval Operations) informed SC members about NATO's strategy for tracking submarines thus revealing that oceanography was

decisive to the future of NATO naval operations. As Gentry's account was summarized in a *cosmic top secret* document (i.e. secrecy ruling extending to all member states), it appears that difficulties with security clearances could be overcome; especially in light of a 'vital and important' subject for which the SC members' 'full consideration' was requested.[9]

In case of war, Gentry explained, the bulk of the Soviet submarine fleet in the Arctic, Baltic and Black Seas would head towards the Atlantic. NATO naval forces should block the submarines before they reached the ocean in order to limit their range of operation. SACLANT would use a tactic known as 'destruction at source' (eliminate the threat in their ports of exit: Leningrad, Murmansk and Sevastopol - with nuclear weapons if necessary), but these vessels were unlikely to be found at their bases. Western navies ought, therefore, to improve their 'detection and kill capability' in sea areas providing access to Atlantic waters.[10] Gentry revealed that SACLANT aimed to improve surveillance of enemy submarines in key passages such as choke-points and narrow waterways (on this strategy see also: Harriett Critchley, 1984, p. 836). The allied commander wished to develop a system of monitoring vessels and stations along detection lines cutting across seven passages leading to the Atlantic: the transit between Greenland and Iceland, the Norwegian coast and the Faroe-Shetland Channel (from the Arctic), the Skagerrak strait (from the Baltic), Gibraltar, the strait of Sicily and the Turkish straits (from the Black Sea). Gentry concluded on the need for a surveillance system that turned 'detection into a kill' (see Figure 1).[11] Monitoring, however, depended on a better understanding of environmental factors such as sea currents, temperature layering and salinity. Thus, implementing the new SACLANT strategy required collecting environmental data and knowledge.

Alerting a group of scientific experts dealing primarily with the promotion of science and technology to these strategic issues betrayed Gentry's wish to direct their action towards scientific problems of importance to new ASW measures. While the SC continued to debate, oceanography became a priority item for the NATO Science Adviser. After the second SC meeting Norman Ramsey drafted plans for a hazily defined 'NATO oceanographic expedition' and arranged a meeting of ad hoc experts for this purpose. The group met in Paris in February 1959.[12]

2. *Only a Few Aboard*

Ramsay carefully chose the invitees for the Paris meeting. He rushed to find oceanographers who could conceive a plan of action consistent with Gentry's statement and the experts either had important sponsors in the Office of Naval Research (ONR), or ties with oceanographers that its administrators held in esteem. The ONR, the largest naval research agency in the USA, provided technical advice to Gentry's organization (the Chief of Naval Operations) and routinely funded both restricted research and

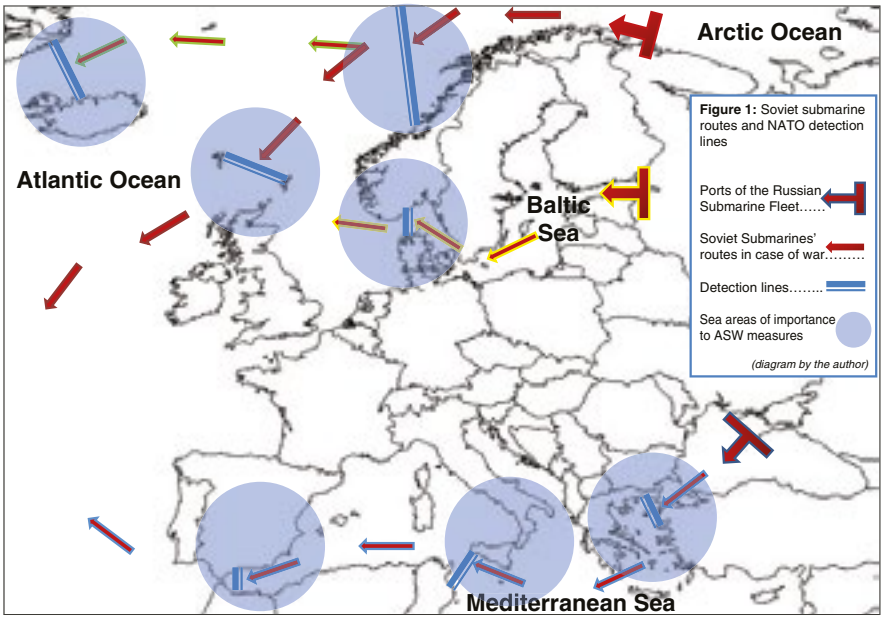

Fig. 1. Ports of the Russian submarine fleet. . . . . and 'choke-points', i.e. points of access to Atlantic (and Mediterranean) waters .

basic science in university laboratories. By then the organization was about to launch the largest national oceanography programme to date (Ten Years in Oceanography - TENOC) following the US administration's decision to prioritize a nuclear strategy based on the submarine-launched nuclear missile POLARIS. By inviting ad hoc experts to join the planning process, Ramsey offered no ammunition to those SC representatives that might have resisted prioritizing oceanographic work with ties to naval surveillance operations. Yet the experts' connections with the ONR suggest that Ramsey wished as much as Gentry to prioritize exactly these kinds of activities.

In the second half of 1958 the NATO Science Adviser alerted the Danish marine zoologist Anton Bruun about the forthcoming ad hoc meeting of experts. A leader of the post-IGY Scientific Committee on Oceanographic Research (that included marine scientists from Eastern and Western blocs), the Dane was better placed than Ramsey to consider the best experts for such a prominent cohort. But rather than letting Bruun take decisions about potential invitees, Ramsey gave him a list of oceanographers to be contacted.

At the top of that list was Columbus Iselin, director of the Woods Hole Oceanographic Institute (WHOI, Massachusetts, US). Iselin had pioneered the study of the Gulf Stream thus prompting research on oceanic circulation in the Atlantic. He was also influential in

ONR sponsorship schemes to the point that the whole system 'at times seemed almost incestuous' due to the conspicuous funding of WHOI's programmes through ONR grants (Weir, 2001, p. 273). Ramsey openly stated the importance of having 'on board' an oceanographer endorsed by the ONR. If Iselin was unavailable, he wrote to Bruun, the American delegate ought to be a 'US oceanographer sent by Admiral Rawson Bennett' (the ONR Chief of Naval Research).[13]

The list included Iselin's closest collaborator in Europe: the British George Raven Deacon, director of the UK's National Institute of Oceanography (NIO, Wormley). Despite the contrasts between US and British naval commands, in 1957 Deacon and Iselin's institutes had initiated joint surveys with their research vessels *Chain* and *Discovery*. Not only had Iselin and Deacon pioneered the study of oceanic currents, but they had both been active in WWII anti-submarine work when the latter headed British Admiralty's Group W (Waves). Iselin investigated the effects of currents on sound transmission; also examining how submarines could find cover in currents by exploiting their different temperatures and become undetectable to sonar (Charnock, 1985; Hamblin, 2002, pp. 4–5; Mills, 2009, p. 225; Crease, 2010, pp. 118–119).

Iselin and Deacon's career trajectories show a much deeper synergy. They represented a tradition in marine science often referred to as 'dynamical oceanography.' Stemming from Vilhelm Bjerknes' work at the Geophysical Institute of Bergen (Norway), it informed oceanographic and meteorological studies forging a new generation of scholars (Friedman, 1993). Bjerknes' associates, Carl-Gustav Rossby and Harald Sverdrup especially, exercised influence in the American scientific community also contributing to ONR-funded underwater research (Mukerji, 1989, pp. 43–44). The third expert invited to the meeting, the Norwegian Håkon Mosby, was a prominent member of the same school. A veteran of oceanographic expeditions, the Bergen-based Mosby had, like Deacon and the other invitees, specialized in the study of currents and sea temperature layering (Mills, 2005, pp. 246–264; Roberts, 2010, p. 175 and 265).

The ad hoc experts had thus a history of collaboration, an understanding of their field's trajectories and important ties with the US naval research establishment. The list prepared by Ramsey also included Henri Lacombe of the Paris-based Laboratory of Oceanography. The ONR liaison officer in London, Robert Dietz, had indicated him as the 'rising star' in French marine science (Hamblin, 2005, p. 65).

During the meeting of 25–26 February 1959 at NATO headquarters in Paris, the invited experts proffered what the SC delegates wanted to hear. Aware of the differences and variety of interests represented within the alliance, they did not exclusively emphasize the military implications of oceanographic research. They stressed instead that co-operation between European nations increased the effectiveness of Western oceanography. They paid lip service to the SC members by envisaging a variety of 'important problems,' and not just ASW, to which oceanography offered solutions. These included: 'fishing, meteorology, submarine operation, ocean transportation, effects of radioactive fallout and waste, anti-submarine warfare.' Yet we have seen that only the last one was introduced

in a top secret SACLANT briefing, while none of the others were discussed in the same detail. The oceanographers' conclusions recommended the establishment of a research committee, rather than just the setting up of an expedition, effectively calling for some degree of autonomy in funding management and decision-making.[14]

These experts, however, openly stated the defence implications of oceanography in the presence of NATO naval commanders. In June 1959 the SACLANT established an ASW research centre, SACLANTCEN (now Undersea Research Centre), at the naval base of La Spezia, Italy. Directed by American nuclear physicist Eugene Booth, the centre became a focus of research on propagation of sound underwater and innovative acoustic detection methods (Wright, 1999, p. 155. See also Allan, 2008; Ranelli, 2008). A few months before the first meeting of the SACLANTCEN advisory council, Iselin urged Deacon to attend it. On that occasion the British expert highlighted the implications of oceanography for sonar detection and tracking of enemy vessels.[15] After the meeting Deacon received a draft report from the NATO deputy science adviser in which the defence aspects of oceanography were openly laid out. Oceanographers ought to understand the physics and layering of oceans in the same way in which radar and radio physicists had looked into that of the ionosphere to improve accuracy in telecommunications and tracking of enemy aircrafts.[16]

In July 1959 the North Atlantic Council approved the ad hoc experts' recommendations. The SC now agreed that a sub-committee should be established, and indicated that the ad hoc experts be nominated ORC members. Meanwhile, the Defence Research Directors (DRD) endorsed Ramsey's proposal that oceanography should be singled out as a research area with implications for defence problems and suitable for international co-operation.[17] The decision effectively sanctioned that some fundamental research (also including operational research, meteorology and defence psychology) would be funded because it allowed a concerted effort on research items of military significance. The DRD recommendations also made it possible for the SACLANT to request the ORC members' scientific advice when needed.

These decisions allowed Rabi to be a little more open in the SC context about the implications of oceanographic work. In a statement at the SC meeting of September 1960 he argued that the ORC programme should be given 'very high priority' and advocated 'the closest liaison' between the ORC and SACLANTCEN at least in an effort to avoid duplicating work.[18] By then the NATO Science Adviser had succeeded in casting the ORC programme within the SC mission by calling in ad hoc experts during the planning process and letting them explain the variety of benefits to be derived from launching a NATO oceanographic programme. Yet the analysis of these experts' background and previous collaborations indicates that priority in this programme would be given to ASW-related problems and that such a research focus would also instigate collaboration with SACLANTCEN beyond the task of making sure that the same work was not replicated. Not surprisingly, it was exactly these kinds of activities that were given precedence, as we shall now see.

3. Surveys, Buoys and Hindcasting

In the 5 years that followed its establishment, the ORC recommended the funding of projects focussing on three endeavours: the accomplishment of surveys; the design and production of novel oceanographic equipment; the completion of investigations on hindcasting (the forecasting of sea phenomena through computational methods). These projects marked the expansion of physical oceanography in Europe and ensured furtherance of research previously carried out by the ORC members in other national or collaborative frameworks. The comparative analysis of this research programme and Gentry's document also reveals that NATO oceanographers re-directed their research interests to accommodate the surveillance concerns expounded in the top-secret statement. In particular, the surveys focussed on the sea areas surrounding the detection lines discussed in Gentry's document; novel monitoring equipment installed on buoys assisted both surveying and surveillance operations in some of these key areas, and hindcasting research indicated those sea areas suitable for enemy submarines' concealment tactics.

By 1965, when the ORC completed its first programme summary report, the sub-committee had designed 22 projects, employed 65 scientists in the establishments of participating institutions and published 19 technical reports. Between 1960 and 1964 it received funding of $700k (US dollars) and a further $300k from national organizations.[19] While funding of specific projects ought to be officially ratified by a NATO research grants advisory panel, the ORC projects were earmarked for support before the panel met.[20] In actual fact this sponsorship mechanism allowed the sub-committee's members to suggest innovative projects and receive grants to co-ordinate them. In 1960 US physicist William Nierenberg, who had previously worked on underwater detection problems, became NATO Science Adviser (Oreskes, Conway and Shindell, 2008) thus increasing even further NATO support for physical oceanography. Several new members joined the sub-committee, including the marine zoologist André Capart (Belgium's *Institute Royal des Sciences Naturelles*) and the oceanographer Walter Hansen of the University of Hamburg (Germany).[21]

Oceanographic surveys represented the largest expenditure and provided environmental analysis on detection and kill passages. NATO oceanographers collected data on currents, temperature layering and water exchanges between seas adjacent to these straits (Figure 2).[22] They used the vessels of participating institutions: *Chain*, *Discovery*, Bergen's *Helland-Hansen*, the French *Calypso* (famously utilized by Jacques Cousteau). SACLANTCEN collaborated with the ORC on a number of surveys with its research vessel *Aragonese* (Ross, 1980, pp. 19–22).

Mosby, who chaired the sub-committee up until 1966, had looked into the dynamics of Norwegian Sea currents for several decades and NATO funding helped him to further these studies with two projects on this sea and the Faroe-Shetland Channel (Mosby, 1963).[23] Lacombe coordinated the Gibraltar strait project and similar surveys in the

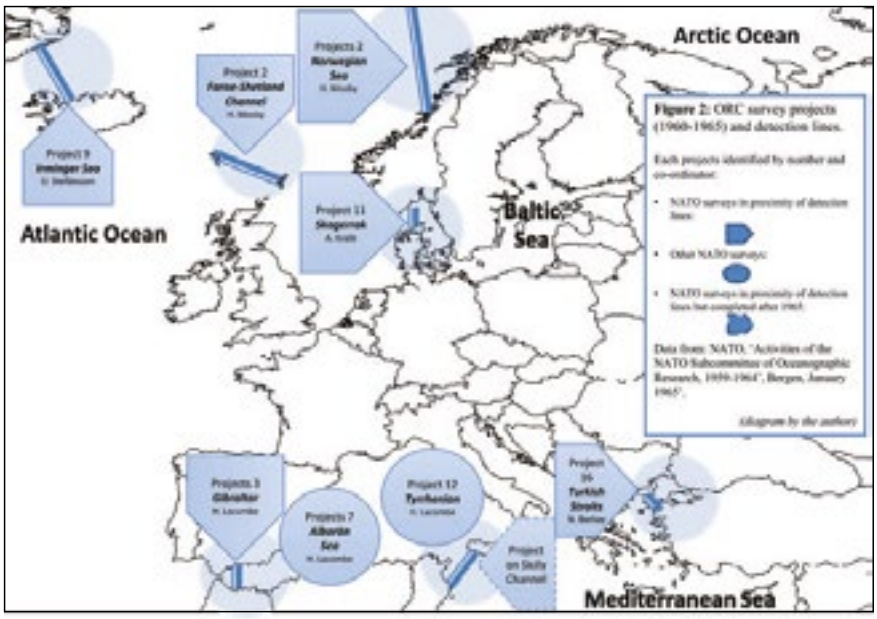

Fig. 2. ORC project for oceanographic surveys. Source: NATO ORC, *Activities of the NATO Subcommittee on Oceanographic Research, 1959–1964*, Technical Report 20, Bergen, 1965.

Alboràn and Tyrrhenian Seas. These two projects stretched surveying activities beyond sea areas envisaged in Gentry's document, but they also complemented SACLANTCEN work on sound propagation (Ross, 1980, pp. 12–19). All the other surveys carried out in this period hit on the detection lines envisaged by Gentry. And when an ORC member suggested the exploration of sea areas of less strategic importance, the proposal was not implemented. For instance, the Icelandic oceanographer Unnsteinn Stefánsson wished to explore the passage between Scotland and Iceland because of its significance to fishery studies. But his proposal strangely disappeared from the minutes (something he complained about with Deacon).[24] Stefánsson eventually became co-ordinator for the Irminger Sea survey (the strategically vital Iceland/Greenland passage). In the case of the Turkish straits survey, not only did it hit on one of these critical 'choke-points,' but it complemented special gravity and magnetic surveys jointly carried out by the ONR and the Turkish Navy's Hydrography department. Turkish oceanographers trained in the USA used the same vessel for the ORC project and this collaborative framework (Figure 3).[25] Gentry's document mentioned only one passage that the sub-committee did not explore before 1965: the channel of Sicily. A survey of this passage was completed 2 years later.

