

Report of the Roundtable

Chairpersons: Kai-Uwe Schrogl (Germany), Geir Houmork (Norway)
Rapporteur: Isabelle Duvaux-Béchon (France)

Global warming is particularly visible and challenging at the Poles. Following the changes in the climate and supporting the evolution of the activities in these regions are and will be challenging tasks that will benefit from actual and future satellite systems and applications and cannot be done without. The Treaties and agreements governing the activities in the Arctic and the Antarctic are important elements that frame the activities and the involvement of States in the area.

The topic of “Space and the Polar Regions” attracted some 30 to 40 conference participants to the IAA/IISL Scientific-Legal Roundtable. As in the previous years the IAA/IISL Scientific-Legal Roundtable could benefit from the participation of the President of the IISL, Tanja Masson-Zwaan, and the Secretary General of the IAA, Jean-Michel Contant, who had been invited by the IAA/IISL Scientific Legal Liaison Committee, chaired by Kai-Uwe Schrogl. They delivered the welcome speeches for this Roundtable. The Chairmen introduced the topic and the speakers. Five of the six expert speakers who had been invited were present and introduced their view on the topic.

Stephan Hobe presented the governance and legal issues regarding the polar regions with the difference between the Arctic governed mainly by the Convention on the Law of the Seas of 1982, because most of it is covered by oceans and the Antarctic governed by the Antarctic Treaty of 1959, that entered into force in 1961 and that is still valid. No economic activities, except some tourism are allowed in the Antarctic and new claims on territories are not acceptable. For the Arctic, a certain number of open questions still exist, for example on claims for outer continental shelves or the status of the passages. One million inhabitants live in this region that will likely see an increase of the economic activity because of the global warming. The Arctic Council has been created in 1996 and is composed of the Arctic States, representatives of the indigenous populations and observers.

Isabelle Duvaux-Béchon presented the activities linked to the poles that are performed at ESA, the European Space Agency, and the concept behind the support provided by space to the activities and understanding of these regions. Space is a tool that, given the remoteness and harsh environment of those regions, is compulsory, even if not solving all problems. For the Arctic, space can support a better knowledge of the region and of its evolution, as well as the economic development and security and safety of the activities. For the Antarctic, space is providing support to research activities, safety and security, but also

the Antarctic supports space activities by providing a test base for technologies or human exploration. It has been recognised by all actors that the need of broadband telecommunications is what will be the most important in the next years for both regions. Analysis of policies helps identifying where and how space can help.

Lauren Small-Pennefather recalled that $\frac{1}{4}$ of the Arctic was located in Canada. This part of the Arctic is composed of three territories with characteristics of potential resources, low population and relatively new self-government. The historical use of space covers telecommunications, remote sensing, navigation and search & rescue. Users include the indigenous / local populations, industry, government and defence, scientists. Challenges are data continuity, dissemination of data, fusion of data from different origins and in-situ validation. Many actors in Canada and outside collaborate on a daily basis.

Toru Fukuda concentrated on space applications for transportation describing the Japanese mission “Global Change Exploration” with microwave scanning radiometer for water-related geophysical parameters. Daily updated sea ice information is being provided. There is also an identified need for telecommunication satellites to transmit this sea-ice information, as well as for navigation satellites.

Bo Andersen confirmed that climate changes imply Arctic changes and that all science and applications in the Arctic require space, which is the necessary tool. Moreover, international collaboration is the only way to develop space means and applications. Large reproductive resources and potentially large mineral resources, as well as potentially new sea routes exist. There is a need for daily monitoring of the waters as there are 400 to 800 ships every day moving in the waters north of the Arctic Circle, 55% to 85% of them being in Norwegian waters. AIS (Automatic Identification System) and radar satellites are being used to monitor ships, identify illegal fishing (this has decreased since monitored with increase of fish stock accordingly), detect oil spills and find where fish goes (following fishing ships, cod moving North with global warming). The real problem is with broadband communication north of 72°. Concerning the Northern sea route, 46 vessels used it in 2012 and this might go up to 100 per year (to be compared to 20,000 per year via the Suez Canal). Other routes 25% shorter than the Northern sea route (passing closer to the North Pole) might be used in the future with high ice-class vessels that can reach 5 knots in 1m ice thickness. There is today no capability to rescue in the high North.

