

## Importance Of Fiducial Reference Measurements For Satellite Earth Observation Characterisation

B. R. Bojkov<sup>1</sup>, A. von Barga<sup>2</sup>

<sup>1</sup> European Space Agency (ESA), Earth Observation Mission Management Division,  
Via Galileo Galilei, Frascati (RM), 00044, Italy – Bojan.Bojkov@esa.int

<sup>2</sup> German Aerospace Center (DLR), Space Administration, Earth Observation, Königswinterer Str. 522-524, 53227 Bonn, Germany

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### ABSTRACT:

Earth observation (EO) from satellites has revolutionised our view of the Earth’s atmosphere, the oceans, land and the solid-earth sciences. Due to these advances, EO offers an enormous potential for continuous monitoring the state of the environment, for examining the planet’s response to the changes in the climate, and services. As such, satellite instruments and their measurements are playing an increasingly important role in supporting the formulation, management and stewardship of our environments policies.

Starting with the first Earth Observation (EO) satellite TIROS-1 in 1960, a rigorous instrument calibration, a continuous monitoring of sensor performance and an extensive validation of the derived products, using independent high-quality in-situ measurements, or Fiducial Reference Measurements (FRM), have been key to any successful mission. Long-term data quality requirements, such as for climate change or for data preservation, have added to the importance of the continuous characterization of sensors and the validation of products across missions using FRM. In addition, the development in recent years of “down-stream” applications and services using space-borne data have increased the need for documented end-to-end characterization of the EO sensors and their derived products.

It is essential for all space agencies to ensure that an uninterrupted stream of high quality, well-calibrated FRM are available to scientists and policy makers to address strategic issues of national, European and global significance. As far as calibration and validation (Cal/Val), and data quality are concerned, many issues such as interoperability between EO sensors and products have led to coordinated efforts in the Cal/Val methodologies through the Committee on Earth Observation Satellites Working Group Cal/Val (CEOS/WGCV) and World Meteorological Organization’s Global Space-based Inter-Calibration System (WMO/GSICS), leading to the establishment of QA4EO guidelines by CEOS/WGCV and their subsequent adoption by the Group on Earth Observation (GEO). These efforts need however an improved coordination across the space agencies and international bodies, especially in regards to the Fiducial Reference Measurements infrastructure, measurement planning and the use of best practises across common activities.