QOS2016-262-1, 2016
Quadrennial Ozone Symposium of the International Ozone Commission

GAIA-CLIM traceability chains and uncertainty quantification study for ozone observations

K. Kreher and the GAIA-CLIM WP2 Team
BK Scientific, Mainz, Germany (karin.kreher@bkscientific.eu)

For climate change research and in particular for trend analysis of ECVs (Essential Climate Variables) such as ozone, it is vital to provide high-quality observational data sets from satellites. These data sets need to be calibrated and validated against standards that enable them to be used with confidence for applications across a broad range of scientific areas. In turn, this requires data sets from reference observation networks that need to be of sufficiently high quality and quantity to robustly characterise e.g. sensor performance and radiative transfer modelling to provide confidence in the satellite data.

We endeavour to address this requirement within the GAIA-CLIM (Gap Analysis for Integrated Atmospheric ECV CLImate Monitoring, www.gaia-clim.eu) project with the aim to improve our ability to use ground-based and sub-orbital observations to characterise satellite observations for a number of atmospheric ECVs. The establishment of unbroken and complete uncertainty chains for each Earth observation product considered that can be traced to SI units (or at least to an accepted community standard) as well as the quantification of the corresponding uncertainties introduced by unavoidable mismatches in time and space of the collocation and the differences in sampling footprints are at the core of GAIA-CLIM objectives. High-quality data sets that have been characterised in this way will be made available through a “Virtual Observatory” facility, which is currently being developed within GAIA-CLIM. This facility will enable the community to visualize, probe, analyse, and download co-locations between satellite data and high-quality reference data.

We have investigated a list of ECV/instrument combinations with regard to their operating procedures, quantification of their measurement uncertainties and their metadata collection, and have undertaken an uncertainty gap analysis. Based on this information and diagrams of traceability chains, which we have also developed within the project, we attempt to identify the maturity of these data sets. We will present the current status of this study and the findings to date with focus on ozone measuring techniques such as LIDAR, FTIR and UV-visible spectroscopy. However, GAIA-CLIM also investigates water vapour, aerosol, methane and temperature profiles and we will discuss the most recent outcomes for these ECVs as well.