# Preparation of NEQs & Product Proposal

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# Preparation of NEQs

- Monthly mean of background models

- Dealing with background models for user products

$\Rightarrow$ **AI02: graceProductProposal.pdf**

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# Product Proposal

GRACE Signal

- The time variable gravity field is composed of signals from different sub-systems.

- Processes responsible for temporal mass variations:
  - **Solid Earth:** Solid Earth tides, Solid Earth Pole Tides, Effects of large earthquakes, GIA, Solid Earth mass redistributions caused by loading masses.
  - **Oceans:** Ocean Tides, Ocean Pole tides, Sea level rise, Other oceanic mass redistributions
  - **Atmosphere:** Atmospheric Tides, Atmospheric mass redistributions
  - **Cryosphere:** Continental ices sheets, Snow melt & accumulation, Permafrost, Glaciers.
  - **Hydrology:** Groundwater, Soil moisture, Surface Water

- GRACE observes the full signal and cannot separate between different sub-systems and contributions of individual system-components.

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# Product Proposal

GRACE Signal: Geocenter motion

- Geocenter Motion:
  - Motion of the center of mass (CM) of the entire Earth system relative to the center of mass of the Solid Earth (CE)
  - Caused by *loading mass redistributions* and *deformations and mass redistributions in the solid Earth caused by these loading forces*

- Most users of GRACE Level-2 products are only interested in loading masses $\Rightarrow$ **CE-frame**

- GRACE observes the sum of both $\Rightarrow$ **CM-frame**

# Product Proposal

Monthly mean reduced models

- Dealiasing models
  - Necessary due to temporal and spatial resolution of GRACE
  - Contain high frequent variations of the gravity field, but also long-wavelength parts

- After correct compensation of dealiasing:
  - Gravity field solutions should be independent of GRACE temporal resolution (observation epochs used for computation)
  - Background models should be independent from GRACE data

- **Comparison and validation of GRACE products with other models:**
  - Gravity field solutions & models should reflect the monthly mean over all days
  - Average over complete time span (1 Month) regardless of possible GRACE data gaps

# Product Proposal

GRACE Data Products I

- **Status Quo:**
  - Level-2 data products: residual gravity field solutions
  - Including static and time-variable gravity field & related data products (e.g. AOD1B)
  - GSM, GAC, GAD
  - Background models: *Some models are restored others not!*

- **Problems due to inconsistency in handling of background models:**
  - Derivation of accuracy information
  - Signal separation and dealiasing
  - Comparability of different solutions and data releases
  - Complex data handling for the (hydrology) user

# Product Proposal

GRACE Data Products II

- **Future:**
    - Level-2 data products: residual gravity field solutions containing the full signal
    - Including static and time-variable gravity field & background models
    - Background models: *All models are restored!*

    - Enables a more consistent and intuitive data handling for the user!

- User Interface/Platform

# Discussion

GRACE Products & NEQs: background models

- **The provided GRACE solutions:**
  - Should contain the full signal, i.e. all background models should be restored consistently
  - Should be given in the CM frame

- **The background models should be provided as monthly mean of all days:**
  - Average over complete time span (1 month), regardless of possible GRACE data gaps

# Discussion

GRACE Products: user requirements

- **We should provide:**
  - Monthly gravity field solutions & background models
  - Additional models to enable the user to separate the signal
    (e.g. tidal effects, Ocean, Atmosphere, Hydrology, etc.)

  - GIA corrections        (from external data)
  - Geocenter motion     (from external data)

- Implementation of a new user interface/platform providing the gravity field solutions and arbitrary background models.
  - *Should the user be enforced to use a new data system (including new data content) compared to the official releases?*

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