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Water Cycle Multimission Observation Strategy (WACMOS)

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To understand the role of the terrestrial hydrosphere-biosphere in Earth's climate system it is essential to be able to measure from space hydroclimatic variables, such as radiation, precipitation, evapotranspiration, soil moisture, clouds, water vapour, surface water and runoff, vegetation state, albedo and surface temperature, etc. Such measurements are required to further increase our understanding of the global climate and its variability, both spatially and temporally. Additionally, such observations advance our understanding of the coupling between terrestrial and atmospheric branches of the water cycle, and how this coupling may influence climate variability and predictability. To enhance the prediction of variations in the global water cycle, based on improved understanding of hydrological processes and its close linkage with the energy cycle and its sustained monitoring capability, is a key contribution to mitigation of water-related damages and sustainable human development. In many cases, the combination of space-based and high-resolution in situ data provides the essential information for effectively addressing water management issues (GEOSS 10-Year Implementation Plan – REFERENCE DOCUMENT, GEO 203-1).

Recently the European Space Agency (ESA) has initiated, in its Support to Science Element programme, the Water Cycle Multimission Observation Strategy (WACMOS). WACMOS contributes to above described international efforts by supporting scientists in ESA member countries to develop and validate novel and improved multi-mission based products, and to enhance currently available global water datasets, so as to maximize the use of ESA data.

In this context, the short term objectives of the project include:

• Develop and validate a Product Portfolio of novel and/or improved multi-mission based geoinformation datasets at global and regional scales contributing to the objectives of the GEWEX program. WACMOS is focused on four Thematic Priorities described below and identified in close collaboration with GEWEX. This includes:

1. Evapotranspiration based on the synergic use of MERIS, AATSR and MODIS data;
2. First multi-decadal (30+ years) multi-mission soil moisture data set based on the synergic use of soil measurements derived from scatterometer data (from ERS-1/2 and METOP) and passive (SMMR, SSM/I, TMI, AMSR-E) microwave observations;
3. Water vapour measurements based on the combination of SEVIRI and IASI observations at 25Km resolution and SEVIRI and MERIS at 1Km resolution.
4. Enhanced cloud and precipitation products based on the synergic use of MSG, GOME(2) and SCIAMACHY data.

• Explore ways to facilitate the integration of the final Product Portfolio into models through data assimilation processes at different scales (e.g., run-off, water balance, flood risk, drought, climate) and demonstrating its value for science and applications;

• Consolidate a Scientific Roadmap to advance towards establishing long-term coherent multi-source data records in support of GEWEX and other user communities.