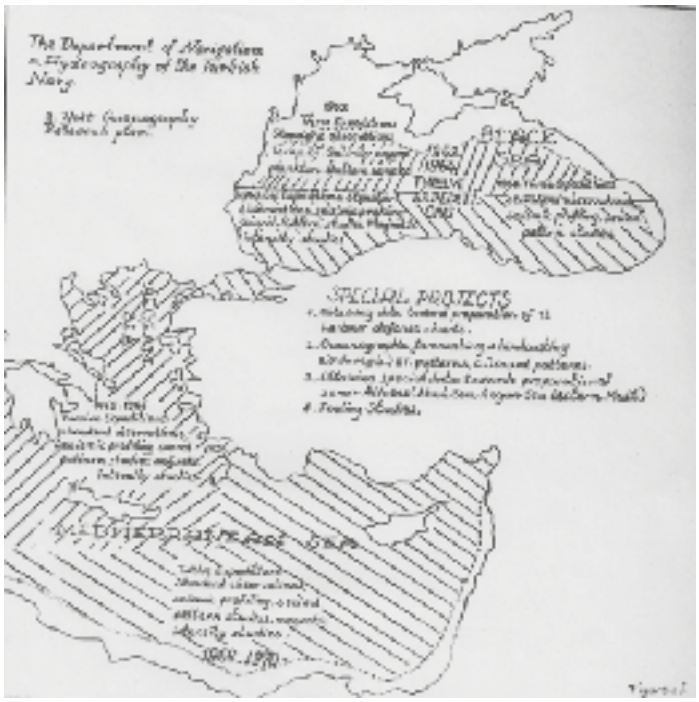

Fig. 3. Plan for 'special projects' designed by the Turkish Navy's Department of Navigation and Hydrography in collaboration with the US Navy. Source: Essentials of the Project Supported by the NATO Research Grant. Turkey, 12 July 1962, Box 87, Deacon Archive (Reproduced courtesy of the National Oceanographic Library, National Oceanography Centre, Southampton, UK).

Furtherance of basic oceanographic science assisted ASW measures also through the design of state-of-the-art oceanographic instrumentation and the provision of systems of measurements and automatic recording of environmental data. One ORC project aimed at laying out a system of moored buoys in the Faroe-Shetland Channel. Odd Dahl (*Christian Michelsen Institutt*, Bergen) co-ordinated the project together with Mosby. Dahl recruited the Norwegian Ivar Anderaa to design an instrument for measurement and data collection that was completed in 1964 and trialled during ORC surveys. The instrument had sensors to calculate speed and direction of currents, temperature and salinity. A fixed buoy structure tied to the seabed assembled several of these devices at different depths (Dahl, 1969). The buoy project was funded at a cost of $50 k per year.[26] It also stimulated interaction with the private sector as, thanks to the collaboration between Bergen's and Wormley's institutes, the ORC secured a deal with the British firm Plessey for the production of a commercial device: the Anderaa RCM4 (Crease, 2010, p. 125; Gould, 2010, p. 131).

The moored structures containing these sensing devices had value as scientific installations, but they also addressed the urgency stressed in Gentry's document to ensure the collection of intelligence on the transit of ships (and submarines) across passages. Buoy installations offered ideal cover for surveillance operations. In 1959 British intelligence had exposed the existence of a Soviet buoy array also utilizing automatic recording of oceanographic data. From 1961 the US Navy had made operational its Sound Surveillance System (SOSUS), an array of hydrophones covering the underwater areas surrounding the USA. Such a system, however, ensured no coverage beyond the Eastern Atlantic, thus compelling the US and its European allies to provide coverage for the sea areas closer to the continent. In the same year the British Admiralty representative at the NATO Naval Steering Group, informed colleagues that his organisation was busy designing a new type of buoy for the identification of submarines also calling for international co-operation in this research.[27] This is exactly when the ORC began trial installations with the Anderaa device in the Faroe-Shetland channel; the main exit passage for the Soviet fleet in case of conflict. The function of these buoys was the collection of environmental data, but they were equipped with additional sensing devices such as radar and sonar and radio-equipment for the transmission of recorded environmental and 'non-environmental' information. The Soviet Union responded to these NATO efforts by installing a similar buoy system of surveillance along the sea passages stretching from Greenland to the UK (the so-called Greenland-Iceland-UK/GIUK Gap). These installations became the subject of CIA studies as its purpose was precisely to monitor the movement of nuclear submarines.[28] Soviet trawlers were also busy sabotaging or stealing Western allies' buoys, something that instigated collaboration between the NIO and the British Ministry of Defence (Hamblin, 2005, pp. 187–188). Thus, while gathering data on environmental factors, NATO buoy installations offered important information on the movement of ships in general and underwater vessels more specifically.

Surveys and buoys, however, made the ORC no more than an instigator of prosaic data collection, whereas its ultimate goal consisted of using the records in the design of environmental prediction methods. Gentry's document had revealed that Soviet submarines could find cover in North Sea fjords and tidal movements made these coves suitable or unsuitable locations for the hiding vessel. Thus the ORC promoted innovative research focussing on swells and storm surges and, unsurprisingly, the North Sea was targeted as the key sea area for hindcasting studies.

Since WWII the military advantages to be derived from a more accurate prediction of weather events had become apparent. British and Norwegian meteorologists provided accurate prediction of meteorological conditions and tidal movements on occasion of the allied troops' landing in Normandy (Fleming, 2004). From 1946 US-Hungarian mathematician John Von Neumann pioneered, through the 'Meteorology Project,' the application of numerical and computational methods to weather prediction using the mainframe computer ENIAC (Harper, 2008, pp. 104–198). Hindcasting research complemented these studies and offered similar returns in knowledge to organizations responsible for

planning naval operations. The ORC hindcasting project, directed by Hansen, consisted of designing numerical methods to predict North Sea surges. From 1964 statisticians Hans Erik Jensen and Steen Weywadt of the Institute of Mathematical Statistics and Operational Research at the Technical University of Denmark designed a computer model for their forecast (Jensen and Weywadt, 1966). By then two European institutions, the Tidal Institute (University of Liverpool) and *Institut für Meerskunde* (University of Hamburg) had pioneered numerical prediction methods through the study of residuals (difference between predicted and observed sea levels) and hydrodynamical equations applied to set parameters (Carlsson-Hyslop, 2010, pp. 287–300). While there is no reason to suggest that this type of research was tied exclusively to naval defence goals, it is worth considering that the US Navy ASW prediction system only covered the Atlantic and Arctic oceans. There was nothing offering a similar level of information and accuracy for the North Sea. Moreover, during one of the NATO Naval Steering Group meetings and in the presence of naval officers, Lacombe had provided evidence of the importance of supporting hindcasting work in light of its decisiveness in submarine detection.[29]

As the ORC programme was re-directed so as to provide data and analyses badly needed by NATO's naval commands, ORC members neglected the funding of projects which had less relevance to naval operations. Unsurprisingly marine biology was under-represented in the ORC framework: one project co-ordinated by the Italian marine zoologist Umberto D'Ancona (Hydrobiological Station, University of Padua), focussed on fish productivity in the Mediterranean.[30] Moreover, the sub-committee never paid sufficient attention to the provision of fellowships for training, in contrast with what represented the SC's key mission. ORC project number one (Research Associates) aimed to offer scholarships to young trainees, but the oceanographers used the allocation almost exclusively to employ qualified personnel for the ORC surveys.

This is because the oceanographic sub-committee paid attention to the production of fundamental knowledge useful to NATO naval commands rather than the training of scientific manpower. From 1960 the NATO oceanographers participated in the Naval Steering Group's meetings where they considered the strategic implications of their work together with naval officers, also planning future activities. Lacombe reiterated that closer scientific co-ordination in marine science had value for the allies' navies as it represented a concerted attack on oceanographic phenomena.[31] His words echoed those of the US Navy representative, who argued that such an effort was decisive to the allied navies' mission due to the 'circular pattern' that typified the dissemination of oceanographic information:

> . . .military operations require certain data which are acquired in surveys. These data are interpreted and analysed, then disseminated back to military operations, ships, instruments, facilities and personnel [which, sic] are required to analyse and disseminate the data. A feed in is also given to designing ships, equipment and weapons systems. Of course basic research feeds into everything by improving our basic knowledge.[32]

In 1961, the NATO committee on long-range planning chaired by Theodore Von Karman noted repeatedly that 'improved understanding of oceanographic phenomena depends on the advance of fundamental research which must be supported by the military [. . .] The development of oceanography must be accelerated if we are to meet future military requirements' (cit. in Ross, 1980, p. 19). And 3 years later even the otherwise chary British Admiralty officials pledged to pay 'considerable attention' to ORC work that was used to develop synoptic oceanographic forecasting and to ascertain detection ranges.[33] So, at least up until 1965 the production of basic oceanographic knowledge through the ORC activities served a specific function within the NATO naval command structure as this knowledge was distributed amongst specialists in naval organizations and used at their end for operational purposes.

But by the mid-1960s this framework of activities changed considerably, as NATO defence research underwent an important reorganization. While ORC work on the key sea areas envisaged in Gentry's document reached completion, this restructuring placed the production of fundamental oceanographic knowledge that tied into surveillance requirements under a separate sponsorship system now encompassing solely defence research groups. Lacombe was correct in advocating a concerted effort, but he did not know that the ORC would no longer be among the organizations called upon to carry it out.

4. *Clouds on the Horizon*

From 1965 NATO defence planners advocated a major restructuring of naval strategies so as to allow oceanographic information to be disseminated more regularly amongst NATO and national naval commands. These transitions strengthened the ties between national defence research groups undoing those between SACLANT and the ORC. In turn the SC delegates reconsidered the independence and financial autonomy that was originally granted to the ORC due to the importance of its mission to the success of naval operations. The sub-committee's activities now attracted growing criticism.

Following the Cuban Missile Crisis, NATO military planners reviewed defence plans to accommodate a new strategy of 'flexible response.' The Superpowers' confrontation on the deployment of nuclear missiles in the Caribbean island had shown how problematic the strategy of massive retaliation was, thus envisaging the need of a more versatile and diversified response to avoid 'mutually assured destruction.' Flexible response, according to a NATO Military Committee report, 'made it imperative' that military oceanographic information was made available to NATO commands at the onset of an emergency because naval forces needed it to track down and identify enemy vessels before they launched the weapons they carried.[34] Moreover, the creation of a SACLANT-controlled nuclear submarine fleet made it necessary to reconsider security

criteria in the distribution of oceanographic data. The Naval Steering Group thus revised the alliance's dissemination policy and the SACLANT now took responsibility for ASW data of utility to NATO. The allied commander also set up data centres in Northwood (UK) and Malta and, from 1965, appointed a NATO military oceanographic agency (MILOC) to explore more closely the determination of sonar ranges in light of the sea current patterns that the ORC investigated. MILOC would also execute magnetic and gravity surveys.[35] Given that by 1965 most ORC surveys were about to be completed and the new data dissemination structure offered a wealth of information to NATO naval forces, the need for the ORC to focus on research items of interest to naval commands was greatly reduced.

The restructuring process affected the interaction between NATO civilian and defence research too. In 1967 the DRD became the only permanent committee advising the alliance's military organizations.[36] A DRD Exploratory Group had by then concluded that the NATO Science Adviser's action had not stimulated military-related science sufficiently, and thus the SC should no longer prioritize international cooperation in defence-related areas (Krige, 2006, pp. 206–207).[37] It is unclear if the criticism extended to the oceanography sub-committee's activities given that the Naval Steering Group had actually praised its work. Yet responding to a Science Adviser's request for clarification on how military groups would seek advice from the alliance's scientists in the future, the SACLANT now indicated that it no longer needed ORC's assistance. The sub-committee may be consulted, but more sporadically than before.[38]

These transitions presented the SC members with an opportunity to re-consider the sub-committee's financial autonomy and research agenda. In June 1963 the Canadian representative urged his colleagues to re-examine the ORC position opposing the idea that 'any single project [. . .] should be continued indefinitely.'[39] The following December he stressed that NATO defence organizations, rather than the SC, ought to support oceanography 'projects of specific military significance.'[40] The Canadian's criticism drew on an on-going polemic. Fostering oceanographic research under the aegis of a strongly defined political entity like NATO affected the efforts of non-NATO oceanographers to bring the Soviets into other international cooperative schemes. The British marine biologist Arthur J. Lee, of the International Council for the Exploration of the Sea, had voiced these concerned and clashed with Deacon on several occasions, also criticizing the ways in which the sub-committee disseminated his findings (Rozwadowski, 2002, pp. 206–207; Hamblin, 2005, pp. 232–235).[41]

From 1965 the polemic stirred by the Canadian representative extended to other items in the sub-committee programme, especially because NATO oceanographers appeared to be unrestrained in the use of funding. The ORC budget had by then risen well over its yearly allocation of $200k per year. The Research Associates project continued to grant no fellowships for training, but its cost rose from $25k (1964), to 30k (1965), to 47k (1966). This and other ORC projects were now frowned upon. In 1967 SC representatives from Norway and France argued that the hindcasting project taxed too heavily on the

science budget.[42] In the same year the chairman of the NATO research grant advisory panel complained that oceanography represented an 'inertial mass' taking 25–30% of the resources available for new fellowships. French and German representatives thus suggested reducing the sub-committee's financial independence by putting its budget under SC control.[43] As old ORC projects reached completion, new ones could not be so easily approved because the SC now wished to use funds sparingly. In 1969 only 14 out of 28 grant requests were recommended for support. In 1970 the SC obliged the ORC 'to work within a maximum ceiling to its total budget.' Its secretariat was disbanded.[44]

Meanwhile the SC members debated if NATO should give precedence to military or civilian science. During the meeting of February 1965 Rabi clashed with the UK representative, Alan Cottrell, over the sub-committee's future as the latter asserted that the alliance should now prioritize collaboration between military research groups rather than synergies between civilian and defence science. British diplomats at the NATO headquarters commented that cuts in the SC budget represented 'a good opportunity to do a little streamlining,' and that only 'Military Science' should be supported.[45] The altercation reflected changes in the SC's financial structure. Until then its funding had predominantly come from the US administration and in 1965 the introduction of the 'burden-sharing' formula (based on Gross National Products; see Krige, 2000, p. 96) increased the contribution due by America's allies. Thus, if until then Britain's representatives at NATO had complied with the US wish to fund fundamental research; they now uttered their opposition because further investments entailed a more generous UK contribution.

Some US-allies now claimed that SC needed streamlining and that the ORC represented a load on it, which meant that the sub-committee was now believed to be a financial burden 'squared.' The oceanographers needed a new plan of action if their organization was to retain a role in NATO despite its recent shake-up. But NATO oceanographers divided over the sub-committee's future. Deacon couldn't avoid considering his government's call for financial restraint and Iselin was by then struggling with ageing and alcoholism (Stommel, 1994, p. 180). Mosby thus took responsibility for a new and ambitious programme and in 1968 set up an ad hoc oceanography group with the hope of finding a new research focus for the sub-committee.

5. A Changing Environment

In the late 1960s the NATO science programme changed considerably in terms of focus and allocations. The alliance began to play a different role in global affairs with the rise of environmentalism and its policy-makers' attempt to build a dialogue between East and West. Meanwhile, the reduced investment in NATO science paved the way for a new policy privileging the allocation of smaller grants for several new research

cohorts. While the ad hoc oceanography group managed to find a new research focus enabling the ORC to set an agenda consistent with this new science policy framework, the new NATO economic regime ruled out support for the large-scale endeavours the oceanographers had in mind. Increased competition for NATO sponsorship and financial constraints thus defined a new situation that made it more difficult for the ORC to retain a role within the alliance.

In 1969 the ad hoc oceanography group met seven times. In 1967 Capart had succeeded Mosby as ORC chairman. But the Norwegian oceanographer, as the co-ordinator of the ad hoc oceanography group, took responsibility, together with Dahl, Lacombe and WHOI's Allyn C. Vine (see Oreskes, 2003), to design the sub-committee's new research agenda.[46] They concluded that the ORC should now focus on air-sea interaction as such analysis could be used to help explain global patterns of weather change. They thus advocated establishing a North Atlantic Platform; a large manned buoy/vessel structure that could collect data through a variety of sensors.[47] By then, similar facilities such as the French Bouèe Laboratory and the ONR buoy/vessel FLIP (FLoating Instrument Platform) already operated in the Mediterranean and the Pacific. Notably, NATO oceanographers evidenced the platform's utility to both environmental analysis and surveillance activities thus tying together old and new ORC priorities. The platform could be used by climatologists and biologists (monitoring of plankton), as well as for traditional ASW buoy operations including '*veille surface*' through radar and '*veille sous-marine*' through sonar.[48]

The platform's cost would however be well above anything requested that far by the NATO oceanographers. When the Science Adviser received the proposal, he manifested some reservations. The Norwegian Gunnar Randers, formerly a science planner in the Norwegian atomic and defence research establishments, shared Mosby's view that the ORC should formulate a more focussed programme of activities.[49] But he worried about the expenditure, especially as there was resistance among the European allies to burden-sharing. In March 1970 Deacon had written to him saying that it was 'too soon to think of putting a lot of money into a large North Atlantic Facility.'[50]

Randers chaired the newly-established NATO Committee on the Challenges of Modern Society (CCMS); a circumstance that made him even more wary about offering support to the oceanographers' ambitious plan. Launched in April 1969 by US President Richard Nixon, the CCMS aimed to tackle environmental and global problems through innovative research. Of course Nixon's environmental diplomacy chimed with his domestic political goals, especially in light of the recent protests on university campuses and the Vietnam conflict (Hamblin, 2010; Turchetti, 2010). But it also marked a clear shift in NATO's patronage strategies. In particular, the CCMS budget originated from voluntary national contributions (in contrast with the SC's cost-sharing mechanism) thus ensuring the promotion of innovative research at no extra-costs for the alliance.

