



## Work Package 2

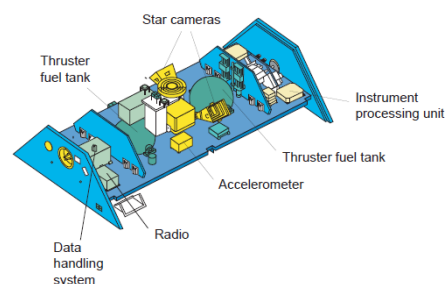
# SATELLITE GRAVITY DATA PROCESSING

**Work package 2 includes satellite gravity data processing on several levels.**

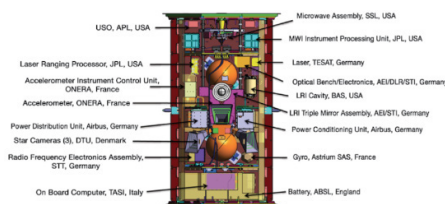
## DESCRIPTION OF THE ACTIVITIES

### Alternative Level-1B Processing

Implementation of an alternative Level-1A to Level-1B processing chain to exploit additional information within the Level-1A data compared to the officially available Level-1B data. From an instrumentation point of view, GRACE-FO is an evolution of GRACE with modernizations due to both experience from the GRACE mission and overall technical improvements. The updates on GRACE-FO compared to the predecessor include improved and additional measurements. Therefore, it is essential to implement data handling and processing routines tailored to these new data.



*GRACE instruments (credit: NASA/JPL)*



*GRACE-FO instruments (credit: Airbus-DS, GmbH)*

For the first time Level-1A data products will be publicly available to all processing centers, in addition to pre-processed Level-1B data products. The accessibility to Level-1A allows to exploit additional information within the data, but also to enhance treatment of instrument specific error sources. In this way, Level-1A data could be used to produce alternative Level-1B data that can be compared to the officially available Level-1B. The derived data products will then be cross-validated with the official Level-1B data from NASA's Jet Propulsion Laboratory (JPL).

### Level-2 Processing of global monthly gravity fields

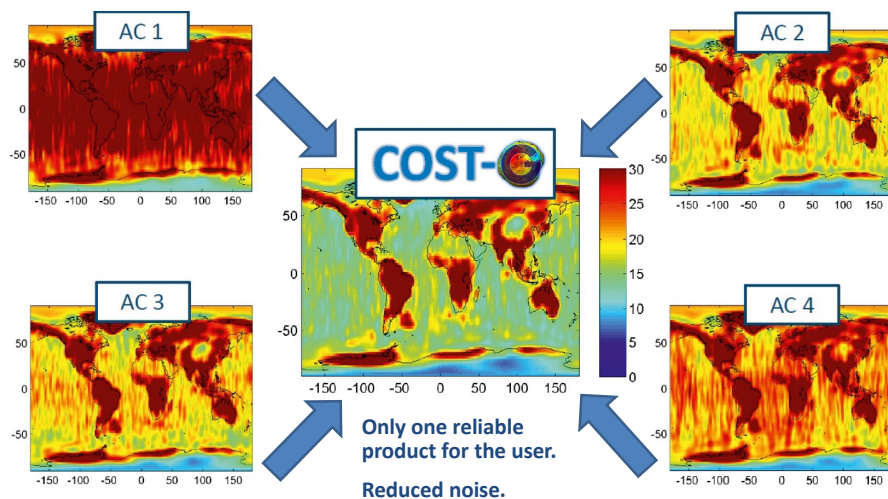
Through rigorous and independent processing approaches based on the latest processing standards and background models of the latest operational release, the analysis centers will compute gravity field solutions (Level 2 products) using both the standard Level-1B and the alternative Level-1B data.

### GRACE-FO combinations

Combining the Level-2 products from different ACs, where each of which performs independent analysis methods but employs consistent processing standards, will significantly increase the quality, robustness, and reliability of the monthly gravity field solutions. This process will be carried out by the Combination Service of Time-variable Gravity field models (COST-G).

COST-G operationally delivers combined monthly gravity field solutions derived from GPS positioning and K-Band inter-satellite ranging of the two GRACE-FO satellites. Prior to combination the individual contributions have to pass quality control, where their hydrological and ice mass change signal content is evaluated. The combined products undergo noise assessment and validation by the COST-G validation centres and by expert users of the Product Evaluation Group (PEG).

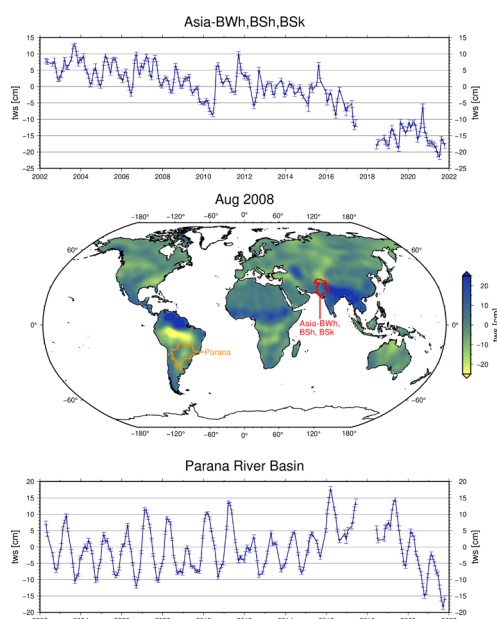
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### Level-3 Data

The calculation of Level-3 TWS products consists of transforming global gravity field models obtained from GRACE/GRACE-FO sensor data into globally 1° gridded TWS or mass anomalies.

Using background models will remove mass signals not related to the continental hydrosphere, such as glacial isostatic adjustment. Co- and post-seismic deformation due to mega-thrust earthquakes are corrected with empirical estimates obtained from the time-series of gravity fields available so far. The individual and the combined data products will be validated and related uncertainties will be provided on the global grid. Results are available via the GravIS portal for visual exploration and data download.



### DELIVERABLES

- 2.1: GRACE/GRACE-FO Level-1B Report
- 2.2: GRACE/GRACE-FO Level-2 Report
- 2.3: GRACE/GRACE-FO Level-2 Combination Report
- 2.4: GRACE/GRACE-FO Level 3 Report

### CONTACT

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