



## C-SIGMA

### Collaboration in Space for International Global Maritime Awareness Stepping stone to Arctic Surveillance.

Implementing C-SIGMA could well be the key to Arctic surveillance. The obverse is also true. Implementing C-SIGMA in the Arctic could be the needed stepping stone to the implementation of Global Maritime Awareness for the betterment of the world. Both are needed. A careful study of the problem will most likely show the benefits far outweigh the costs. At a minimum such a study should be undertaken.

In the last few years there has been a revolution in space-based Earth observation systems and, led by space-based AIS, their utility over the world's waterways has increased dramatically. These capabilities not only support safety and security at sea but can also significantly assist in economic and environmental stewardship and resource protection. This is especially true of the remote areas of the world such as the Arctic, and the resource rich areas in the underdeveloped world such as the Gulf of Guinea and the Indian Ocean. Thus the potential contributions of space-based Earth observation systems to global maritime awareness is of growing interest to the world's naval and law enforcement forces, as well as to environmental preservationists, governmental transport, commerce, maritime and environmental protection ministries in addition to ship operators, brokers, and others with an interest in the marine environment, and the protection its resources.

It is widely recognized that no one single country or international organization has the ability and resources to fully support safe, secure and efficient use of the maritime domain as well as the conservation and protection of the marine environment with its finite resources of fish, minerals and oil, as well as assist oceanic commerce. Substantial international collaboration is essential to achieving these objectives in a balanced manner. Indeed, this effort may need to be managed by an agency of the United Nations. Among the greatest need, as well as the greatest opportunities for international collaboration are presented by the effort to coordinate the technology now available for detecting, identifying and tracking vessels well offshore. These systems are especially suited in areas with shared international interests such as the Arctic, or in pirate infested waters, or in areas known to support smuggling or resource theft of all types.

There are four basic types of space-based systems that must be integrated for effective results.

Two of the four employ imaging sensors:

1. Synthetic aperture radar satellites (SARsats)

2. Electro-optical (EO) imaging satellites

The other two are based on communications systems:

3. Individual transponders sending short formatted reports to communications satellites

4. Automatic Identification System (AIS), an automated short message system designed for ship collision avoidance and traffic control in congested waters but is now also used as a primary ship identification and tracking system.

The C-SIGMA concept brief explores those capabilities and how they are be used for maritime awareness, and the possibilities of linking them together globally for international GLOBAL MARITIME AWARENESS .

This concept directly supports the US National Space Policy (June 2010) and would go a very long way in satisfying NSP Implementation Task #1.

It could also go a long way toward satisfying many of the Arctic Council's need for surveillance to protect the maritime environment of the Arctic. Implementing C-SIGMA would provide a focal point for the efforts to achieve the common goal of protecting the Arctic environment. Space based earth observation does not solve all problems, but it does go a long way in starting to bound the core problem of knowing who is where in the Arctic.