Unwilling to support large-scale endeavours in this new NATO financial framework, Randers appointed a special consultant on oceanography so that the platform project could be divided into segments. The consultant Amos J. Shaler, a metallurgical engineer who had advised SACLANT and MILOC, used network analysis to assess the sub-committee's plans. He viewed favourably the development of buoy-based systems for environmental studies and their application to a variety of problems including surveillance, marine pollution and seafood supplies. His report outlined the scientific problems that needed to be tackled and the resulting benefits on the micro-, meso- and macro-scales.[51]

NATO oceanographers, however, dismissed its utility. During the sub-committee meeting of 21 October 1970 the Canadian Neil J. Campbell noticed that some of the micro-scale studies were outside the ORC terms of reference. So were meso-scale studies regarding pollution problems; Lacombe argued. Deacon stated that the study did not shape a programme of actions.[52] Shaler's review irritated the oceanographers mainly because it was forced upon them by Randers. Yet the Science Adviser had acted in the knowledge that unless the ORC succeeded in designing a plan of action in agreement with the new NATO sponsorship regime, its mission would be too indistinct to be supported by the alliance in the future.

It was now apparent that the sub-committee was at risk of being shut down. During the meeting of 5 April 1971 a minute of silence commemorating Iselin's death preceeded Randers' outcry. The Science Adviser stated that the ORC's value was 'as apparent as ever,' but its budget would suffer due to competition from other NATO organizations.[53] He thus reiterated the need to follow Shaler's advice and plan its activities. If the oceanographers agreed to these intentions, he was even prepared to reinstate oceanography as a separate item in the science budget. When the oceanographers rejected the proposal, Randers envisaged the opportunity of a merger with the NATO meteorology group, which shared with the ORC an interest in air-sea interaction studies. But in 1972 he put forward a far more drastic plan: the sub-committee would cease its activities at the end of that year.[54]

Randers' draconian measures might have been taken in light of the disagreement with (and between) the oceanographers, but it is also likely that the administration of ORC grants, which had attracted criticism at the NATO headquarters, played a part. Notably, the groups that replaced the sub-committee enjoyed far less independence and financial support. An air-sea interaction panel, chaired by NIO's oceanographer Henry Charnock, had Lacombe amongst its members and aimed to complete work originally designed by the ad hoc oceanography group. Meanwhile the special programme panel on marine science, that included Deacon and Campbell amongst its members, set out to use small budgets to give 'maximum catalytic effect' to innovative research in marine biology.[55]

6. Conclusions

The ORC history shows that the circumstances of its patronage affected both its ascendancy and fall. The ASW requirements offered Western oceanographers a 'context of motivation' (Oreskes, 2003) to prompt fundamental research. The establishment of an organization devoted to marine science addressed the US anxiety deriving from the growth of Soviet oceanography, the surveillance requirements of the alliance's navies and the shortcomings of naval coordination between its member states. The US and its Western European allies were not prepared to share defence data. The prospect of a forum that would produce open and unrestricted knowledge represented a solution to the problem of gathering and sharing oceanographic information. The knowledge produced by the sub-committee could be applied to a variety of problems, but a naval urgency prompted the effort to put it together. In particular the emphasis on the study of choke-points in the Arctic, the Baltic and the Mediterranean derived from the need to support new detection measures for surveillance of Soviet submarines entering Atlantic waters. Thus NATO's 'sword and shield' strategy found implementation at sea through the use of far less iconographic floating devices serving both as tools of surveillance and scientific instruments.

The oceanographers who played a key role in the ORC used the circumstances outlined by the ASW requirements to significantly expand the field in Europe. NATO sponsorship also helped them to further studies on the dynamics of oceanic circulation that existed from much earlier. Moreover, the management of new research increased their reputation in the scientific community, even elevating some of them, like Deacon, to a leading role. In turn this allowed Deacon to challenge the Soviets internationally and clash with British colleagues wishing to instigate collaboration with them, thereby carrying out 'oceanography without an apology' (Hamblin, 2005, p. 172).

It is somewhat ironic, however, that while Deacon so forcefully pursued these goals, the power that helped him to achieve them evaporated. From 1963 the reorganization of defence research at NATO set the conditions for a review of the committee's activities. It is possible to speculate that the ORC work did not satisfy the SACLANT, in which case the naval commander's decision to renounce support for the sub-committee derived from this disappointment. Yet, SACLANT's pronouncement was not the only factor determining this revision. By the mid-1960s the SC no longer wanted to accord the financial and research autonomy that the sub-committee had enjoyed since its establishment. From 1969 the growing influence of environmental diplomacy set the conditions for increased competition in funding allocation. The following year the project for a North Atlantic Platform failed to materialize due to cost concerns. A review of the sub-committee's activities soon followed and then its dissolution.

While this account on the ORC's history resonates with other studies on the history of Cold War science, it sits uneasily with dominant historiographical interpretations, in particular with respect to the circumstances of patronage in a transnational framework

like NATO; the implications of oceanographic research for surveillance operations; and the role of Cold War science in the shaping of environmental analysis.

It is questionable whether this case validates further Forman's 'distortionist hypothesis.' No oceanographer was openly co-opted to develop a specific plan. While the SC members knew about oceanography's role in the shaping of future ASW measures, no explicit request appears to have been made by the representatives of naval commands for specific actions. Moreover, the funding granted to the ORC might well have been 'soft-money' in terms of size of investment, but at least up until 1967 NATO oceanographers administered it independently, enjoying the freedom to carry out the research they wanted to pursue (on soft-money see: Mukerji, 1989, pp. 52–53). It is also true that an 'anti-distortionist' interpretation focussing on the ability of oceanographers to retain their intellectual agenda might equally fail to incorporate this case (see for instance Kevles, 1990). The sub-committee's circumstances after 1965 show that NATO accorded support to the oceanographers' programme for as long as an interaction between civilian and military (naval) research was sought. Its reduced weight in NATO affairs forced the oceanographers to operate in a less profligate funding environment.

On the whole the 'mechanics' of patronage appear in this case to have been somewhat more subtle. The experts were metaphorically given a white canvas on the understanding that their interests would lead them to paint in the way desirable to SACLANT—or at least to grant their independence for as long as they did so. What counted therefore was not their direct input in selecting research items to work on, but in picking up the right people for the tasks ahead; notably all oceanographers with a reputation at the ONR. Presumably informal (and non-documentable) ties between sponsors in NATO naval organizations and scientists might have been decisive in casting these plans.

If this is the case, then these experts appear to have been interpreters of a new research agenda rather than managers of a set plan. This evidences even more their ability to dwell in both the scientific and diplomatic arenas and to gain and retain control over their programme. This is even more relevant in a transnational space like NATO where a variety of vested interests existed and found representation through national delegations, military bodies and civilian agencies. The US administration, through its military (Parker, Gentry) and civilian (Rabi) representatives, continued to urge its allies to strengthen the co-ordination between civilian and military science. French and Norwegian administrations had similar interests. Britain (and partly Canada) had a more ambivalent approach revealing the wish to maximize returns in knowledge while attempting to reduce costs and threats deriving from data dissemination. The NATO oceanographers reflected these various positions. When the committee was first established, these experts were perceptive enough to emphasize the value of oceanography for problems beyond ASW so as to accommodate these different views. And free as they were, their action was ultimately tuned in to that of their governments. Mosby and Lacombe continued to pursue oceanography through

the promotion of large-scale endeavours consistent with the sizable investment that their governments granted to marine science. By contrast, from the mid-1960s Deacon might have realized that the new funding environment did not allow him to carry out oceanographic studies in an 'un-apologetic' fashion. He thus merely reiterated instructions received from London; he was urged to make sure that NATO funding was used parsimoniously.

It is also important to underscore the role of NATO Science Advisers in finding a compromise between these different (and often diverging) interests; at times successfully (Ramsey) but sometimes unproductively (Randers). In particular, their actions aimed to blend different agendas given that the directions of the NATO science programme polarized national delegations. Finding a solution to these contrasts entailed official decisions whose implications, however, could not always be officially stated. Ramsey appointed *experts* to provide indications about the future oceanography programme, yet these were oceanographers skilled in ASW studies or endorsed by the ONR. Randers appointed *a consultant* to review the ONR programme, yet the appointment aimed to justify a cost-cutting exercise.

NATO's science policy was always driven by personality (and idiosyncrasies), but it encapsulated political, strategic and military urgencies. It was consistent with the USA's quest for hegemony in Europe as evidenced by the sharing of cultural ideals and the exportation of a American model of training and research (Krige, 2006). But it also created an opportunity to address important tasks of military coordination and transfer a US national security agenda within the dimension of international scientific collaboration. During the Cold War, environmental knowledge became a key resource for intelligence and surveillance operations. US administrators, however, felt their country was not up to the challenge of gathering of environmental data alone. Following the IGY, the SC establishment offered an invaluable opportunity to put international collaboration to work in a new context.

Oceanography occupied a special place in the USA's attempt to inform collaborative work with a national security agenda due to the oceans' vastness and intimate complexity. Fundamental research delivered a wealth of new data and projects focussing on basic science did not compromise classified research. It may well be that this open knowledge assisted allies and enemies alike, but its real value rested with the possibility of integrating the new data in further synoptic work separately carried out by naval defence research groups. It is also likely that alternative channels of dissemination for the results of this work existed as ORC hydrographic data were made available to World Data Centres, but technical reports were issued in limited numbers and made available on request; a dissemination practice that attracted criticism in the community of oceanographers. In any case, the NATO marine scientists do not appear to have constituted a 'reserve labor force' as their programme was instigated by the need to strengthen international cooperation and not the training of scientific manpower. Their

activities fell in a 'grey area' between civilian and military research; like other ONR-funded projects (Mukerji, 1989, p. 56).

Presumably NATO oceanography was also politics by other means as it helped to address differences between some of its members; the US and France especially. In 1965 Charles De Gaulle famously withdrew the French fleet from NATO command (Bozo, 1998). Although the episode might have represented an obstacle to defence integration, oceanography was accorded a special status and French oceanographers carried on working within the SACLANTCEN and the ORC. The US and French governments effectively sanctioned the existence of a domain of common interests in an otherwise fraught relation in which 'they couldn't agree on anything else' (cit. in Mukerji, 1989, p. 96). It notably resulted, in 1973, in the French American Mid-Ocean Undersea Study (FAMOUS. See Oreskes, 2003).

One final issue that this paper helps to re-consider, especially in light of the present attention to the origins of environmental analysis, is the legacy to Cold War science. Ronald Doel has argued that since the 1960s two distinct 'environmental sciences' existed: one was military-driven and the other biology-centred; one motivated by military-operational needs and the other ecology focussed; one accustomed to military sponsorship and the other critical of its implications (Doel, 2003, p. 653). This paper shows that such a division was decisive in shaping NATO oceanography as demonstrated by the funding imbalance between physical oceanography and marine biology. Yet, it also suggests that physical oceanography left a long-lasting imprint on modern environmental studies. The sub-committee did not survive long enough to carry out air-sea interaction research, but revealed the exchanges between atmosphere and oceans to be one of the earth's key environmental features thus paving the way for modern environmental analyses that emphasized this systemic co-ordination (see for instance Lovelock, 1979). NATO's transition to environmentalism accelerated the sub-committee's fall, but the research groups that replaced it inherited an emphasis on monitoring as a key feature of environmental analysis. Tools such as Anderaa's current meter found widespread application in the study of marine eco-systems, whereas the idea of sea-based monitoring array was applied more broadly to the study of water pollution. Thus if during the Cold War the buoy functioned primarily as an enemy tracking tool; it eventually became a key feature of what we now call—in an interesting merger of old terms and new priorities-'environmental surveillance.'

NOTES

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of the geosciences and intelligence programmes in the organisation of scientific explorations. For more information see: http://teus.unistra.fr/. I am indebted to Anne-Marie Smith and Joannes Geurts for providing assistance at the NATO archive; to Adrian Burkett for assistance at the National Oceanographic Library; to Peder Roberts, Sarah Rayner, Jeff Hughes, Leucha Veneer, Helen Dobson and three anonymous referees for comments on earlier drafts of this paper.

2. US Navy Rear-Admiral J. R. Jaap, 'Collaboration Amongst NATO nations,' Statement made at the Meeting of the NATO Naval Steering Group, 2–3 May 1961, Confidential, AC/141- R/6, NATO.
3. Ibid.
4. The study is based on archival collections from the NATO Archive, Brussels (NATO); the UK National Archive (TNA), London; George Deacon's papers at the National Oceanography Library, Southampton, UK (NOL); Geophysical Institute's papers at the University of Bergen, Bergen, Norway (BER). When NATO documents are copies retrieved from other archives, the provenance appears in brackets.
5. AFCP agreement, 17 May 1957 in 'Anglo-French Collaboration in Military Oceanography,' DEFE 69/104, TNA.
6. Directorate of Scientific Intelligence, *Oceanography and Defence in the USSR, 1956–1958* (London: Ministry of Defence, 1959), copy in DEFE 44/27, TNA.
7. The three wise men were the foreign ministers of Italy (Gaetano Martino); Norway (Halvard Lange) and Canada (Lester Pearson).
8. T. Parker, 'Invited Statement on Matters of Defence Science to the 1st SC meeting of 26–28 March,' Secret, 6 May 1958, AC/137-D/10, NATO.
9. K. M. Gentry, 'Statement of future trends in anti-submarine warfare,' Cosmic Top Secret, 17 July 1958 in AC/137-D20, NATO.
10. Ibid.
11. Ibid.
12. Norman Ramsey, 'The Working Group on preparations for a NATO Deep-Sea Oceanographic Expedition,' 1958, Deacon Papers, Box 87, NOL.
13. Ramsey's note in 'The Working Group on preparations for a NATO Deep-Sea Oceanographic Expedition,' 1958, Deacon Papers, Box 87, NOL.
14. N. Ramsey, 'Recommendations of Ad Hoc Meeting of Experts on Oceanography,' 3 March 1959, AC/137-D/37, NATO. Iselin did not attend this meeting and was replaced by WHOI's Bostwick H. Ketchum.
15. C. Iselin to G. Deacon, 10 April 1959 and G. Deacon, Speech at the ASW meeting, 27 April 1959 in Deacon papers, Box 87, NOL.
16. H. A. Sargeant, NATO Deputy Science Adviser to G. Deacon, 27 April 1959, Deacon Papers, Box 87, NOL.
17. H. West-Burnham, Office of Science Adviser, Proposals on Particular Defence Problems, 27 July 1959, Restricted, AC/137-D/46, NATO.
18. Statement by the US representative at the SC meeting of 10 September 1960, AC/13-R/8, NATO.
19. Although the logistic support through vessels drew heavily on resources, this was quantified only in days. NATO ORC, 'Activities of the NATO Subcommittee of Oceanographic Research, 1959–1964,' Bergen, January 1965, BER.
20. The panel was formed by six scientists appointed by the NATO Division of Scientific Affairs.
21. Bruun died in 1961 following his appointment as chairman of the Intergovernmental Oceanographic Commission. Minutes of ORC Meeting, 3 November 1959, AC/137-D/50, NATO; NATO, 'Activities of the NATO Subcommittee of Oceanographic Research, 1959–1964,' Bergen, January 1965, BER, 2.
22. Their total cost between 1960 and 1963 was in the range of $250k. Meeting of the Advisory Panel on the Research Grants Programme. 20. April 1964, AC/137-D/216 and Report of the 2nd ORC meeting, 23–24 May 1960, AC/137-D/66, NATO.

