

A large, stylized graphic for the SWARM 10 Year Anniversary Science Conference. It features the word "SWARM" in a bold, teal, sans-serif font above the number "10" in a very large, teal, outlined font. The "10" is partially enclosed by a teal circular arc. Below the "10", the text "YEAR ANNIVERSARY" and "SCIENCE CONFERENCE" is written in a smaller, teal, sans-serif font. The background of the graphic is a dark blue space with a glowing green aurora and a satellite in orbit.

SWARM

10

YEAR ANNIVERSARY  
SCIENCE CONFERENCE

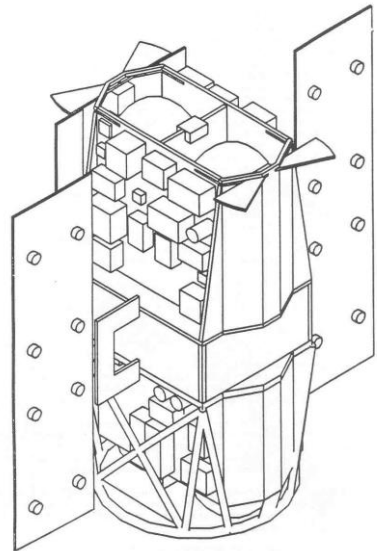
Swarm: a truly multidisciplinary mission

*Pieter Visser*  
*TU Delft*

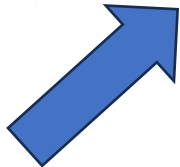
Swarm 10 Year Anniversary & Science Conference 2024



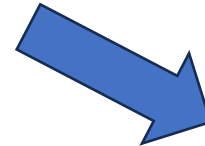
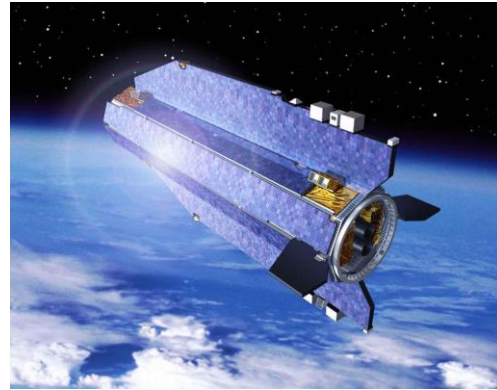
Applications and Research Involving Space Techniques to Observe The Earth's fields from Low Earth orbiting Satellites (ARISTOTELES)



1988



Operations: 2009-2013



Gravity field and steady-state Ocean Circulation Explorer (GOCE)



High Level Processing Facility (HPF)

**The *swarm* Mission Advisory Group**

**Minutes of the First Meeting  
11-12 July 2002  
ESA-ESTEC, Noordwijk, The Netherlands**

Convenor: R. Haagmans

**Participants**

MAG members

E. Friis-Christensen, A. Jackson, G. Hulot, H. Lühr, M. Purucker, P. Visser

Excused

A. De Santis, M. Rothacher

ESA

R. Haagmans (EOP-FSE), A. Schönberg (EOP-FPP)  
Part-time: M. Aguirre (EOP-FPP), E-A. Herland (EOP-FS)





- Project Management Plan (PMP)
- Configuration and Documentation Management Plan (CDMP)
- Meeting and Review Plan (MRP)
- Schedule Report (SR)
- Documentation Tree and Status List (DTSL)
- Project Directory (PD)
- List of Purchased Hardware and Software Items (PHS)
- List of Re-used Hardware and Software (LRHS)
- System Product Assurance Plan (SPAP)
- Revision Release Notes (RRN)
- Test Plan (TP), Test Data Specification document (TDS) and Test Reports (TR)
- Progress Reports (PR)
- Centralized Problem Report (CPR)

