EARTH OBSERVATION SYMPOSIUM (B1)
Poster Session (P)

Author: Mr. Simone La Torre
International Space University (ISU), France, simone.latorre@yahoo.it

Mr. Massimo Pellegrino
International Space University (ISU), France, massimo.pellegrino@isu.isunet.edu

ADVANCED DATA MANAGEMENT SYSTEM (ADAMS) FOR EARTH OBSERVATION IN RESTRICTED ACCESS AREAS.

Abstract

Earth observation is too often related to the assumption that the environment can be adequately monitored via remote sensing assets.

However, this is not realistic in restricted access areas (e.g. the Arctic region) where, to collect data points, the space-born sources alone cannot ensure a sufficient monitoring process. As a consequence, the common approach is to collect data from a variety of sources (both from space and in-situ) and to display it via a web platform or a proprietary software, in the form of multi-layer high-utility maps (i.e. for disaster management and/or situational awareness).

The existing monitoring systems for the restricted access regions are all affected by the same limitation: for each parameter of interest they collect data points from different sources but, because they consider all the sources as independent, they end up displaying a number of maps equal to the number of sources. As a consequence, redundant maps to visualize a single parameter are built (e.g. one map could show the temperature profile given by a space instrument and another map could display the temperature profile in the same area, relying on data points collected by one in-situ instrument). Generally, these maps are then graphically overlapped to provide users with the "best effort" situational awareness. However when more superimposed maps are displayed for the same parameter, problems with interpretation and responsiveness of decision-making process are likely to happen.

To solve this limitation, an "Advanced Data Management System" (ADaMS) is necessary. Its novelty factor is the integration and merging of data points, coming from different sources (both quantitative and qualitative), to build a single comprehensive map for each discrete parameter (e.g. the temperature coming from four different data sources must be integrated and merged to build one single temperature profile map).

Regarding quantitative parameters, ADaMS is not only able to merge them in a mathematically efficient way, but it is also capable of excluding inaccurate inputs via a comparative recognition procedure; regarding the qualitative parameters, ADaMS takes into account precise norms and procedures to convert the qualitative knowledge into quantitative information, via a combination of the fuzzy logic approach with the dual truth model. To create reliable maps, ADaMS recognizes that a quantitative-born data point is intrinsically more accurate and precise than a qualitative-born value converted to the quantitative domain.