23. ORC Progress Reports, 27 September 1963, AC/137-D/187, NATO; ORC Extended Progress Report, 18 February 1964, AC/137-D/208. H. Mosby, 'Proposal on Current Measurements in the Faroe-Shetland Channel and in the Straits of Gibraltar,' 31 December 1959, BER, 5.
24. U. Stefánsonn to G. Deacon, 6 October 1959, Deacon Papers, Box 87, NOL.
25. Essentials of the Project Supported by the NATO Research Grant. Turkey, 12 July 1962, Deacon Papers, Box 87, NOL.
26. Meeting of the Advisory Panel on the Research Grants Programme. 20 April 1964, AC/137-D/216, NATO.
27. Meeting of the NATO Naval Steering Group, 2–3 May 1961, Confidential, AC/141- R/6, NATO.
28. CIA, 'Prospects for Soviet Success in Improving Detection of Submarines in Open Ocean,' 11.1.1974 (available at: http://www.foia.cia.gov/docs/DOC_0000681962/DOC_0000681962.pdf). The existence of a Soviet buoy array was also revealed in the British press (Defence Correspondent, 'Submarine Counters,' *The Guardian* 2 February 1965).
29. Meeting of the NATO Naval Steering Group, 2–3 May 1961, Confidential, AC/141- R/6, NATO.
30. ORC Report of Meeting, 9–11 November 1964, AC/137-D/234, NATO. D'Ancona died in 1964 and was replaced by the Dane E. Steeman Nielsen as project coordinator.
31. Meeting of the NATO Naval Steering Group, 2–3 May 1961, Confidential, AC/141- R/6, NATO.
32. Ibid.
33. Research Oceanography, unsigned UK paper presented at AFCP meeting, 21 February 1964, DEFE 69/104, TNA.
34. Policy and General Guidance for the Provision of Military Oceanographic Information Services in NATO, Appendix A, Confidential, 11 December 1970, Military Committee Report, MC 140, NATO.
35. 'Statement of Commander Morgan on Military Oceanography,' Appendix II to ORC meeting of 22–23 September 1967,' AC/137-D/318, NATO (Deacon Box 87, NOL).
36. Recommendations of the Defense Research Directors Reached in Restricted Session, Secret, 29 March 1963, AC/137(DR)D/3, NATO.
37. Report by the Exploratory Group set up to investigate the Provision of Scientific and Technical Advice to the NATO Military Authorities, Confidential, AC/137(DR)D/4, 17 October 1963, NATO.
38. Provision of Scientific Advice to the NATO Military Authorities, NATO Restricted, 16 September 1963, AC/137-D/185, NATO.
39. SC minutes of meeting, 28–29 June 1963, Restricted, AC/137-R/16, NATO.
40. SC minutes of meeting, 9 December 1963, Confidential, AC/137-R/17, NATO.
41. The confrontation typified the meetings of a UK Cabinet Group on Oceanography. Meeting of the Working Group on Oceanography, 22 May 1964, CAB 124/2170, TNA.
42. SC minutes of meeting, 2 February 1967, Restricted, AC/137-R/27 (Deacon papers, Box 88, NOL).
43. ORC report, 7–8 November 1966, AC/137-D/299 and SC minutes of meeting, 29–30 May 1967, AC 137-R/28 (Deacon papers, Box 88, NOL).
44. ORC committee report of meeting, 21–22 October 1970, AC/137(OCR)-WP/4, and SC minutes of meeting, 7 June 1971, AC/137—R/40 (Deacon papers, Box 88, NOL). COBLAMED being the Combined Operation Bouée Laboratoire Mediterranean. N. J. Campbell and E. D. Goldberg, 'History and Achievements of the Sub-Committee on Oceanographic Research and the Special Programme on Marine Science,' NATO Annex to ASG.SEA(77)287, 1–14 (Deacon Papers, Box 89, NOL)
45. Copy of SC minutes and handwritten notes, 11 February 1965, Confidential, in 'NATO Science Committee,' FO 371/189409, TNA.
46. Campbell and Goldberg, 'History and Achievements,' 14.
47. O. Dahl and H. Mosby, Guidelines for a steering group to be responsible for the preparation of a Final Report to the Science Committee, Report 111, undated, BER.

48. H. Mosby, Tentative Plans and Evaluation for a NATO North Atlantic Platform for Air-Sea Interaction Studies, Report 106, 21 July 1969, BER.
49. Gunnar Randers, NATO Assistant Secretary for Scientific Affairs to OCR members, 30 January 1970 in Correspondence and papers , 1970–1971, H8/8, Box 88, George Deacon Papers, NOL.
50. G. Deacon to G. Randers, 2 March 1970 in Deacon Papers, Box 88, NOL. It is worth considering that this is the time when NATO also failed to establish a NATO institute of science and technology. See Krige, 2006, pp. 218–220.
51. A. Shaler, Long-Range Programme in Ocean-Atmosphere Interaction, Document NATO Unclassified 6.5.21(70)080/AJS, 31 August 1970 (Deacon Papers, Box 88, NOL).
52. ORC Minutes of Meeting, 21 October 1970, AC/137-D/425 (Deacon Papers, Box 88, NOL).
53. ORC Minutes of Meeting, 5 April 1971, AC/137-D/441 (Deacon Papers, Box 88, NOL).
54. OCR Meeting of 13 November 1972, in H8/10 OCR Agendas and Minutes of Meetings.
55. Panel on Marine Science Minutes of Meeting, 22 March 1974, AC/137-D/541 in Deacon papers, Box 89, NOL.

REFERENCES

Allan, T. D. (2008) Memories from the sixties, *Oceanography*, 21(2), 21–23.

Barth, K.-H. (2003) The politics of seismology: nuclear testing, arms control, and the transformation of a discipline, *Social Studies of Science*, 33, 743–781.

Bozo, F. (1998) Détente, vs. and Alliance. France, the US and the politics of the Harmel report (1964–1968), *Contemporary European History*, 7, 343–360.

Carlsson-Hyslop, A. (2010) An anatomy of storm surge science at Liverpool Tidal Institute, 1919–1959. Forecasting, practices of calculation and patronage. Unpublished PhD thesis, The University of Manchester.

Charnock, H. (1985) George Edward Raven Deacon, 1906–1984, *Biographical Memoirs of the Fellows of the Royal Society*, 31, 113–142.

Crease, J. (2010) Ocean currents—Entering the modern age, in: A. Laughton, J. Gould, T. Tucker and H. Roe (eds.) *Of seas and ships and scientists* (Cambridge: The Lutterworth Press), pp. 111–127.

Dahl, O. (1969) The capability of the Aanderaa recording and telemetering instrument, *Progress in Oceanography*, 5, 103–106.

Doel, R. E. (1997) Scientists as policymakers, advisors and intelligence agents, in: T. Söderqvist (ed.) *The historiography of contemporary science and technology* (Amsterdam: Harwood), pp. 215–244.

Doel, R. E. (2003) Constituting the postwar earth sciences, *Social Studies of Science*, 33(5), 635–666.

Doel, R. E. (2010) Does scientific intelligence matter, *Centaurus*, 52(4), 311–322.

Fleming, J. R. (2004) Sverre Petterssen, the Bergen School, and the Forecasts for D-Day, *Proceedings of the International Commission on the History of Meteorology*, 1, 75–83.

Forman, P. (1985) Behind quantum electronics: national security as basis for physical research in the US, 1940–1960, *Historical Studies in the Physical Sciences*, 18(1), 149–229.

Friedman, R. M. (1993) *Appropriating the weather. Vilhelm Bjerknes and the construction of modern meteorology* (New York: Cornell University Press).

Gould, J. (2010) Exploring Ocean variability, in: A. Laughton , J. Gould, T. Tucker and H. Roe (eds.) *Of seas and ships and scientists* (Cambridge: The Lutterworth Press), pp. 128–141.

Hamblin, J. D. (2002) The Navy's 'sophisticated' pursuit of science: Undersea warfare, the limits of internationalism and the utility of basic research, 1945–1956, *Isis*, 93, 1–27.

Hamblin, J. D. (2005) *Oceanographers and the cold war. Disciples of marine science* (Seattle: University of Washington Press).

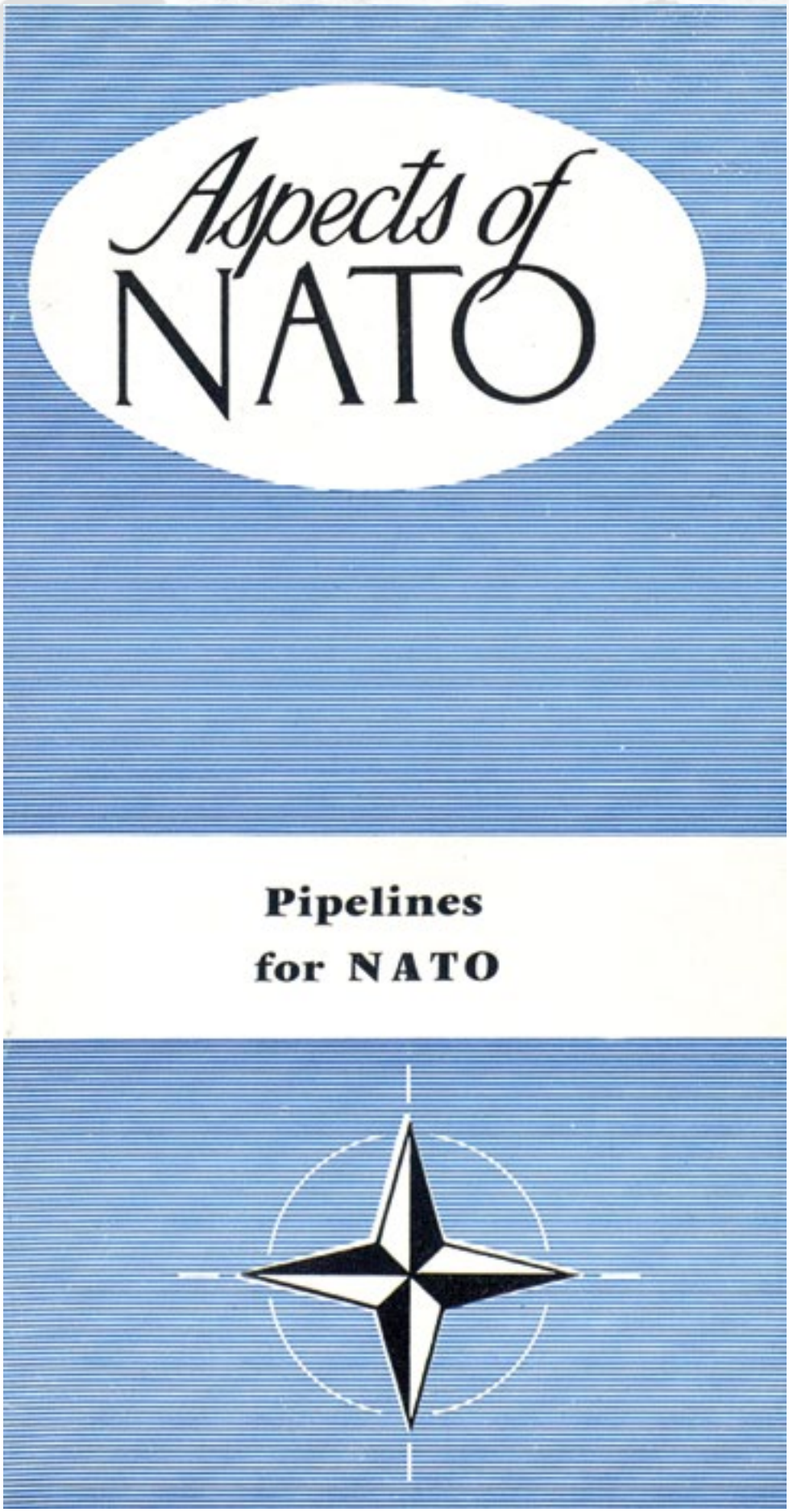
Hamblin, J. D. (2010) Environmentalism for the Atlantic Alliance: NATO's experiment with the 'Challenges of Modern Society', *Environmental History*, 15, 54–75.

Harper, K. (2008) *Weather by the numbers. The genesis of modern meteorology* (Cambridge: MIT Press).

Harriett Critchley, W. (1984) Polar deployment of Soviet submarines, *International Journal*, 39, 828–865.

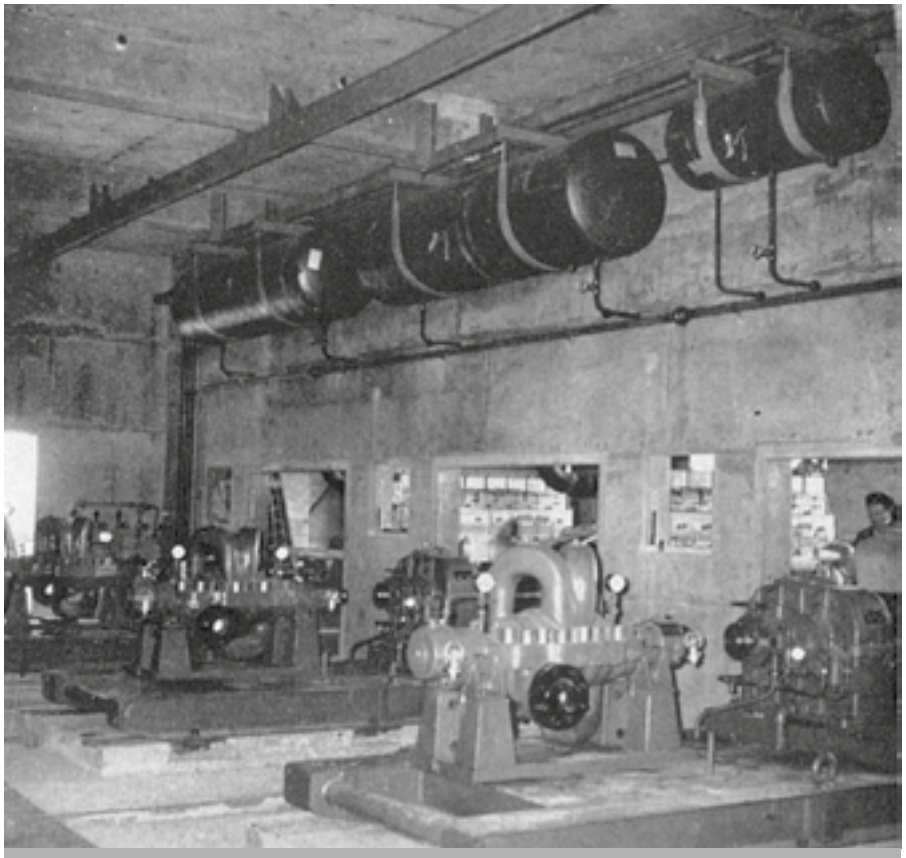
Kevles, D. J. (1990) Cold War and hot physics: science, security, and the American state, 1945–1956, *Historical Studies in the Physical Sciences*, 20(2), 239–264.

Krige, J. (2000) NATO and the strengthening of Western science in the post-sputnik era, *Minerva*, 38, 81–108.
Krige, J. (2006) *American hegemony and the postwar reconstruction of science in Europe* (Cambridge: MIT Press).
Jensen, H. E. and Weywadt, S. (1966) Forecasting of storm surges in the North Sea. *NATO Technical Report 28* (Copenhagen: NATO/Technical University of Denmark).
Laughton, A., Gould, J., Tucker, T. and Roe, H. (eds.) (2010) *Of seas and ships and scientists. The remarkable story of UK's National Institute of Oceanography* (Cambridge: The Lutterworth Press).
Lovelock, J. (1979) *Gaia. A new look at life on Earth* (Oxford: Oxford University Press).
Maloney, S. M. (1995) *Securing command of the sea. NATO naval planning, 1948–1954* (Annapolis: Naval Institute Press).
Mills, E. L. (2005) From *Discovery* to discovery: the hydrology of the Southern Ocean, 1885–1937, *Archives of Natural History*, 32, 246–264.
Mills, E. L. (2009) *The fluid envelope of our planet. How the study of ocean currents became a science* (Toronto: University of Toronto Press).
Mosby, H. (1963) Current measurements in the Faroe-Shetland Channel. *NATO Technical Report No 5* (Bergen: NATO/Geophysical Institute of Bergen).
Mukerji, C. (1989) *Scientists and the state. A fragile power* (Princeton: Princeton University Press).
Oreskes, N. (2003) A context of motivation: US Navy oceanographic research and the discovery of sea-floor hydrothermal vents, *Social Studies of Science*, 33, 697–742.
Oreskes, N., Conway, E., and Shindell, M. (2008) From Chicken Little to Dr. Pangloss: William Nierenberg, global warming, and the social deconstruction of scientific knowledge, *Historical Studies in the Natural Sciences*, 38, 109–152.
Ranelli, P. (2008) A little history of the NATO Undersea Research Centre, *Oceanography*, 21(2), 16–20.
Roberts, P. (2010) A frozen field of dreams. Science, strategy, and the Antarctic in Norway, Sweden and the British Empire, 1912–1952. Unpublished PhD thesis, Stanford University.
Ross, D. (1980) [online] Twenty years of research at the SACLANT ASW Research Centre, SACLANTCEN. *Special Report M-93*, 1 January 1980. Available online at: http://www.nurc.nato.int/publications/pubs/others/M-93_lr.pdf (accessed 3 March 2010).
Rozwadowski, H. (2002) *The sea knows no boundaries. A century of marine science under ICES* (Seattle: ICES/University of Washington Press).
Rozwadowski, H. and Van Keuren, D. (eds.) (2004) *The machine in Neptune's Garden. Historical perspectives on technology and the marine environment* (Sagamore Beach: Science History Publications).
Stommel, H. (1994) Columbus O'Donnell Iselin, *National Academy of Sciences Biographical Memoir*, 64, 165–186.
Turchetti, S. (2010) NATO: cold-warrior or eco-warrior? *Research Europe*, 308, 8.
Van Keuren, D. (2001) Cold war science in black and white: US intelligence gathering and its scientific cover at the naval research laboratory, 1948–1962, *Social Studies of Science*, 31(2), 207–229.
Weir, G. E. (2001) *An ocean in common. American naval officers, scientists, and the ocean environment* (College Station: A&M University Press).
Wright, T. (1999) Aircraft carriers and submarines: naval R&D in Britain in the mid-cold war, in: R. Bud and P. Gummett (eds.) *Cold war, hot science. Applied research in Britain's defence laboratories 1945–1990* (London: Science Museum), pp. 147–183.


