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## **Aerial Campaigns for Cal/Val purposes in the Context of Copernicus - Survey Results of the Project “Copernicus Cal/Val Solution (CCVS)”**

**Stefanie Holzwarth**<sup>1</sup>, Martin Bachmann<sup>1</sup>, Bringfried Pflug<sup>1</sup>, Aimé Meygret<sup>2</sup>, Caroline Bès<sup>2</sup>, Céline Tison<sup>2</sup>, Clémence Pierangelo<sup>2</sup>, Patrice Henry<sup>2</sup>, Frederik Tack<sup>3</sup>, Michael van Roozendaal<sup>3</sup>, Bernardo Motta<sup>4</sup>, Martin Ligi<sup>5</sup>, Riho Vendt<sup>5</sup>, and Sébastien Clerc<sup>6</sup>

<sup>1</sup>German Aerospace Center (DLR), Germany ([stefanie.holzwarth@dlr.de](mailto:stefanie.holzwarth@dlr.de))

<sup>2</sup>Centre National d'Etudes Spatiales (CNES), France

<sup>3</sup>Royal Belgian Institute for Space Aeronomy (BIRA-IASB), Belgium

<sup>4</sup>National Physical Laboratory (NPL), UK

<sup>5</sup>University of Tartu, Estonia

<sup>6</sup>ACRI-ST, France

The objective of the H2020 project “Copernicus Cal/Val Solution (CCVS)” is to define a holistic Cal/Val strategy for all ongoing and upcoming Copernicus Sentinel missions. This includes an improved calibration of currently operational or planned Copernicus Sentinel sensors and the validation of Copernicus core products generated by the payload ground segments. CCVS will identify gaps and propose long-term solutions to address currently existing constraints in the Cal/Val domain and exploit existing synergies between the missions. An overview of existing calibration and validation sources and means is needed before starting the gap analysis. In this context, this survey is concerned with measurement capabilities for aerial campaigns.

Since decades airborne observations are an essential contribution to support Earth-System model development and space-based observing programs, both in the domains of Earth Observation (radar and optical) as well as for atmospheric research. The collection of airborne reference data can be directly related to satellite observations, since they are collected in ideal validation conditions using well calibrated reference sensors. Many of these sensors are also used to validate and characterize postlaunch instrument performance. The variety of available aircraft equipped with different instrumentations ranges from motorized gliders to jets acquiring data from different heights to the upper troposphere. In addition, balloons are also used as platforms, either small weather balloons with light payload (around 3 kg), or open stratospheric balloons with big payload (more than a ton). For some time now, UAVs/drones are also used in order to acquire data for Cal/Val purposes. They offer a higher flexibility compared to airplanes, plus covering a bigger area compared to in-situ measurements on ground. On the other hand, they also have limitations when it comes to the weight of instrumentation and maximum altitude level above ground. This reflects the wide range of possible aerial measurements supporting the Cal/Val activities.

The survey will identify the different airborne campaigns. The report will include the description of

campaigns, their spatial distribution and extent, ownership and funding, data policy and availability and measurement frequency. Also, a list of common instrumentation, metrological traceability, availability of uncertainty evaluation and quality management will be discussed. The report additionally deals with future possibilities e.g., planned developments and emerging technologies in instrumentation for airborne and balloon based campaigns.

This presentation gives an overview of the preliminary survey results and puts them in context with the Cal/Val requirements of the different Copernicus Sentinel missions.

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