# Satellite gravimetry

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> What it is What it brings Present & Future



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## What it brings ... static gravity field





## What it brings ... time-variable gravity field

An Essential Climate Variable (ECV) is a physical, chemical or biological variable or a group of linked variables that critically contributes to the characterization of Earth's climate. GCOS currently specifies <u>54 ECVs</u>. <u>https://gcos.wmo.int/en/essential-climate-variables/about</u>

#### TVG reflects (300 km): ice melting, large rains/droughts, irrigation, crust uplift



#### ECV IN BRIEF

 Domain:
 Terrestrial

 Subdomain:
 Hydrology

 Scientific Area:
 Hydrosphere

 ECV Stewards:
 Claudia Ruz Vargas, Andreas

 Güntner, Stephan Dietrich

 Products:
 Groundwater volume change

 Groundwater level

 Groundwater recharge

 Groundwater discharge

 Wellhead level

Groundwater quality



## **Present & future**

- GRACE-FO (JPL/DLR) successfully measures since 2018
  - Satellite-to-satellite low-low technique (SST-II)
  - Continues in GRACE (2002-2017)
  - Carries microwave and laser interferometers (a first realization in space)
  - Contributes to ECV gravity is the only way to observe total changes of mass transport
- NGGM/MAGIC recent plan of ESA/NASA/DLR to continue in SST-II
  - Pair 1
    - NASA/DLR driven
    - **500** km altitude, incl = polar, continuity with GRACE-FO,
    - 2027 to be launched
    - Laser onboard
  - **Pair 2** 
    - ESA driven
    - 400 km, performance enhancement via a Bender constellation
    - Laser onboard

### Thank you for your attention!