Aspects of
NATO
Pipelines
for NATO

Pipelines ready for laying somewhere in Europe

Trench digging



A pumping station near a port

What's in a pipe? Transnational negotiation of a 'strategic' item at NATO (1960-1962)

Abstract

By the late-1950s, the Soviet Union had reacquired a strong position as a world oil exporter, thanks to major discoveries in the Ural-Volga area. The new availability prompted the USSR to greatly increase its exports, especially to West European countries. Such strategy was met with ambivalent reactions by those countries, depending on their power on the world oil scene. In order to transport their oil to strategic areas within the Soviet Union and to Europe, the Soviets devised a project for a colossal pipeline system. Soviet plans caused anxiety at the North Atlantic Treaty Organization (NATO) since Russian oil could be effectively wielded as a weapon to weaken the West militarily and economically. The enormous amount of cheap oil the pipeline system would carry could both damage the interest of Anglo-American and French oil majors, and enable the Soviets to supply their navy at sea terminals. In order to complete the system, however, the Soviets needed considerable amounts of large-diameter steel pipes, which they had to import from the West. Thus the US delegation at NATO proposed a comprehensive embargo of large-diameter pipes in order to delay the system's construction. In this paper, I argue that the definition of what oil pipes are s technological artifacts was shaped by the NATO debate on the US proposition. The technopolitical dispute was fought through technical reports, especially in terms of distinguishing between 'strategic' and 'non strategic' pipes. What an oil pipe was – or was not – as a technological product derived from the struggle to control or suppress commerce with the Soviet Union.

The "red oil flood"

Between 1955 and 1965, Soviet oil production rose spectacularly from 71 to 243 million tons (Mt).[1] Worried by such spectacular increase, in 1958 CIA Director, Allen Dulles, warned the US Cabinet, led by President Dwight Eisenhower, that "[t]he free world face[d] a quite dangerous situation in the Soviet capacity to dislocate established markets".[2] The new Soviet production had significant implications for Western security as well, as it meant a higher capability to boost production of USSR's heavy industries and fuel its military machine. The Soviet Union also increased its exports. Over ten years, the exports' share of total Soviet production rose from 5.2 percent to 26.4 percent, and oil exported to non-Communist countries increased from 3.8 Mt in 1955 to a stunning 35.5 Mt in 1965.[3] Such bonanza was the result of an immense prospecting effort, which bore its finest fruit in the Ural-Volga region, where a number of large oilfields were discovered. Not only could the Soviets produce a colossal amount of oil, they could also offer prices that international companies could not match.

Historians of technology have recognized the importance that social, political and economic factors play in shaping what a technological artifact is.[4] More recently, Paul Edwards and Gabrielle Hecht have further developed this analysis suggesting that political factors play a major role too.[5] In particular, introducing the notion of technopolitics, Hecht has proposed that we should think about the underlying political dimensions of technological networks and the interconnectedness of these networks in favoring the spreading of some technologies globally.

This paper enriches this analysis by showing, on the one hand, the absolutely crucial role that oil pipes had in shaping international relations during the Cold War. On the other hand, it also highlights that the Cold War shaped the definition of what oil pipes are. In particular, the actual understanding of their size, methods of manufacturing and materials was negotiated in the set of responses that NATO implemented to face the Soviet threat.

This study also refines our understanding of the role of pipelines in political history, which has been emphasized by historian Timothy Mitchell and more recently by geographer Andrew Barry. While Mitchell has highlighted, amongst other things, the importance of Middle Eastern pipelines and refineries as sites of intense political struggle, Barry, in his study of the Baku-Tbilisi-Ceyhan oil pipeline from the Caspian Sea to the Mediterranean, built in the second half of the 2000s, has demonstrated that pipelines as material artifacts are active agents of politics.[6] In line with Barry's approach, I demonstrate that pipes as political devices were the central element of the NATO debate on Soviet oil exports and technological capabilities, which was debated at NATO from the late 1950s. Finally, my paper also draws on recent analyses highlighting the importance of science and technology in understanding the Cold War conflict, and thus helps overcoming the limitations of historiographical approaches focusing mainly on nuclear weapons.[7]

1 John A. Berry, "Oil and Soviet Policy in the Middle East," 150. Source reported: Economist Intelligence Unit, Quarterly Economic Review, "USSR Annual Supplement - 1971", 10; Robert E. Ebel, Communist Trade in Oil and Gas, 40; D. L. Spencer, "The Role of Oil in Soviet Foreign Economic Policy," 98.

2 Quoted from: Daniel Yergin, The Prize, 497. Source reported: Eisenhower Library, Cabinet Minutes, July 25, 1958, Whitman Files, 1953-1961, Cabinet Series, b. 11.

3 Ebel, Communist Trade in Oil and Gas, 40, 44.

4 Trevor J. Pinch, and Wiebe E. Bijker, "The Social Construction of Facts and Artefacts," 399-441.

5 Gabrielle Hecht, The Radiance of France; Michael Thad Allen, and Gabrielle Hecht (eds.), Technologies of Power; Gabrielle Hecht, and Paul N. Edwards, The Technopolitics of Cold War.

6 Timothy Mitchell, "Carbon democracy," 399-432; Timothy Mitchell, Carbon Democracy; Andrew Barry, Material politics.

7 Notable examples of the new historiographical trend are: Ronald E. Doel, "Constituting the Postwar Earth Sciences," 635-66; Ronald E. Doel, "Does scientific intelligence matter?," 311-22; John Krige, American Hegemony and the Postwar Reconstruction of Science in Europe. An example of the older trend is: John Lewis Gaddis, Philip H. Gordon, Ernest R. May, and Jonathan Rosenberg (eds.), Cold War Statesmen Confront the Bomb.

More significantly, the Soviet oil flood promised to upset the Western bloc militarily and economically. Individual countries were about to sign agreements to import Soviet hydrocarbons and had also promised to sell the pipes needed to rapidly transfer it from central Russia to the western borders of the Iron Curtain. The US administration first, and NATO afterwards, swiftly moved in to block these deals. This paper discusses how their strategy unfolded in debates at the defense alliance. The bone of contention, oil pipes, did not just feature as an object of political controversy, but their very nature was moulded in the clash between national representatives.

In order to be able to compete, Anglo-American majors opted for cutting posted prices, allowing them to share losses with producing countries instead of having to bear them alone. Between 1959 and 1960 British Petroleum (BP), Standard Oil of New Jersey (SONJ) and other majors agreed cuts of between 7 and 10 percent. This was immediately denounced by producing countries. Such cuts would ultimately lead to producers clubbing together in the Organization of the Petroleum Exporting Countries (OPEC) in 1960.[8] As BP cut prices, the US government imposed a system of mandatory quotas on foreign oil imports to the USA, intended to protect American domestic production from cheap foreign oil and avoid the country's dependency on imported supplies.[9]

Soviet oil exports were part of a larger offensive, in which barter agreements were employed as powerful economic and diplomatic weapons, in that they enabled beneficiary countries to find outlets for their productions. When trading with Egypt, the Russians bartered oil for cotton; in the case of Cuba, they swapped oil for sugar.[10] Technoscentific expertise was also used as a lever to convince developing countries to collaborate. This was a cornerstone of Soviet oil policy, and was successfully employed in Afghanistan, Ethiopia, Pakistan and Egypt. The USSR provided crews of experts to assist the locals with building pipelines and tankers, executing geological studies, and training executives of national oil industries. Indeed, such training was not limited to technical aspects: it catered for political and social engineering.[11]

Reactions to the Soviet oil offensive varied from country to country. While, expectedly, the American government firmly refused to allow Soviet imports into the United States, European positions were more varied, depending on each country's trading activity with the USSR. In terms of Soviet exports, the top three West European countries in 1957 (the UK, West Germany and France) imported merchandise for 756, 286 and 268 million rubles respectively. Exports to Italy amounted to 117 million. However, Italy was the only country among these whose balance of trade was negative.[12] In Britain, Harold Macmillan's government was divided on the issue on an oil embargo on Soviet oil imports. It eventually implemented one in 1959, but serious divergences remained between government departments, notably between the Board of Trade (against) and the Ministry of Power (in favor), which would reemerge over the next years.[13] In France Victor de Metz, the President of the flagship of French oil, the Compagnie française des pétroles (CFP), feared that Soviet trade could extend to the entire European Economic Community (EEC), and hoped an alliance between Arab producers and

8 Yergin, The Prize, 497.

9 Petroleum Press Service (PPS, henceforth), 'Restriction obligatoire des importations américaines', XXVI (4), 1959: 126-30.

10 Niklas Jensen-Eriksen, "The Cold War in Energy Markets," 201. Source reported: The National Archives, Kew (TNA) – Ministry of Power (POWE) 33/243, "Russian oil imports", MOP, 13 May 1960.

11 Archives Historiques du Groupe Total, La Défense (AHTOTAL) – Fonds Total-CFP, b. 90.4/102, Revue de presse, n. 30, Chronologie des accords politiques entre l'URSS et les pays arabes, December 1958; The Reporter, "The Soviet Oil Offensive", by Leon M. Herman, 21 June 1962. p. 27.

12 The equivalence is 1957 was 1 ruble = 4 dollars (http://www.cbr.ru/currency_base/OldVal.aspx, accessed 13 April 2014), so the figures reported correspond to $3.02 billion for the UK, $1.14 billion for West Germany, $1.07 billion for France, and $468 million for Italy. Bruna Bagnato, Prove di Ostpolitik, 97.

13 Jensen-Eriksen, "The Cold War in Energy Markets", 204. The embargo notwithstanding, Italian-labelled oil products made from Soviet oil were sold by ENI's British affiliate in the UK in the early 1960s (Spencer, "The Role of Oil in Soviet Foreign Economic Policy," 100-1).

oil majors could counteract the nefarious 'red oil flood'.[14] The Arab countries turned their noses up to the Soviet exports strategy, but their heavy dependence on the Soviet economy and technical expertise prevented them from taking retaliatory measures toward them.[15]

The Italians were conspicuous by their silence, the reason being that the Italian public oil company, Ente nazionale idrocarburi (ENI) was deeply involved in trading with the USSR, and commercial exchanges also existed between the Soviets and many large Italian industrial concerns such as FIAT, the car manufacturer. Moreover, by the end of 1959, ENI was negotiating the terms of a massive oil-for-technology supply contract with the Soviet Union. This would materialize in 1960, causing a scandal in the Western industrial and political world: the Soviet state-run company, Soyuznefteexport (SNE), would provide ENI with 12 million tons of crude and fuel oil and over four years, in exchange for synthetic rubber, steel pipes for pipelines and pipeline equipment.[16] Two months before the Italian contract, West Germany had also signed an important barter contract with the Soviets. The exchange value was double that of the 1960 ENI-SNE agreement. Among German exports to the USSR were plants for chemical and extractive industry, iron and steel products, ships and large-diameter pipes; among its imports, crude oil and products.[17] Unlike France and Germany, which could count on large domestic resources of coal, Italy almost totally depended on oil. Therefore, its massive reliance on Soviet imports was seen as a veritable danger for western security, much more than in the German case. ENI's trading with the Soviets soon brought the Italian company to the attention of transnational organizations. In the American press, as well as in the US National Security Council's and State Department's reports, dangers deriving from dependency on Soviet oil were always highlighted: for example, the Russians may decide to abruptly interrupt their deliveries following unfavorable political decisions by Western bloc governments.[18] Soviet dependency on Western technology, however, was largely neglected; discontinuing exports would have deprived the Eastern giant of part of its industrial power. This reason, more than any other, made an interruption of supplies unlikely. American anxieties were also clearly expressed in two documents produced by the US Senate, Soviet Oil in the Cold War and Problems raised by the Soviet oil offensive, in 1961 and 1962 respectively.[19] In the first study, authors Halford Hoskins, a senior specialist in international relations, and Leon Herman, an analyst in Soviet economics, warned that Soviet exports to foreign countries were "a political hand that has worn the economic glove".[20] When illustrating the Italian deal, the two authors maintained that if the Italian attitude spread over Western Europe, more countries would dislocate part of their supplies from the majors to the USSR, thus causing fewer revenues to international companies. That would not only damage American, but also British, Dutch and French interests, since the British and Dutch were part of Royal Dutch-Shell, the British alone run BP, the French run CFP, and all of these countries were already exporting their oil

14 Emmaneul Catta, Victor De Metz, 289.

15 On Soviet aid to Arab countries, see: NATO Archives, Bruxelles (NATOA) – AC/89-WP/67,confidential (later unclassified), 'Sub-Committee on Soviet Economic Policy – The Economic Offensive of the Sino-Soviet Bloc, Note by the Chairman', 6 July 1960; AC/89-WP/76 (Revised 1), confidential (later unclassified), 'Sub-Committee on Soviet Economic Policy – The Economic Offensive of the Sino-Soviet Bloc (1st July, 1960 - 31st December, 1960)', 12 May 1961; Archives Nationales, Pierrefitte-sur-Seine (AN) – 19900317/8, fd. 1, sub-fd. Afrique 1957/77, secret, Note SDECE, Pénétration italienne (ENI) et soviétique dans le domaine pétrolier en Afrique, 30 August 1960 (FOIA n° 111 382).

16 Archivio storico del Ministero degli affari esteri, Rome (ASMAE) – Telegrammi ordinari, Russia (Ambasciata Mosca), 1960, vol. 59 arrivo (Jul-Dec), n. 36288, Italian Embassy in Moscow (Itemb Moscow) (Pietromarchi) to Ministry of Foreign Affairs, 'Contratto ENI-Finsider', 3 October 1960; n. 37331, Itemb Moscow (Pietromarchi) to Ministry of Foreign Affairs, 'Importazione petrolio', 11 October 1960. For the laborious negotiations preceding the agreement, mainly carried out by Giuseppe Ratti and under the auspices of Italian Ambassador Luca Pietromarchi, see: Archivio storico ENI (ASENI) – Fondo ENI, Presidenza Raffaele Girotti, b. 264, fd. 482E.

17 ASMAE – Telegrammi ordinari, Russia (Ambasciata Mosca), 1961, vol. 55 arrivo (Jan-Jun), n. 13, Itemb Moscow (Pietromarchi) to Ministry of Foreign Affairs, 'Stampa sovietica', 2 January 1961.

18 TNA – Foreign Office (FO) 371/153362, fd. RT 1532/17, P. J. E. Male, FO, to J. Gwynn, Ministry of Power, 'Italy and Russian Oil', New York Times article, 'Italy Oil Deal With Soviet Weakens Her Ties to West', 11 November 1960.

19 Halford L. Hoskins, and Leon M. Herman, Soviet Oil in the Cold War; Halford L. Hoskins, Problems Raised by the Soviet Oil Offensive.

