Chapter 4
A Methodology for Effective Metadata Design in Earth Observation

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ABSTRACT

The satellite images have become an essential source of information to address and analyze environmental issues quickly, repeatedly and in a reliable way. The increasing number of remotely sensed images are the first impediments for data discovery, access and processing. In this context, it is critical to simplify efficient multi-sensors image-based data access and query processing to provide accessibility to a variety of users in remote sensing. Describing satellite images through a metadata application profile may leverage capabilities to promote easy use of satellite image for environmental analysis. Accordingly, an application profile conforming to the Dublin Core Application Profile guidelines and designed for Earth observations data have been developed. The aim is to provide insights of key methodological considerations in relation to the design of this profile called EOAP (Earth Observation Application Profile).

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1. INTRODUCTION

Satellite images have become an essential source of information to address and analyze environmental issues quickly, repeatedly and in a reliable manner. The technical diversity of satellite sensors as well as their increasing number allow satellite images to be considered as unprecedented sources of information, richer and precise enough to deliver new insights or capabilities, such as a novel understanding of ecosystem dynamics or the monitoring of environmental changes at a local scale. However, the ever-increasing number of remotely sensed images as well as their large-scale availability form the first barrier to data discovery, access and processing. In such a context, it is critical to simplify efficient multi-sensor image-based access and processing so that a large variety of users, both experts and non-experts in remote sensing, can draw benefit from them.

To facilitate geospatial data sharing, many initiatives have emerged from the Earth-observation community (space agencies, industry) or from the broader environmental community, whether they are national (THEIA[1]), European (INSPIRE[2], COPERNICUS[3]) or global (GEOSS[4]). In most cases, access to the images is made possible by the deployment of a spatial data infrastructure that provides access to distributed and heterogeneous data (Maguire & Longley, 2005; Friis-Christensen et al., 2007). This infrastructure provides access to images through web services discovery allowing them to be viewed and downloaded, and, in some cases, processed online. These facilities require the implementation of an interoperability framework, which relies primarily on the adoption of a specific metadata standard by the user community or of its adaptation. It is the basis for the implementation of image access and processing services.

However, these different distribution hubs are weakly interconnected and do not provide a comprehensive view of available images as end-users would expect. Therefore, users have to expend substantial effort to take advantage of the multiple platforms available for image distribution to identify, select and subsequently process images that meet their needs. Indeed, the design process that led to these developments is domain-specific and produces heterogeneous metadata schemes. This makes it difficult to implement common tools for image discovery. Nevertheless, various interoperability frameworks have been defined in the field of Earth observation. They offer metadata schemes that take the common needs of multiple users from various communities into account. The resulting scheme usually corresponds to the core elements of a standard. It provides general information about the resource to meet the needs only of discovery and localization.