



MORSE Concept Paper

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Introduction

Arctic coastal areas are a unique and important part of the Earth system from a historical, environmental, social, economical and political perspective. Environmental concerns and considerations over sovereignty as well as safety and security have sparked and renewed interest in the Arctic at local, national and international levels. Given the importance of the Arctic coastal zone to human endeavour and the sensitivity and susceptibility of the entire Arctic to global climate change, it is imperative to monitor, observe and understand the processes affecting these vast and thinly populated areas. Earth Observation satellites are important tools to accomplish these tasks.

Scope

Remote sensing satellites can provide a cost effective means of obtaining Earth Observation (EO) information in the vast, barren and often inaccessible Arctic areas and their coastal zones. To this end, the Canadian Space Agency (CSA) and the European Space Agency (ESA) have initiated an inter-agency activity to develop and demonstrate the use of EO data for monitoring coastlines and coastal processes in the Arctic.

The joint MORSE will foster the assessment, development, and exploitation of the broad spectrum of capabilities offered by existing CSA, ESA and ESA third party satellite missions. MORSE will:

- ✓ Open a dialogue with End-Users to understand their needs and requirements
- ✓ Demonstrate how space based measurements can contribute to and support Arctic coastal issues and activities through new and innovative EO applications
- ✓ Provide institutions and companies access to new EO products and services
- ✓ Foster the development of Canadian and European EO expertise that is directly linked to and in support of climate change, environmental security, economic development, sovereignty, and the people in the Arctic.

MORSE will directly engage governmental, industrial, academic and non-governmental organisations by supporting the integration of EO data into

operational and research activities for Arctic coastal zone monitoring and management.

MORSE will address the following Arctic coastal themes:

1. Mapping, Characterization and Changes with Time of Arctic Coastal Areas

This theme encompasses cartographic information in Arctic coastal areas, where up to date cartography is often scarce. It will also address characterization and physical changes with time due to coastal processes and dynamics.

2. Environmental Monitoring of Land, Water and Air in Arctic Coastal Areas

This theme includes environmental monitoring of land, water and air in the Arctic coastal transition zone. Environmental monitoring covers physical, chemical and biological issues, and usually implies revisits with sufficient frequency to detect trends and short-term changes.

3. Sustainable Economic Development of Natural Resources in Arctic Coastal Areas

This theme addresses mapping and monitoring of Arctic coastal regions to support economic activities including the exploitation of natural resources and also transportation, by land, water and air.

4. Safety and Emergency Response in Arctic Coastal Areas

This theme covers aspects of monitoring in order to improve safety in the coast zone and to support emergency response to both natural and man-made conditions.

5. Security and Sovereignty in Arctic Coastal Areas

This theme covers monitoring in Arctic coastal areas to support the protection of humans, wildlife and property and the terms of the United Nations Convention on the Law of the Sea (UNCLOS).

There is clearly some overlap among the themes but they are intended to structure the work for greater effectiveness. Participants are asked to use the definitions to find the best home for each potential activity.

Implementation

MORSE will be conducted and managed by the ESA Data User Element (DUE) program and the CSA Earth Observation Applications and Utilization (EOAU) User Niche Program. Starting in 2009, both agencies will provide multi-year funding for MORSE activities under their respective frameworks and programs. In Canada, sources of financial support include the GRIP, EOADP and the Grants & Contributions funds (see www.space.gc.ca); ESA funding will be provided under the DUE and the EO Innovator programs (see dup.esrin.esa.it).

At the outset of the MORSE initiative, CSA and ESA are planning to implement the following elements:

1. Identification of End-User Communities

The MORSE initiative will engage the End-User organizations involved in coastal zone management with the stated interest of improving the integration of Earth observation data and information products into operational services and to assist in fulfilling their mandates.

2. End-User Consultation and Definition of their Information Needs

For the purpose of exploring the possibility of developing a MORSE concept, it is necessary to confirm the coastal community's high-level information needs, and to assess the extent of the potential interest in participating in space borne monitoring and mapping initiatives. This will be done through the MORSE User Consultation Workshop.

The objective of the workshop is to bring together the Arctic coastal stakeholders and those from the Earth Observation community, and gain a better understanding of the information needs, and to what extent Earth Observation can help to satisfy them.

This workshop is a unique opportunity for End-Users to present their information needs, particularly those that present challenges for current techniques. Workshop participants will be invited, together, to identify the highest priorities of products and services to be developed, demonstrated and operationalized.

A MORSE position paper will be formulated based on the workshop conclusions.

3. Development of Partnerships with End-User Organizations

The purpose of this task is to engage the End-User organizations with the space agencies in the implementation of EO-based solutions in direct response to their expressed needs. The partnership will define roles and responsibilities of the involved parties within the context of the project implementation. The End-Users are requested to be closely involved in the call for proposals, proposal review, project selection, and project implementation.

4. Development of Products and Services, and Demonstrations towards Operationalization

Based on the prioritized User Needs, the space agencies will seek the participation of industry and academia through a Request for Proposal (CSA) and Invitation to Tender (ESA) for the successful fulfilment of the MORSE initiative objectives. Industry and academic partners will be requested to respond to product and service requirements. The implementation will also include review and selection of projects and portfolio harmonization between CSA and ESA. A mechanism will be

established to ensure international collaboration and minimize redundant or duplicate activities among the agencies.

5. Outreach and Sharing of Results

The MORSE reporting framework will focus on joint CSA/ESA outreach activities and sharing of information and results. The activities under each agency will be pooled and coordinated in order to provide harmonized reporting on contributions, results, and achievements. The following elements are proposed:

- ✓ A series of MORSE workshops (mid-term and final progress workshops)
- ✓ Harmonized reporting to National and International organisations, as well as to regional institutions and governments
- ✓ The development of a MORSE newsletter, web site (news, data, etc.) and other outreach products.

EO data availability and sharing

EO data required for the implementation of the projects under the MORSE activity will be made available by CSA and ESA. The data available includes Canadian (e.g. RADARSAT-1 and -2) and European satellite platforms (e.g. ERS-1 and -2, Envisat, Metop, Meteosat, SMOS) and ESA third party missions. The data distribution will comply with the respective data policies enforced by the respective agencies.

Targeted End-user Partners

The types of End-Users that are targeted as partners include:

- National Departments of Environment and Meteorology
- National Ice Services
- First Nations
- National Departments of Fisheries and Oceans
- National Departments of National Defence
- National Geological Surveys
- Government Research Institutions involved in Arctic and Polar research
- National Departments of Natural Resources
- National Departments of Transport
- Universities
- National and international Arctic research and knowledge networks
- Industry (e.g. Oil & Gas, EO service providers, transportation, etc.)
- Provincial, territorial and local governments and northern communities
- Non-governmental organizations

MORSE Web Site

For more information, please see www.morse-arctic.net.