20 Quoted from: Hoskins and Herman, Soviet Oil in the Cold War, 4.

to Europe.[21] In Problems raised by the Soviet oil offensive, Hoskins went further to provide various examples of Soviet oil offensive in several countries in Asia, Africa and Europe, and their consequences. As for Italy, he warned that ENI's policy was intended to eliminate as many foreign companies as possible from Italy.[22] ENI's further plans to build a pipeline for the Soviets between the USSR and East Germany, and another one to connect Italy's Adriatic seaport of Trieste to Vienna did nothing to appease Western governments. The first threat was defused through international diplomatic pressure. The French and US governments had promptly been informed of the news of the Italian-Soviet agreement regarding the East German pipeline project by their secret services.[23] The implementation of ENI's project was depicted as a dramatic security threat to the Western bloc, as the very possibility of having an oil terminal in East Germany may sooner or later lead to its connection to West Germany, thus initiating a Soviet oil invasion. The State Department suggested the Italian Ambassador in Paris, Manlio Brosio, apply pressure on his government, and eventually the pipeline agreement was not finalized.[24] ENI eventually supplied certain pumping and auxiliary equipment, while the plan to provide technical assistance toward installing the pipelines was dropped.[25]

As mentioned, ENI's technical services were also planning a pipeline that would run from Trieste to Vienna. The pipe might easily be linked to Bratislava, where the Soviets planned to establish the Czechoslovakian terminal of their pipeline system (Fig. 1). Starting from the Ural-Volga oilfields, the European branch of the Soviet system (called Druzhba, the Russian for 'friendship') was planned to branch into a northern line serving Poland and East Germany, and a southern line serving Hungary and Czechoslovakia.[26] Vienna's short distance from Bratislava made the project a threat for supplies of Middle Eastern oil delivered by the majors.[27]

The German newspaper Neue Zürcher Zeitung argued in June 1961 that from a geographical viewpoint the Soviet project contained elements that made it more enticing than a continued commitment to majors' oil from the Middle East, transported through the Mediterranean. The proximity of Sweden and the Netherlands to the Baltic port of Klaipeda, where another terminal of the Soviet European pipeline was to be built, would make the Soviet pipeline a constant temptation for countries belonging to the Western Bloc, thanks to the savings its use would allow. Moreover from the Baltic port, oil could easily be carried to West Germany by railway. On top of that, by linking the Soviet pipeline to ENI's planned pipeline, Soviet oil could reach the Mediterranean, and thence be exported by tanker to areas already supplied by Anglo-American majors in Southern Europe.[28]

21 Ibid., 6.

22 Hoskins, Problems Raised by the Soviet Oil Offensive, 11.

23 ASENI – Fondo ENI, Estero, b. 2, fd. 7E6, letter, Itemb Moscow (Pietromarchi) to ENI President (Enrico Mattei), 25 November 1959; ENI President (Enrico Mattei) to Itemb Moscow (Luca Pietromarchi), 28 December 1959; AN - 19900317/13, fd. 1, sub-fd. Italie 1955/1979, secret, Note SDECE, L'activité de l'Ente Nazionale Idrocarburi (mai 1958 - septembre 1959), 23 October 1959, p. 5 (FOIA n° 111 382); National Archives and Records Administration, College Park, Maryland (NARA) – CIA Records Search Tool Database (CREST), CIA Current Intelligence Weekly Summary, confidential, 'Italian Oil Combine May Build Pipeline for USSR', 28 January 1960. p. 11; NARA – Record Group (RG) 59, Central Decimal File, 1960-1963, b. 2694, file 865.2553/1-2660, confidential, Foreign Service Dispatch, US Embassy Rome (Amemb Rome) to State Department, 26 January 1960; Bagnato, Prove di Ostpolitik, 176.

24 NARA – RG 59, Central Decimal File, 1960-1963, b. 2694, file 865.2553/2-660, confidential, Memorandum of Conversation, 'Italian Government Guaranteed Credit for Soviet Pipeline Project', 6 February 1960.

25 NARA – RG 59, Central Decimal File, 1960-1963, b. 2694, file 865.25553/3-160, limited official use, Amemb Rome (Zellerbach) to State Department, 1 March 1960; AN – 19900317/13, fd. 1, sub-fd. Italie 1955/1979, secret, Note SDECE, L'activité de l'Ente Nazionale Idrocarburi (octobre 1959 – octobre 1960), 18 October 1960, p. 15 (FOIA n° 111 382).

26 More branches had been planned to the Baltic ports of Klaipeda and Ventspils, and to the Siberian port of Nakhodka. NATOA – AC/127-WP/56 (Revised), confidential, 'ECONAD, Sino-Soviet Bloc Oil on World Markets, Note by the Economic Service,' 11 July 1960, p. 2.

27 TNA – FO 371/153362, fd. RT 1532/6, f. RT 1532/6D, A. A. Jarratt, Ministry of Power, to J. T. Fearnley, FO, 17 June 1960. p. 10.

28 ASENI – Rassegna stampa estera 1961, n. 39, para 370, Neue Zürcher Zeitung, 11 June. The project for the Trieste-Vienna pipeline was approved only in 1963. The laying of the Transalpine Pipeline, as it would be called, was eventually to include a number of majors beside Eni. It was commissioned in 1967, while its extension to Vienna had to wait until 1970 to become operational.

A dangerous Friendship

Unsurprisingly, the laying of Druzhba triggered frantic debate at NATO. By consequence of the imminent threat, Western technologies that made the construction of the pipeline possible were placed under strict surveillance by the Atlantic Alliance and the European Community alike. Throughout the long NATO debate over the American proposal of an embargo on large-diameter pipes (LDP, henceforth) and pipeline equipment exports to the USSR, US and UK administrations held conflicting points of view, which corresponded to two markedly different perceptions of the Soviet threat. The two governments fought their battle through industrial estimates, as well as through mobilizing their military and intelligence agents. During and because of this debate, the nature of the 'pipe' artefact changed, its final status as technological artifact ultimately resulting from technopolitical negotiation.

Fig. 1

Throughout the 1960s the NATO Committee of Economic Advisers (ECONAD), operating under the authority of the North Atlantic Council (NAC) and chaired by the Monegasque, François-Didier Gregh, discussed a number of oil-related issues, including assessments of Russian oil production, exports and reserves, NATO countries' imports of oil from Communist countries, and issues regarding pipelines. Founded in 1957 to "study and report to the Council on economic issues of special interest to the Alliance", ECONAD was particularly concerned with those that had political or defense implications, or affected the economic health of the Atlantic Community.[29] Envisioned as a standing committee, ECONAD was meant to complete the functions conducted by the Committee on Soviet Economic Policy, established in 1954.[30]

29 Quoted from: NATOA – AC/127-D/1, confidential, 'Committe of Economic Advisers (ECONAD), Date of the first meeting and programme of work - Note by the Chairman,' 22 March 1957, p. 2.

30 However, the functions of the two committees sometimes overlapped.

In July 1960, ECONAD met to examine the impact of Soviet oil on world markets.[31] In the same month, it decided that NATO members should prepare statistics on their trade with the Soviet bloc, and proposed a common policy be outlined for Western oil-supplying countries in the face of the Soviet oil threat.[32] An ad hoc Study Group on Soviet Oil Policy was then established.[33] NATO's need of such an assessment became even more urgent following the creation of OPEC in September, which generated fears the USSR may conclude an agreement with the new organization.

ECONAD had charted Soviet efforts to increase oil exports since the beginning of 1960, noticing that these had been highly successful, especially outside Europe, and attempts to stop them had failed.[34] Were this not enough, at the same time the Russian fleet's capacity had been growing at an alarming speed, which had obvious economic and military repercussions.[35] From September, the Study Group debated a common policy to stem these dangers. The national delegations abided to the recommendations issued by their national oil companies.

That national enterprises collaborated with their NATO delegations within the Study Group was to be expected. But these contacts also reveal the network of acquaintances between the oil industry and top-rank personalities in national administrations. US majors such as SONJ, Standard Oil of New York and Texaco lobbied the State Department. BP and Royal Dutch-Shell also had frequent exchanges with the Foreign Office, and as historian Niklas Jensen-Eriksen has emphasized, when the Joint Intelligence Bureau of the Ministry of Defence was asked to draft a memorandum on Soviet oil exports in 1958, the Ministry of Power asked Shell to collect material for it.[36] CFP worked closely with the French Foreign Ministry, to the point of plainly suggesting which tactics to pursue.[37] Finally, ENI had frequent contacts with the Study Group's Italian delegation, formed of two officials from the Ministry of Industry and led by the General Director of Energy Sources.[38]

While the Study Group prepared its report, the US government – wary that the NATO group's conclusions were not adequately tailored to American interests – set up its own study group in the summer of 1961, in Washington. The American group conducted a parallel analysis of the political and economic consequences of the completion of the Soviet pipeline system. Based on the results of the American study group, the US NATO delegate, Alfred Reifman, went as far as to suggest an embargo on Western-bloc LDP and pipeline equipment, based on the strategic and military advantages the USSR would achieve from its exports.[39] In fact in 1958 Soviet oil transportation was being handicapped by an overloaded railway, which carried around 60 percent of its overall amount, against 5 percent in the USA. The Soviets aimed to

31 NATOA – AC/127-WP/56 (Revised), confidential, 'ECONAD, Sino-Soviet Bloc Oil on World Markets, Note by the Economic Service,' 11 July 1960, p. 1; PPS (1959) "Dix millions de tonnes de pétrole exportées par le bloc soviétique", XXVI (3): 111-2.

32 NATOA – AC/127-R/53, confidential, 'ECONAD, Meeting held at the Permanent Headquarters on 21 July 1960, Decision Sheet,' 22 July 1960, p. 1.

33 NATOA – AC/127-WP/64, confidential, 'ECONAD, Study Group on Soviet Oil Policy, Note by the Chairman,' 23 September 1960, p. 1, 3. On the ad hoc Study Group, see also: Bagnato, Prove di Ostpolitik, 383 et seq.

34 NATOA – AC/127-WP/66, confidential, 'ECONAD, Recent Facts and Figures on Petroleum, Note by the Economic Service,' 30 September 1960, p. 9, 11; Spencer, "The Role of Oil in Soviet Foreign Economic Policy," 102.

35 NATOA – AC/127-WP/66, p. 12-3.

36 Niklas Jensen-Eriksen, "British government, business and the Soviet Cold War oil offensive, 1957-1964", 8-9. Sources: TNA – FO 371/153362, fd. RT 1532/10, secret, 'Relations between Signor Mattei and the Western Oil Group,' Ashley Clarke, British Embassy Rome, to Sir Paul Gore-Booth, K. C. M. G. FO, 11 August 1960; TNA – POWE 33/2443: "Note on Soviet Bloc oil exports to the Free World," J. R. Jenkins, 16 September 1958; A minute by A. B. Powell, 19 May 1960.

37 AHTOTAL – Fonds Total-CFP, b. 92.26/31, fd. Pétrole soviétique: Notes de M. de Laboulaye, confidential, 'Note pour M. Granier de Lilliac,' 18 November 1960.

38 ASENI – Fondo ENI, Estero, b. 2, fd. 7E2, Ruffolo (ENI) to Giorgi and Carbone (Italian delegation to NATO), 'Memorandum,' 29 December 1960.

39 NATOA – AC/127-D/83, secret, 'ECONAD, Soviet oil and gas pipelines, Note by the Secretary,' [2 or 3] October 1961, p. 5; AC/127-R/71, confidential, 'ECONAD, Meeting held at the Permanent Headquarters, on 20 July 1961, Decision Sheet,' 4 August 1961, p. 5. On the pipes issue, see also: Bagnato, Prove di Ostpolitik, 382 et seq.

meet 35 percent of oil transport requirements via the new pipeline system. Besides allowing them to relieve their railway network, the system would allow them to increase exports and reduce the demand for tankers.[40] In addition, the pipeline could easily be connected to seaport terminals where the Soviet Navy's vessels were moored. By 1962, the significance of pipelines for the Soviet marine military apparatus was clearer than ever to NATO, and added to concerns deriving from Russian technological progress in war vessels. In 1952, the US Navy had revealed that the Soviets were about to develop a submarine-based nuclear deterrent. This news had been followed by other alarming updates on advances in military equipment and in oceanography studies, and had eventually led NATO to establish an ad hoc group to produce oceanographic knowledge for anti-submarine warfare needs in late 1958.[41]

From a secret ECONAD memorandum, it emerges that NATO military authorities were especially worried about the Soviet war ships docked along the Baltic and Pacific coasts. The Soviet railway and naval units, relieved of transporting oil, could then be used to carry logistically critical goods, such as ammunition and foodstuffs. Moreover, were the Russians able to develop a system parallel to the NATO military network in Western Europe, support for their troops in any European campaign would be materially improved. Finally, the pipeline system would also allow an undetectable build-up of oil stockpiles in Central Europe.[42]

It was not the first time the USA had proposed blockades in order to hinder Soviet industrial projects. For example in 1946, a penicillin plant program launched by the United Nations Relief and Rehabilitation Administration to build up the capacity of the pharmaceutical industry in Eastern and Southern Europe, was significantly delayed by an American embargo on extractor technologies. The State Department refused to grant exporting licenses for the necessary equipment to pass the Iron Curtain.[43] Other products including radioisotopes and computer equipment were also embargoed to stifle Soviet technological progress. In October 1960, after Prime Minister Fidel Castro nationalized the properties of US citizens and companies, an embargo was famously enacted against Cuba.[44] It is therefore not surprising that the US delegation hoped to enforce one on western oil technologies.

In light of Reifman's proposition, ECONAD decided to establish a further group of experts responsible for analyzing the issue of LDP supplies. Only once this second study group had presented its results, would a final examination of the Study Group's report on Soviet oil policy be dealt with. The long debate that followed the embargo proposal is indicative of the manifold status of technological items, and reminds us of the argument put forward about uranium by historian Gabrielle Hecht.[45] Like 'nuclearity' for uranium, the strategic nature of pipes was not something given; rather, it depended on the technopolitical context.[46] From the 1940s, the development of nuclear weapons assigned a political significance to uranium, which radically changed status, from being simply a radioactive mineral to being the principal fuel of nuclear warfare. Similarly in the early 1960s, LDP came to acquire a marked military significance they did not have before. The change of status of pipes, from freely tradable to embargoed merchandise, was to affect commercial relations between the USSR and European countries. This was particularly true for Italy and for West Germany, whose almost

40 NATOA – AC/127-D/68, confidential, 'ECONAD, Report by the Ad Hoc Study Group on Soviet Oil Policy to Econad,' 23 May 1961, pp. 8-12.

41 Simone Turchetti, "Sword, Shield and Buoys," 208, 224.

42 NATOA – AC/127-WP/85, secret, 'ECONAD, Soviet Oil and Gas Pipelines, Standing Group views,' 9 April 1962, p. 1.

43 Sławomir Lotysz, "Democratizing access to modern drugs in postwar Eastern Europe".

44 Patrick J. Haney, and Walt Vanderbush, The Cuban Embargo; Peter Schwab, Cuba. On radioisotopes embargo, see: Angela N. H. Creager, "Radioisotopes as Political Instruments, 1946-1953," 219-39.

45 Gabrielle Hecht, "The Power of Nuclear Things," 1-30; Gabrielle Hecht, Being Nuclear.

46 Hecht, The Radiance of France. At p. 15, Hecht defines technopolitics as: "strategic practice of designing or using technology to constitute, embody, or enact political goals".

simultaneous agreement with the Soviets also included LDP.[47] In the eyes of US delegates in NATO, by contributing to the Soviet effort, these countries were imperiling the security the entire Western bloc.[48] Yet it is not easy to assess to what extent American responses reflected genuine military concerns, or were the disguised commercial interests of US oil majors. At NATO debates on the embargo, these interests were never named, but their presence lingered in the discussions.

In order to complete their pipeline system, NATO estimated the Soviets would need immense foreign assistance. Soviet plants had sufficient capacity to produce all kinds of pipe except 40" diameter, and NATO forecast the Russians would be short of these pipes until and beyond 1965. The USSR had already been importing LDP from abroad for a few years. NATO members had not prevented these kinds of exports ever since the NATO Coordinating Committee for Multilateral Export Controls (CoCom) had reduced restrictions on pipe and oil equipment exports to the Soviet Bloc in 1958. Most equipment used in oil exploration, refining, production and transport had previously been embargoed or highly restrained in volume in shipment to the Soviet bloc's countries under the CoCom agreement.

In the 1958 review of international strategic controls, however, almost all items relative to the oil industry had been deleted or downgraded to Watch List status, which only required reporting deliveries to the Eastern Bloc to the Atlantic Alliance's authorities. Since Soviet demand for LDP had been limited, these items had been deleted from the list. On that occasion, the authoritative review Petroleum Press Service had warned that the removal of restrictions would make it easier to provide the Soviets with tools for prospecting, drilling and refining.[49] This is exactly what happened. By the spring of 1961, new Soviet orders had been placed or were being negotiated with West Germany, Italy, Sweden and Japan. Although it was not possible to evaluate the extent to which the USSR would erode its 'pipe gap' thanks to these imports, they still appeared to be a bottleneck to the Soviet government's plans.[50] Soviet companies were also trying to acquire the new industrial technology required to produce the pipes, and by the end of 1960, had already been in contact with German firms, to negotiate the use of a new spiral welding process. The German innovation enabled the construction of pipes from long strips of steel plate fitted together to form helical seams, a process which improved the quality of pipelines, by minimizing leaks.[51]

It was exactly the ease with which the Soviets could acquire foreign technology drove the USA to propose the mentioned embargo. The request, however, triggered a British reaction during ECONAD meetings. A ban, the British delegate contended, besides posing difficulties for the exporting industries of member countries, would either be ineffective or only postpone increases in the oil exports of the Eastern Bloc until they had arranged to produce the necessary equipment themselves. In fact, he argued, it would push the Russians into increasing their production installations.[52] However, pipe supply problems were already demonstrating their effect. In the summer of 1961 the construction of the pipeline's branch to the Baltic ports had to be postponed indefinitely.[53] On the issue of pipeline technologies, the discussion was not limited to NATO. Oil companies did not stand idly by. In fact one might speculate that

47 ASMAE – Telegrammi ordinari, Russia (Ambasciata Mosca), 1961, vol. 55 arrivo (Jan-Jun), n. 13, Itemb Moscow (Pietromarchi) to Ministry of Foreign Affairs, 'Stampa sovietica,' 2 January 1961.

