



Work Package 4

GROUNDWATER PRODUCT DEVELOPMENT, EVALUATION AND SERVICE PREPARATION

Work Package 4 includes evaluating the compatibility of all compartmental storage data sets for merging, in terms of spatial and temporal resolution, coverage, and signal filtering. In addition, calculation of the global groundwater product and of related uncertainties is being undertaken, as well as the validation of G3P groundwater product with independent in-situ groundwater observations. Another objective is to design and implement demonstration of G3P service architecture.

DESCRIPTION OF THE ACTIVITIES

Merging of observation and model based storage data sets

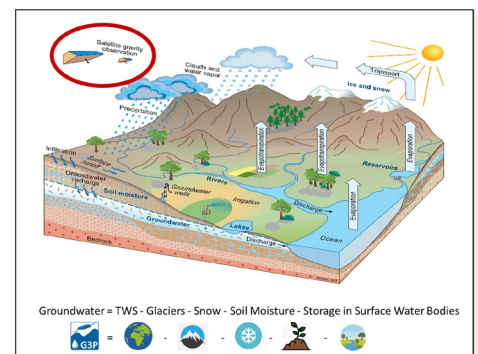
Spatial and temporal gaps in the data sets of single storage compartments (surface water storage, soil moisture, SWE) are filled with the help of simulation results of hydrological / land surface models. Different merging approaches are tested (e.g., Gaussian processes machine learning methods, offline data assimilation). Ensembles of model outputs are used to assess the uncertainty of the model data in the merging process. This task will be carried out in collaboration with the activities of WP3 on merging methods.

Spatial correlation lengths and smoothing of storage data sets

Given the spatially smoothed nature of satellite gravity data due to the observation process itself and due to filtering for noise elimination, in this step the storage data sets of individual storage compartments are made compatible for the data merging / reduction process from total water storage to groundwater variations. To this end, the individual storage data sets will be smoothed in a way that their spatial correlation lengths (possibly varying with region and season) match the ones empirically obtained from GRACE in a least-squares sense.

Calculation of the global groundwater data set and of related uncertainties

The global gravity-based groundwater product is calculated by the subtraction process of gravity-based TWS variations and all compatible data sets of storage variations in individual storage compartments. The uncertainties of the individual data sets are propagated to the final G3P product. The groundwater product and its uncertainties is computed on the global 0.5 degree grid and as area-average time series for the selected large aquifers worldwide.



Evaluation and selection of aquifers

A set of aquifers around the world will be selected to be used (1) for calculating and making available to the public area-average groundwater storage time series of G3P and (2) a sub-set of those aquifers that will be used for the evaluation of G3P against in-situ observations.

Validation of the G3P groundwater product with in-situ data

The evaluation will be made after transformation of in-situ groundwater levels to area-average groundwater storage time series or by other statistical approaches if not enough information for conversion into groundwater storage is available. In-situ data will be collected from different sources within this task.

G3P service preparation

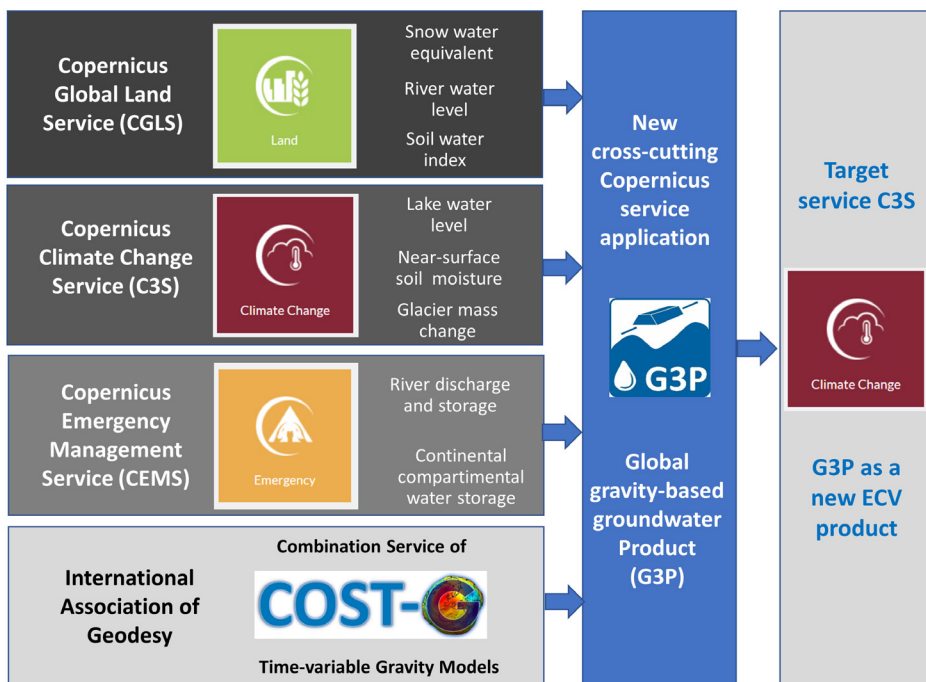
In close collaboration with project partners, and understanding C3S CDS requirements (<https://>

WP4



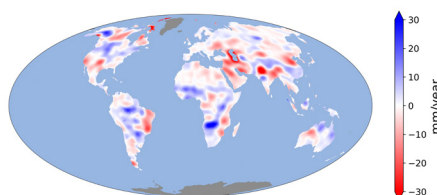
FutureWater

climate.copernicus.eu/climate-data-store), activities include capture the technical requirements for G3P processing service, assess current status of processing chains and data streams that need to be integrated and ported to G3P Processing Framework on EODC infrastructure. Another task is to provide design for the organisational framework, the technical platform and its operational framework, the G3P processing framework and, also, data management and data streams.



G3P prototype service implementation and demonstration

This includes the implementation and limited operation (demonstration) of G3P service on EODC infrastructure. Moreover, an assessment of demonstration service by gap analysis and maturity matrix and provision of recommendations, detailed in a Road Map, for the evolution of demonstration service towards an operational service will be provided.



DELIVERABLES

- 4.1: G3P product report
- 4.2: G3P evaluation report
- 4.3: Service Specification Document
- 4.4: Prototype Service Design Document
- 4.5: Road Map Document for G3P Operational Service

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