



A Portal to Atmospheric and Marine Information Resources (PAMIR)

Contract BR/132/A6/PAMIR

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Summary

Context

The Global Earth Observation System of Systems (GEOSS) aims at providing decision makers worldwide with a wide range of information and decision-supporting tools in nine *societal benefit areas* (SBA), namely disasters, energy, agriculture, biodiversity, ecosystems, health, climate, water and weather. Europe contributes to the GEOSS through the European Global Satellite-Based Navigation System Galileo, the Programme for the Establishment of a European Capacity for Earth Observation Copernicus, and the Infrastructure for Spatial Information in the European Community INSPIRE.

A key driving factor of the PAMIR project, the INSPIRE Directive applies to any dataset in electronic format which possesses a geographic extent or is related to some geographic location. Its double objective is to harmonise such datasets over the European continent and to make them available to the community (citizens, administrations, environment agencies, universities, research institutions, hospitals, doctors, policy makers, etc.) all over Europe, through a network of information facilities. The many *data themes* targeted by INSPIRE include *atmospheric conditions, meteorological geographical features and oceanographic geographic features*.

Objectives

PAMIR aimed at exploring common and specific aspects of atmospheric and oceanographic data validation and documentation in order to generate harmonised practice guidelines and tools in compliance with international standards. Its objectives included the elaboration of a metadata scheme virtually applicable to any scientific atmospheric or oceanographic dataset, with the purpose of providing Belgian federal scientific institutes with a consistent common framework to document such data holdings and to comply with their reporting obligations set by the applicable European directives.

It is in the nature of terrestrial physical processes to deploy themselves in the full four-dimensional spatiotemporal space. Variables describing the oceans and atmosphere extend along time and the vertical as much as over horizontal dimensions. The pressure gradient along the vertical is one of



the major triggers of movement and chemical transformation of water and air masses at large scales. As for time, it is embedded in the notions of movement and transformation themselves. Moreover, by definition, monitoring changes in the Earth system (e.g. climate change) implies taking time into consideration. Based on actual examples, this project explored current possibilities of representing fully 4-dimensional Earth datasets, or datasets essentially depending on the vertical and/or on time, in the INSPIRE formalism, primarily designed to support the representation of data depending on longitude and latitude.

Methodology

Work was divided into the following tasks.

- (1) Inventory the resources and practices in use in each partner's community.
- (2) Derive common principles and identify domain-specific features.
- (3) Build up an appropriate common conceptual scheme and map it to international standards.
- (4) Test the validity of the scheme against use cases.
- (5) Design and develop a practical instrument underpinned by the conceptual scheme (this task ended up to be replaced by the investigation of existing tools and the selection of one of them).
- (6) Integrate the tool to the project website and populate it with examples.

Results

PAMIR has shown the ability of the ISO 19115 norm for geographic metadata to fit the needs of the atmospheric and oceanographic communities in Belgium. The INSPIRE implementing rules based on ISO 19115 leave open the possibility to make use of the full standard, only formulating guidance for the elements pertaining to the INSPIRE Regulation. Metadata elements of a general atmospheric metadata theoretical model have been mapped to the ISO 19115 standard, showing that the latter, already widely used by the marine community, is fit for purpose for air, meteorology and climate data.

PAMIR has investigated practical tools to edit and catalogue metadata. Based on various criteria, GeoNetwork was identified as the best suited existing instrument to document ocean and atmosphere datasets of the partners' institutes in an INSPIRE-compliant way. A deliverable of the project, the GeoNetwork multi-task tool was implemented and tested against example datasets, and was integrated to the project website at <http://pamir.aeronomie.be/>.

The project fostered the partner institutes' capacity to comply with their reporting duties set by the INSPIRE Monitoring and Reporting Decision and, for the marine environment, by the Marine Strategy Framework Directive.

Keywords

Interoperability / Metadata / Quality / Spatial data infrastructure