Subsequently, both the speakers and the audience engaged in a lively discussion addressing diverse aspects of the topic. The following conclusions and key points have to be noted:

- It was recognised by all participants that space systems are needed to support the knowledge of these regions and the development of the activities in the Arctic
 - Space is an enabler addressing the gaps supporting knowledge building, accountability
 - Space is providing a service that will put the actors in a better position to act and react and all means should be used to pass the message

- The Arctic and the Antarctic are adequately covered by polar orbiting satellites; long-term operational science is existing
 - For telecommunication there is a strong identified need for broadband communications – however there is no commercial basis for providing service for itself; there is the need for government support and involvement and any project will likely be a combination of government and private
 - AIS is crucial and should be guaranteed (even if private exists) or it might not exist anymore in a few years
 - Russia is developing the “Arktika” system with two or three satellites today plus a constellation, in two orbits – first new satellites in 2015 – for hydro-meteorology monitoring, safety of navigation, surveillance of oil/gas pipelines and transport, fisheries, people
 - Example was given of the Norwegian Ministry for Fisheries who is paying for a satellite, showing that the message is passed and received about the need of space
 - Continuity of data has to be ensured
- Arctic policies have been defined by the States active in the region
 - Describing general needs - complemented in Norway by a white paper stressing that it cannot function without space - there is a growing emphasis put on the Northern areas; space budget was increased recently
 - Space is one of the tools identified in the strong Canadian Northern policy
 - The EU has also an Arctic policy and an accompanying document on space for the Arctic was elaborated with ESA, recognising the role of space
 - For Russia, Arctic is a strategic region, with claims on continental shelf - very soon there will be a separate federal target programme on “socio-economic development of Russia and its regions”
 - For Australia, there exist claims on continent and waters for the Antarctic and there is a considerable development of environmental principles – a new space policy was recently released; emphasis is put on monitoring the waters; Australia depends on other countries for technology
 - Space policies are building and should build on the Arctic policies (national, EU...) analysing if or how space can be involved
- Different considerations exist depending on the States:
 - For Canada: budget, robust policies, interoperability issues, contingency, adequate resources, filling gaps, respecting legislations, translating and using traditional knowledge
 - For Japan, the priorities are: security, then industrial development, then science
- Global warming is a great concern (and the tendency is confirmed by the recent report from IPCC)
 - It might be seen as a threat (and States will have to adapt, not only at the Poles) or an opportunity (development of economic activities in the

- Arctic) that might also lead to an amplified threat (more global warming if more activities in the North) – in all cases space is an indispensable tool
- Can space activities at the end be detrimental to the environment when supporting the development of the economy in the North?
 - On the other hand, IPCC report is possible only because of space, even if people get used to space and do not care of where the data are coming from
 - How to push some major polluting countries to adjust?
 - We have to take care of our space ship, the Earth, on the long-term be able to manage the warming or control some parameters
- No State can act alone, all have to cooperate
 - For global space solutions
 - For the solution to continental disputes (only Norway has no remaining conflict on that)
 - There will not be an Arctic treaty modelled on the Antarctic one (would not be accepted by the Arctic States) – still States are and will have to cooperate, in particular via the Arctic Council
 - The question was asked of the likelihood of an Intelsat type set of agreement if ice continues melting
 - GEOSS (Global Earth Observation System of Systems) and CEOS (Committee on Earth Observation Satellites) framework for cooperation in earth observation – the question is open of collaboration with private companies e.g. in telecommunications

Table of Speakers

| | Name | Presentation | Institution, Country |
|---|--------------------------|--|--------------------------------|
| 1 | Stephan Hobe | Governance and legal issues regarding the polar regions | University of Cologne, Germany |
| 2 | Isabelle Duvaux-Béchon | Space applications for the polar regions – an overview | ESA, France |
| 3 | Lauren Small-Pennefather | Focus on space applications for resource management in the polar regions | CSA, Canada |
| 4 | Toru Fukuda | Space applications for transportation in the polar regions | JAXA/EORC, Japan |
| 5 | Bo Andersen | Marine and maritime monitoring in the Arctic | Norwegian Space Centre, Norway |