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## Current status of the Essential Variables as an instrument to assess the Earth Observation Networks in Europe

Palma Blonda (1), Joan Maso (2), Antonio Bombelli (3), Hans Peter Plag (4), Ian McCallum (5), Ivette Serral (2), and Stefano Stefano Nativi (6)

(1) Consiglio Nazionale delle Ricerche, Istituto di Studi sui Sistemi Intelligenti per l'Automazione. CNR-ISSIA. Bari, Italy, (2) CREA, Bellaterra (Barcelona), Spain, (3) CMCC Foundation, Euro-Mediterranean Center on Climate Change, Lecce, Italy., (4) Old Dominion University, Norfolk, Virginia, USA, (5) International Institute for Applied Systems Analysis. IIASA. Laxenburg, Austria, (6) Consiglio Nazionale delle Ricerche. Istituto sull' Inquinamento Atmosferico. CNR-IA. Firenze. Italy

ConnectinGEO (Coordinating an Observation Network of Networks EnCompassing satellite and IN-situ to fill the Gaps in European Observations" is an H2020 Coordination and Support Action with the primary goal of linking existing Earth Observation networks with science and technology (S&T) communities, the industry sector, the Group on Earth Observations (GEO), and Copernicus. The project will end in February 2017.

Essential Variables (EVs) are defined by ConnectinGEO as "a minimal set of variables that determine the system's state and developments, are crucial for predicting system developments, and allow us to define metrics that measure the trajectory of the system". . Specific application-dependent characteristics, such as spatial and temporal resolution of observations and data quality thresholds, are not generally included in the EV definition.

This definition and the present status of EV developments in different societal benefit areas was elaborated at the ConnectinGEO workshop "Towards a sustainability process for GEOSS Essential Variables (EVs)," which was held in Bari on June 11-12, 2015 ([http://www.gstss.org/2015\\_Bari/](http://www.gstss.org/2015_Bari/)). Presentations and reports contributed by a wide range of communities provided important inputs from different sectors for assessing the status of the EV development.

In most thematic areas, the development of sets of EVs is a community process leading to an agreement on what is essential for the goals of the community. While there are many differences across the communities in the details of the criteria, methodologies and processes used to develop sets of EVs, there is also a considerable common core across the communities, particularly those with a more advanced discussion. In particular, there is some level of overlap in different topics (e.g., Climate and Water), and there is a potential to develop an integrated set of EVs common to several thematic areas as well as specific ones that satisfy only one community.

The thematic areas with a more mature development of EV lists are Climate (ECV), Ocean (EOV) and Biodiversity (EBV). Water is also developing a set of EVs in GEOSS. Agriculture is working with a common set of variables that can be considered essential to them such as Crop Area, Crop Type, Crop Condition, etc.. More work is required for an agreement on other sets of EVs for Disasters, Health and Ecosystems.

Being cross-domain topics, these areas can make use of existing sets of EVs (such as ECVs, EOVs and EBVs) complemented by socioeconomic variables that can help to characterize services (e.g., ecosystem services) to human societies. Renewable energy also makes use of the ECVs but there is a need for additional ones: solar surface irradiance and wind at different heights are good candidates to explore.

ConnectinGEO will link with Climate, Ocean and Biodiversity communities and support Water, Agriculture, Renewable Energy, Health, Disasters and Ecosystems to make progress in the EV development by stimulating the debate in their respective international forums (mainly in GEOSS). The final objective is to foster EV extraction from the integrated use of in-situ and satellite Earth Observation data.