48 Leopolodo Nuti, "Commitment to Nato and Domestic Politics", 374.

49 PPS (1958) "Les exportations aux pays communistes sont rendues plus faciles", XXV (9): 347.

50 NATOA – AC/127-D/68, confidential, 'ECONAD, Report by the Ad Hoc Study Group on Soviet Oil Policy to ECONAD,' 23 May 1961, pp. 6-8.

51 NATOA – AC/127(O)R/2, confidential, 'ECONAD, Ad Hoc Study Group on Soviet Oil Policy, Meeting held at the Permanent Headquarters, 30 and 31 January 1961, Decision Sheet,' 10 February 1961, p. 4.

52 NATOA – AC/127-R/71, confidential, 'ECONAD, Meeting held at the Permanent Headquarters, on 20 July 1961, Decision Sheet,' 4 August 1961, p. 4. I could not retrieve the name of the British delegate in the NATO archives.

53 The Soviets had placed orders for 240 kt in Italy, 135 kt in Sweden and 420 kt in Germany. PPS (1961) "Le réseau de pipe-lines U.R.S.S.-Europe de l'Est", XXVIII (6): 204; PPS (1962) "Le potentiel d'exportation russe", XXIX (4): 127.

such was the osmosis on energy security between the US representatives at NATO and the American oil industry, that the suggestion of an embargo may have come from the latter, and that Kennedy's government was therefore supposedly offering to be the majors' secret diplomacy at NATO.

In 1963, the World Petroleum review admitted that the first demand to use NATO and US diplomatic channels to restrict trade in oil between the West and the USSR had been made in November 1960 at an annual meeting of the American Petroleum Institute, by Gulf Oil's President, Ernest Brockett, and by SONJ's President, Monroe Rathbone.[54] SONJ recommended exactly what Reifman's proposal was designed to achieve: a NATO agreement on a list of strategic materials the sale of which would be prohibited, including those allowing them to complete their pipeline system and refineries in Eastern Europe. A similar agreement, the US major advised, should also be reached to control the release of technological information, thereby banning the kind of contracts made by ENI with the USSR for engineering and design of parts of the Soviet pipeline.[55]

Troubles of a Special Relationship

In August 1961, following the embargo proposal, ECONAD requested that a study be made before taking a definitive decision. The report of the ad hoc Study Group on Soviet Oil, which the Economic Advisers received in September, reflected quite closely the American viewpoint. As far as the Soviet pipeline issue was concerned, it argued that Druzhba and its spur line to the Baltic Sea in particular had "obvious military significance".[56] At a meeting of the Study Group, US General Major Francis Piggott, Assistant Chief of Staff (Intelligence) at the Supreme Headquarters Allied Powers Europe (SHAPE), urged that the construction of the pipeline be delayed, in order to prevent supplying the Soviet Navy. By the same token, the branch line to East Germany, where the Soviets kept many divisions, should also be hindered.[57] Unlike the Soviet railway, which ran north to south, pipelines would run east to west. The flow of oil in that direction would make supplying the Soviet military machine in Eastern Europe easier.[58]

According to the report, the Soviets were not producing 40" pipes, and there seemed to be no evidence they were progressing rapidly enough to build large capacity tube mills or steel rolling mills capable of producing steel plate wide enough to enable single-weld 40" pipe to be manufactured. Considerations on the Soviet ability to access certain technologies led the Study Group to conclude that, although the Soviets claimed to be able to produce pipe by welding two pre-formed halves, there was no indication that they were actually doing so. Soviet industries were also reported to be unable to build gas turbines, electric motors and other equipment required for 40" lines.[59] As for auxiliary equipment, they were in need of Western technology as corrosion was a major problem in their pipes and equipment, due to the high sulphur content of their oil. They also lacked pumps, compressors, turbines, valves, pipe fittings, large electrical engines, gauges, telemetering and short-wave control

54 Boris Rachkov, "Oil, Trade, and Politics,"14-20. Source reported: World Petroleum, May 1963, p. 29.

55 AHTOTAL – Fonds Total-CFP, b. 92.26/31, fd. Pétrole soviétique, 'Statement of position on the threat of Communist trade,' 19 January 1962. pp. 7-8.

56 Quoted from: NATOA - AC/127-D/68, p. 6.

57 NATOA – AC/127-D/83, secret, 'ECONAD, Soviet oil and gas pipelines, Note by the Secretary,' [2 or 3] October 1961, p. 5. The identity of the military representative is not specified in this document, but this is revealed by other documentation.

58 Besides Druzhba, scheduled to complete in 1964, the Soviet pipeline programme included three more pipelines to Leningrad, to the Black Sea port of Tuapse and to the Pacific Ocean at Nakhodka. NATOA – AC/127-D/83, secret, 'ECONAD, Soviet oil and gas pipelines, Note by the Secretary,' [2 or 3] October 1961, pp. 5, 7.

59 Ibid., p. 7.

equipment.[60] An embargo, the report's compilers concluded, would delay the completion of Druzhba.[61] The archive material suggests that European delegates were unconvinced, and the discussion soon became heated. The British delegation replied with its own data, which contradicted the information available to the Americans, and maintained its negative stance.[62] The military nature of the pipeline was asserted by the Americans and denied by the British. The latter maintained that as the embargo proposed covered all LDP and related equipment, it would have to include all possible materials and equipment useful in the construction and installation of pipelines. But these included items in general use such as valves and earth-moving equipment. The UK representatives could not see more value in such an embargo, than in one on communication equipment, most of which was not restricted under CoCom in spite of its likely usefulness in war.[63] In late 1961, to make their point clearer, the American delegation summoned Piggott once again.[64] The General clarified that the pipeline was being placed underground and camouflaged in order to be screened from possible nuclear attacks. He added that in peacetime the whole pipeline system would have a capacity three times over the military needs of the Soviet forces facing the European Allied Command. At war, Piggott explained, such improved supply capability would allow the Soviets to fuel an impressive military machine, not to mention Soviet war vessels and nuclear-powered ballistic missile submarines. It was thus vital, according to the General, that NATO countries stop providing the Soviets with much needed materials.[65] The British government was not the only one alarmed by the embargo proposal. Representatives of other countries with large trading stakes with the Soviets in relation to LDP and pipeline equipment were not at all convinced that an embargo was a desirable solution. In order to reassure NATO allies, in early 1962, the US representative at ECONAD felt compelled to clarify that the proposal was not intended to prevent existing contracts being honored. The clarification was welcomed with a sigh of relief by the Italians and Germans, and triggered general approval of the embargo by the Belgian, French, Dutch, Portuguese and Turkish authorities. The Germans, however, whose position was more complex, still hesitated. While they would accept an embargo on oil pipes, they contended that gas pipes should not be blockaded. But could one distinguish between the two kinds? The German delegation assumed this was the case, but the American representatives did not share its opinion. In addition, most country representatives were lacking instructions about the exact size of pipe to which the embargo should apply, and about whether to include pipeline equipment.[66] Uncertainty on these points makes it clear that the LDP as a technological device was being defined by ongoing negotiations, and was still in a somewhat fluid state. Any embargo approval by NATO delegations, therefore, could only be in principle, contrary to American wishes.

French acceptance of an embargo is not surprising since they, like most other NATO countries, had no interests in the pipe trade with the Soviets, but Italian approval – albeit lukewarm – was unexpected, especially in light of ENI-Soviet relations. However, a rationale for such stance can be found in the fact that during the embargo discussion, the Italian government was essentially sabotaging the Study Group on Soviet Oil Policy through its firm opposition to any effective measure that would force a reduction of Soviet imports. Any strong opposition to another embargo, the practical consequences of which were economically less problematic for Italy than a stop in oil imports, would be most embarrassing to the Italian authorities. It would

60 Ibid., pp. 8-12.

61 Ibid., pp. 12-4.

62 NATOA – AC/127-D/83/1, secret, 'ECONAD, Soviet oil and gas pipelines, Note by the Secretary,' 17 October 1961, pp. 3-4.

63 NATOA – AC/127-R/76, secret, 'ECONAD, Meeting held at the Permanent Headquarters on 19 October 1961,' 28 October 1961, p. 5.

64 NATOA – AC/127-WP/78, secret, 'ECONAD, Joint Meeting of the Committee of Political and Economic Advisors at the Permanent Headquarters on 7 December 1961, Briefing on the Military Aspects of the Soviet Oil Pipe System,' 8 January 1962, pp. 2-3.

65 NATOA – AC/127-WP/78, pp. 3-5; AC/127-WP/85, p. 1. See also: Bagnato, Prove di Ostpolitik, 388-9.

66 NATOA - AC/127-R/86, secret, 'ECONAD, Meeting held at the Permanent Headquarters on 8 March 1962,' 13 March 1962, p. 1.

also be pointless, since British hostility and German ambiguity were currently preventing the project from being enacted. In addition, thanks to the favorable stance the Americans took to existing contracts, ENI could at least be reassured that no major diplomatic accident would occur between them and the Soviets.

As for the British opposition to the embargo, it is less immediately explicable, in the light of Shell and BP would benefit from it. The discrepancies which emerged in the British ministerial environments at the time of the 1959 embargo presumably returned to the surface. In 1959, the opinion of the Ministry of Power had prevailed over that of the Board of Trade, which favored a continuation of trade with the Soviets. This time the Treasury, whose Joint Permanent Secretary, Frank Lee, had earlier been the Permanent Secretary of the Board of Trade, took the latter's side. He was open to the possibility of British companies reaching an 'accommodation' with the Soviets, although his proposal was firmly opposed by the British majors.[67] Notwithstanding the importance of the oil industry in British economic interests, by early 1960 the Treasury already doubted this would be of crucial significance to the country's balance of payments. Many British manufacturing companies were involved in trading with the Soviet Union, and after the oil embargo, they would not accept any further antagonizing of the superpower.

In March 1962, French representatives proposed that NATO countries accept a moral obligation to impede their nationals entering into new contracts for deliveries of LDP to the Soviet Bloc during embargo discussions. When the British replied that the UK government had no legal means of taking such action, the ECONAD chairman supported the French proposal.[68] The British reaction to the looming danger was immediate, and clarified that the 'special relationship' existing between the UK and the USA would not go so far as to put Britain's Soviet trade in jeopardy.[69] The UK delegate questioned ECONAD's competence in debating the matter, and once more downplayed the military significance of the Russian oil pipeline, "except perhaps in the event of extended conventional operations of warfare in Europe". That concept, he reminded them, was "excluded from NATO defense planning under the existing political and military directives".[70] In fact, the military doctrine embraced by NATO in early 1962 was still that of 'massive retaliation', providing for a full-scale response with nuclear weapons. Massive retaliation would only be abandoned in favor of 'flexible response' after the Cuban missile crisis in October.

In order to respond on a par to the American summoning of Piggott, the British invoked the help of the Economic Adviser to the UK Joint Intelligence Bureau, Edward Radice, who stressed the British preference for a technical and economic analysis vis-à-vis strategic/military aspects. Experience in applying economic measures for the latter had proved that these would never be as effective as hoped, because "economic systems [were] much more flexible than is generally supposed".[71] As for the 40" pipes, Radice maintained, the gap was rather small, and the Soviets could cover it if they faced an embargo on LDP exports. For example, they might increase their production of 40" pipes, or use smaller diameters, while doubling the lines of such pipe if necessary; or they could modify their priorities between the oil and gas pipelines,

67 Jensen-Eriksen, "British government, business and the Soviet Cold War oil offensive, 1957-1964". Sources reported: TNA – T236/6237, "Russian oil", Sir Frank Lee, 7 April 1961; Treasury (T) 236/6441, "Note of the meeting on 6 July 1961," G. R. Walker, 10 July 1961.

68 NATOA - AC/127-R/86, secret, 'ECONAD, Corrigendum to AC/127-R/86 (dated 13th March, 1962),' 16 March 1962, p. 2.

69 The 'Special Relationship' is a phrase coined by Winston Churchill in 1946, and used to describe the exceptionally close political, diplomatic, cultural, economic, military and historical relations between the United Kingdom and the United States. David Reynolds, "A 'Special Relationship'?," 1-20.

70 Quoted from: NATOA – AC/127-R/87, secret, 'ECONAD, Meeting held at the Permanent Headquarters on 22 March 1962, Decision Sheet,' 29 March 1962, p. 5. The British delegate was presumably A. K. Potters, who had taken part in all meetings from 1957 to 1959 with no interruptions. Unfortunately, retrieving from NATO archives the names of national ECONAD representatives after December 1959 proved impossible.

71 NATOA – AC/127-R/87, p. 6.

and delay the switch from coal to gas in their industrial apparatus, to use most pipes for oil.[72]

What the British largely contested was the strategic nature of LDP. Pipes for oil might be strategic, pipes for gas were not (or not as much). But entrusting the defence of the status quo to only commercial reasons would not be enough to oppose an embargo, especially if the proposal was forwarded to the NAC, where strategic reasons would prevail. Thus the focus had to move to the 'LDP' label, which had to be reconsidered. As no distinction could be made between the two, the British contended, the Americans were lumping them under the same group, thus conveying the impression that the amounts of this item needed by the Soviets were larger than they actually were. The US tactics were designed to convince NATO allies that an embargo would indeed be an effective measure. On the other hand, for those countries that did have such trading exchanges, such as Italy and West Germany, the question was more delicate. Symbolic of the internecine Anglo-American diatribe, the US delegate retorted that the he "disagree[d] 100%" with Radice's military estimate, adding that even if tactical nuclear weapons were used, he stated, and conventional operations not carried out, it was "contrary to existing NATO military theory to think that one will not need tremendous quantities of oil and other supplies". As for political considerations, he believed, adopting an embargo merely as a final effort to avoid the outbreak of war was contrary to the existing Allied agreements to blockade strategic items.[73] The clash between the USA and the UK became even more evident when the American representative cast doubts on British intelligence's estimate. Gas pipes had to be equalled to oil pipes as strategic items, he maintained, as both would be used to feed industrial expansion which, in turn, fueled the military effort.[74] Realpolitik considerations may have informed the British position. Damaging British iron, steel and equipment producers for military reasons on which the British did not agree, would not make sense. By compromising Anglo-Russian relations with such an inessential measure, the whole British balance of trade would be compromised.

While the British and American positions remained irreconcilable, the German delegation added a further aspect of technical expertise to the pipe debate, by challenging the American Petroleum Institute's viewpoint on standards used for distinguishing between oil and gas pipes. While the US institute maintained that 40" pipes for gas pipelines could also be used for the transport of oil, the Germans disagreed. When trading with the Soviets, those German manufacturers that had already provided pipes had been required to supply them with a very specific characteristic. The impact factors specified by the Soviets for temperatures of -40°C and +20°C seemed to indicate that this pipe was going to be used for gas pipelines.[75] Such qualitative requirements, which the German representative claimed were responsible for a substantial increase in the cost of pipes, was "pointless in the case of oil pipe since only at temperatures above 15°C was oil sufficiently fluid for conveyance by pipeline".[76] Economic considerations, the Germans concluded, reduced to nil the odds they would spend more money than necessary for buying gas pipes and use them for oil.

Through technical expertise, the solution of one of the problems linked to pipes seemed to eventually be possible. The criterion for distinguishing oil and gas pipes could, in principle, be used in favor of the British to invalidate the American claims. Significantly, however, in the meetings that followed the German statement, no further mention was made of this aspect.

72 As for 19" pipes, the UK agreed with the Americans estimates of 8.6 million tons for the seven-year plan. Since it was also estimated that the Soviet production would be 7.9 million tons, such amount plus already imported pipes would cover the USSR's needs except for a few hundred thousand tons: such gap could be filled by slightly expanding the Soviet domestic production.

73 Quoted from: NATOA – AC/127-R/87, p. 9.

74 NATOA – AC/127-R/87, p. 10.

75 NATOA – AC/127-R/87, p. 11; The impact factor is the ratio of a dynamic force to its static weight. Source: William R. Whidden, Buried flexible steel pipe, 185 (http://ascelibrary.org/doi/abs/10.1061/9780784410585.apg, accessed 7 September 2014).

76 Quoted from: NATOA – AC/127-R/87, p. 12.

The Council's last word and consequences of the embargo

As no agreement could be reached about the pipe issue, the embargo proposal finally reached the NAC in the spring of 1962. The general solutions proposed by ECONAD to the Council expectedly echoed those reached by the American delegation, although the British position was also reported.[77] In late May, the Council gathered to discuss the thorny issue. Thirteen countries out of fifteen agreed to the Council's recommendations, at the same time leaving the selection of items to be put under embargo to CoCom. Paul Mason, the British delegate at the NAC, dissented, while the Norwegian, Jens Boyesen took a waiting stance. Firm support was given by France, worried that the 'red oil flood' could fatally jeopardize its recent production from Algeria and Central Africa. For Italy, the delegate, Corrado Orlandi Contucci, approved the recommendations, while stressing the validity of the clause on existing contracts, a proviso of great importance to ENI.[78]

In the meantime, in April agreement was eventually reached at the NAC about the policy to follow regarding Soviet oil imports. The approved Study Group's recommendations were extremely modest in scope, only concluding that "reliance must be placed on the discretion of each NATO member to exercise caution and restraint".[79] The issue of LDP and pipeline equipment exports was instead deferred until agreement be found on the embargo proposal.[80] In this case though, British opposition proved insurmountable, and no agreement could be reached even at the Council meetings. The matter was therefore referred back to ECONAD, with the provision that NATO Secretary General, the Dutchman Dirk Stikker, take up with the highest military spheres the question of a further intelligence assessment, and consult the Supreme Allied Commander for Europe, US General Lauris Norstad.[81] SHAPE analysts, however, informed Stikker they had no additional information to add to that provided by Piggott. By the late summer of 1962, a deadlock was reached.[82] To make matters worse for the US proposal, Norway had reconsidered its position and now tended to side with Britain, while Denmark was also becoming lukewarm on the political convenience of a blockade. It was therefore decided that the issue would again be examined by yet another group of experts from France, Germany, Italy, the UK and the USA. By early October this group had drawn up the definitive report on the consequences of an embargo on the Soviet pipeline system.

The figures provided by the different delegations on Soviet LDP needs still conflicted. For instance, all European experts evaluated 40" pipe needs to be 2.1 Mt, while the Americans offered a figure of 2.4 Mt.[83] When it came to analyzing Soviet LDP imports from Western Europe up to 1963, the experts concluded that, notwithstanding imports from West Germany (681 kt), Italy (181 kt) and Sweden (135 kt), the Soviets would still have a deficit of 253 to 703 kt, depending on the estimate.[84] Discrepancies aside, what mattered was that they would indeed be short of 40" pipes. Were such deficits not filled by further imports from the free world, the pipeline system might be delayed for a period varying from eight months to over two

77 NATOA – C-M(62)51, secret, 'Soviet Pipeline System - Note by the Chairman of ECONAD,' 2 May 1962, passim.

78 NATOA – C-R(62)26, secret, 'Summary record of a meeting of the Council, held at the Permanent Headquarters on 17 May 1962,' 23 May 1962, pp. 11-12.

79 Quoted from: NATOA – C-M(62)47, secret, 'Annual Political Appraisal, Report by the Secretary General,' 17 April 1962, p. 9.

80 NATOA – AC/127-D/82 (Revised), confidential, 'ECONAD, Soviet Bloc Activities in the World Oil Market, Note by the Chairman,' 21 October 1961, p. 6.

81 Ibid., 13.

82 NATOA – C-R(62)40, secret, 'Summary record of a meeting of the Council, held at the Permanent Headquarters on 8 August 1962,' 21 August 1962, pp. 9-11.

83 NATOA – AC/127-D/107, secret, 'ECONAD, Soviet Pipeline System, Report of the Group of Experts,' 8 October 1962, pp. 1-3.

84 NATOA – AC/127-R/97, secret, 'ECONAD, Meeting held at the Permanent Headquarters on 5 October 1962, Decision Sheet,' 10 October 1962, p. 1.

years.[85] As for pipeline equipment, lack of information ruled out any final decisions.[86] When the experts' draft was eventually debated at ECONAD, its members agreed to submit it to the NAC with the recommendation that member countries, "under their own responsibility", should "to the extent possible": 1) stop deliveries of large diameter pipe (over 19") to the Soviet bloc under existing contracts; and 2) prevent new contracts for such deliveries. It was decided the Council would monitor the situation.[87] In the end, the provision covered existing contracts, but the interpretive flexibility suggested by the formulation of the recommendation reassured Italian and German governments.

In late October 1962, a solution on the pipe embargo appeared to be in sight. British officials finally acquiesced to ECONAD's draft proposal, provided the measure did not apply to them.[88] The embargo was finally approved by the Council on 21 November 1962, but its enforcement only caused further trouble. In early 1963, alleged Polish attempts to place new LDP orders in Italy caused the German government to react by requesting member countries take the necessary steps to prevent the execution of Soviet bloc orders placed later then the date of the embargo's enactment. The US representative recommended that country members, excluding the UK, keep ECONAD informed of any Soviet approaches designed to break the embargo.[89]

In March, however, the NAC learnt about the serious problems that Adenauer's government was facing in the German Parliament. The news of the embargo alarmed iron and steel companies, and large sections of the Parliament had opposed the decision, thus further weakening Adenauer's government. It had only avoided a defeat on the embargo resolution by a handful of votes. So, although the situation had been brought under control, the German Chancellor appealed to other NATO members for the blockade to be enforced without producing more crises. This was the only way the government could succeed in implementing the resolution.[90] The oddity of Britain's position was then highlighted by an episode occurring in April 1963, when Stikker was informed by the US government that a British firm, South Durham Steel, was negotiating with the Soviets in regard to LDP purchases. Although the UK had not accepted the embargo, the Americans warned this would seriously put the provision through the wringer. In response to the news, US diplomats contacted their British counterparts to settle the matter. In the same year, the French also reported that an LDP contract with the Soviet Union had been signed by a Japanese firm.[91]

These and other similar attempts to break the embargo did not ultimately succeed. By 1963, France and Italy had refused a number of contracts; the West Germans had embargoed a colossal 203 kt of 40" pipes, despite the order having been placed before the Council's decision. Japan and Sweden also generally cooperated.[92] That the embargo had been successful was also shown by reaction of the Soviet Prime Minister, Nikita Khrushchev who, in a television speech on 27 February 1963, vehemently railed against the embargo. The Soviets

85 NATOA – AC/127-D/107, p. 4; C-M(62)104, secret, 'Soviet Pipeline System, Report by ECONAD,' 29 October 1962, pp. 6-7.

86 NATOA - AC/127-D/107, p. 5.

87 Quoted from: NATOA – AC/127-D/107/1, secret, 'ECONAD, Soviet Pipeline System, Draft Report to the Council, Note by the Secretary,' 19 October 1962, p. 2. The quotes are from: Ibid.

88 NATOA – Annex to AC/127-R/99, secret, 'Soviet Pipeline System, Statement of the United Kingdom Position,' 6 November 1962, pp. 1-2.

89 NATOA – AC/127-R/106, secret, 'ECONAD, Meeting held at the Permanent Headquarters on 7 March 1963, Decision Sheet,' 13 March 1963, p. 1.

90 NATOA – C-R(63)14, secret, 'Summary record of a meeting of the Council, held at the Permanent Headquarters on 20 March 1963,' 27 March 1963, p. 23.

91 NATOA – C-R(63)21, secret, 'Summary record of a meeting of the Council, held at the Permanent Headquarters on 24 April 1963,' 2 May 1963, p. 8; NATOA - AC/127-WP/188/1, secret, 'ECONAD, Sale of large diameter pipe to Soviet Bloc countries - Addendum to the note by the French Delegation circulated as AC/127-WP/188,' 6 October 1966, p. 1

92 NATOA – C-R(63)21, p. 9. However, this last NATO statement is contradicted by Ebel, who claims that Sweden continued to deliver between 40 and 50 kt of pipes a year during the embargo (Ebel, Communist Trade in Oil and Gas, 184).

also complained to Germany, and the blockade was extensively covered in the Soviet media. The construction of the pipeline system was indeed delayed: scheduled to be completed in late 1963, it was only completed a year later.[93] However, the embargo was not able to stop Soviet oil exports to Western Europe, which continued to increase in the early 1960s. By 1970, SNE had been exporting wherever it had found the opportunity.[94]

As for the embargo, it lasted until November 1966, when the French and West German governments requested its cancellation, arguing that its scope had been reached, and that the Soviet rolling mills had by then recovered their backlog.[95] Curiously, the embargo seems to have not so much affected the production of 40" pipes as that of smaller diameters, because in order to offset the amounts of 40" pipe denied by the embargo, the Soviets converted a number of their pipe mills to the production of 40", thus reducing their smaller pipe production capacity.[96]

Conclusions

Were the American and most West European diplomacies really acting in European security interests when trying to limit Soviet oil exports? Historian Geir Lundestad, disagrees, and maintains the USA was more interested in perpetuating Europe's dependence on American national companies. His claim, I believe, can hardly be disproved. Strong economic interests were the elephant in the room at NATO discussions on restraining trade with the Soviets.[97]

In analyzing the debate that took place at the Atlantic Alliance, we saw the emergence of two opposed and incompatible attitudes: on the one side, the US delegation urged other country members to attribute a paramount value to considerations of Western military security, by emphasizing infrastructural improvements the Soviets would gain from the completion of their pipeline system. On the other side, the British delegation stressed the economic reasons underlying their contrariety to an embargo on technological items, which would imperil West European commercial relations with the USSR – and British trade in particular. In the end, the American standpoint prevailed, and most NATO members, even though some of them may not have been convinced that the embargo was the best decision to take, sided with the USA. The price to pay for the American government was the circumstantial cracking of its special relationship with the UK. The embargo was not endorsed by the British government, a decision that was to cause some embarrassment to that very administration when it became known that British steel industries were continuing to trade with the Soviets. What is most interesting in the NATO discussion over the blockade, is the role played by technological artifacts in it. Beyond the Anglo-American security vs. economy debate, the discourse revolved around steel pipes.

For the Americans, an oil pipe was essentially any object that could carry oil regardless of its size or technical characteristics. Essentially. they adopted a prescriptive principle that stretched the definition of an oil pipe so as to include as many steel pipes as possible, and in order to reduce any potential risk. The British and Germans objected to such an all-encompassing

93 NATOA – AC/127-D/220, confidential, ECONAD, "Sale of large-diameter pipe to Soviet Bloc countries - Note forwarded by the Delegations of France and of the Federal Republic of Germany," 29 August 1966, p. 1.

94 Jonathan P. Stern, Soviet Oil and Gas Exports to the West, 27, 30.

95 NATOA – AC/127-D/220, p. 2. See also: NATOA – AC/127-WP/188 (19 September 1966), AC/127-R/185 (same date), AC/127-WP/190 (21 September 1966), AC/127-WP/192 (4 October 1966), AC/127-R/194 (30 January 1967).

96 Ebel, Communist Trade in Oil and Gas, 185, 231. Source reported at p. 231: Vneshnyaya torgovlya, "Lessons of an Ill-Fated Embargo," 12 December 1966: 50-1.

97 Geir Lundestad, The United States and Western Europe since 1945.

definition and sought to distinguish. Oil could be carried only in certain kind of pipes, with well-defined technical specifications, and these pipes should not be lumped together with gas pipes. Vested interests prompted the adoption of either of these definitions.

Technical reports and estimates were wielded as scientific weapons on which to ground attack and defense strategies, and the use to which some kinds of pipes could be put (gas, oil or both) came to be regarded no longer as an eminently technical issue, but as a paradigmatically technopolitical one. Eventually the priority given by the NAC priority to strategic issues over economic ones aligned most NATO members to the American proposal. By the time the embargo was approved in late 1962, no one at NATO – to the notable exception of Britain – seemed to doubt that steel pipes had transformed, from simple metal object, into dangerous threats to the West.

Bibliography

Archival sources

Archives Historiques du Groupe Total, La Défense

Archives Nationales, Pierrefitte-sur-Seine

Archivio storico ENI, Pomezia (Rome)

Archivio storico del Ministero degli affari esteri, Rome

National Archives and Records Administration, College Park, Maryland

NATO Archives, Brussels

The National Archives, Kew

Published sources

Bagnato, Bruna (2003) *Prove di Ostpolitik. Politica ed economia nella strategia italiana verso l'Unione Sovietica, 1958-1963*. Firenze: Olschki.

Barry, Andrew (2013) *Material politics: disputes along the pipeline*. Chichester: Wiley-Blackwell.

Berry, John A. (1972) "Oil and Soviet Policy in the Middle East". *Middle East Journal* 26 (2): 149-60.

Catta, Emmanuel (1990) *Victor De Metz. De la CFP au Groupe Total*. Paris: Total Edition Presse.

Creager, Angela N. H. (2009) "Radioisotopes as Political Instruments, 1946-1953". *Dynamis* 29: 219-39.

Doel, Ronald E. (2003) "Constituting the Postwar Earth Sciences: The Military's Influence on the Environmental Sciences in the USA after 1945". *Social Studies of Science* 33 (5): 635-66.

Doel, Ronald E. (2010) "Does scientific intelligence matter?" *Centaurus* 52 (4): 311-22.

Ebel, Robert E. (1970) *Communist Trade in Oil and Gas.* New York/Washington/London: Praeger.

Haney, Patrick J., and Walt Vanderbush (2005) *The Cuban Embargo: The Domestic Politics of an American Foreign Policy.* Pittsburgh: University of Pittsburgh Press.

Hecht, Gabrielle (1998) *The Radiance of France: Nuclear Power and National Identity after World War II.* Cambridge, Mass./London: MIT Press.

Hecht, Gabrielle (2010) "The Power of Nuclear Things". *Technology and Culture*, 51 (1): 1-30.

Hecht, Gabrielle (2012) *Being Nuclear: Africans and the Global Uranium Trade.* Cambridge, Mass./London: MIT Press.

Hoskins, Halford L. (1962) *Problems Raised by the Soviet Oil Offensive.* U. S. Senate. Committee on the Judiciary. Committee Print. Washington: U. S. Government Printing Office.

Hoskins, Halford L., and Leon M. Herman (1961) *Soviet Oil in the Cold War.* U. S. Senate. Committee on the Judiciary. Committee Print. Washington: U. S. Government Printing Office.

Jensen-Eriksen, Niklas (2012) "The Cold War in Energy Markets. British Efforts to Contain Soviet Oil Exports to Non-Communist Countries, 1950-1965". In Alain Beltran (ed.) *Le pétrole et la guerre/Oil and War. Series Enjeux internationaux*, 21, 191-208. Brussels: Peter Lang.

Jensen-Eriksen, Niklas (unpublished) "British government, business and the Soviet Cold War oil offensive, 1957-1964". Paper presented at the 16th Annual Conference of the European Business History Association, and 1st Joint Conference with Business History Society of Japan, Paris, 30 August - 1 September 2012.

Krige, John (2006) *American Hegemony and the Postwar Reconstruction of Science in Europe.* Cambridge, Mass./London: MIT Press.

Lotysz, Sławomir (unpublished) "Democratizing access to modern drugs in postwar Eastern Europe". Paper presented at: Democracy and Technology. Europe in Tension from the 19th to th 21st Century. 6th Plenary Conference of Tensions of Europe. Université Paris-Sorbonne, 19-21 September 2013.

Lundestad, Geir (2009) *The United States and Western Europe since 1945.* Oxford: Oxford University Press.

Mitchell, Timothy (2009) "Carbon democracy". *Economy and Society* 38 (3): 399-432.

Mitchell, Timothy (2011) *Carbon Democracy: Political Power in the Age of Oil.* New York: Verso.

Nuti, Leopoldo (1998) "Commitment to NATO and Domestic Politics: the Italian Case and Some Comparative". *Contemporary European History* 7 (3): 361-77.

Pinch, Trevor J., and Wiebe E. Bijker (1984) "The Social Construction of Facts and Artefacts: Or How the Sociology of Science and the Sociology of Technology Might Benefit Each Other". *Social Studies of Science* 14 (August 1984): 399-441.

Rachkov, Boris (1966) "Oil, Trade, and Politics". *International Affairs* 12: 14-20.

Reynolds, David (1985-6) "A 'Special Relationship'? America, Britain and the International Order Since the Second World War". *International Affairs* 62 (1): 1-20.

Schwab, Peter (1999). *Cuba: Confronting the U.S. Embargo.* New York: Palgrave Macmillan.

Spencer, D. L. (1966) "The Role of Oil in Soviet Foreign Economic Policy". *American Journal of Economy and Society* 25 (1): 91-107.

Stern, Jonathan P. (1987) *Soviet Oil and Gas Exports to the West: Commercial Transactions or Security Threat?* Aldershot: Gower.

Turchetti, Simone (2012) "Sword, Shield and Buoys: A History of the Nato Sub-Committee on Oceanographic Research, 1959–1973". Centaurus 54 (3): 205-231.

Whidden, William R. (2009) *Buried flexible steel pipe: design and structural analysis.* Reston, VA: American Society of Civil Engineers.

Yergin, Daniel (2009) *The Prize: The Epic Quest for Oil, Money, and Power.* 2nd edition. New York: Simon & Schuster.

1914-14 NATO Graphics & Printing