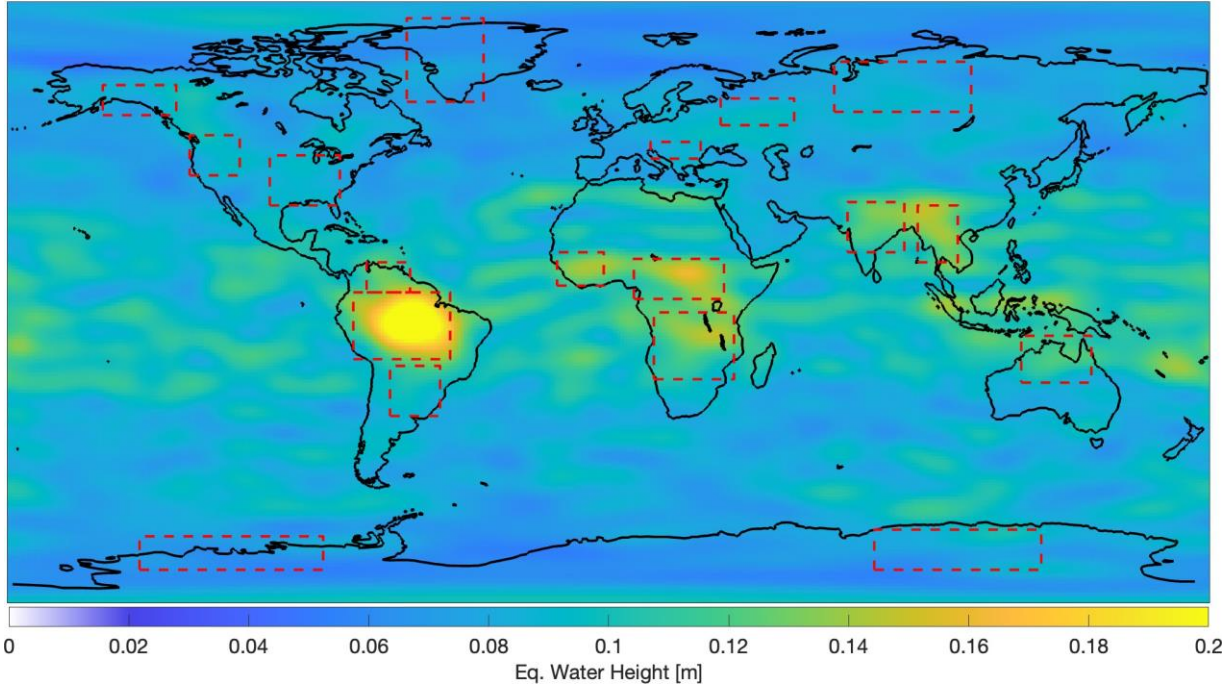


From DRD

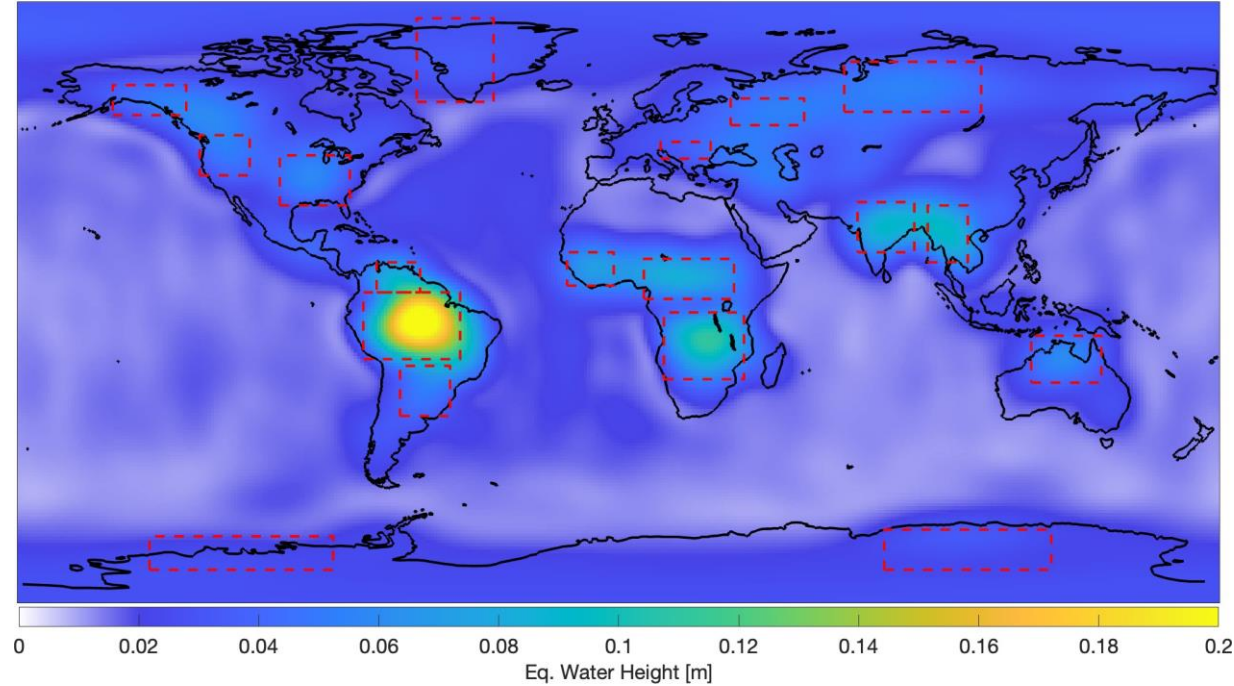
# Swarm: observing Earth's magnetic field ... and much more!



temporal STD of Swarm RL01 (2014-01 to 2023-09)  
750km Gaussian smoothing



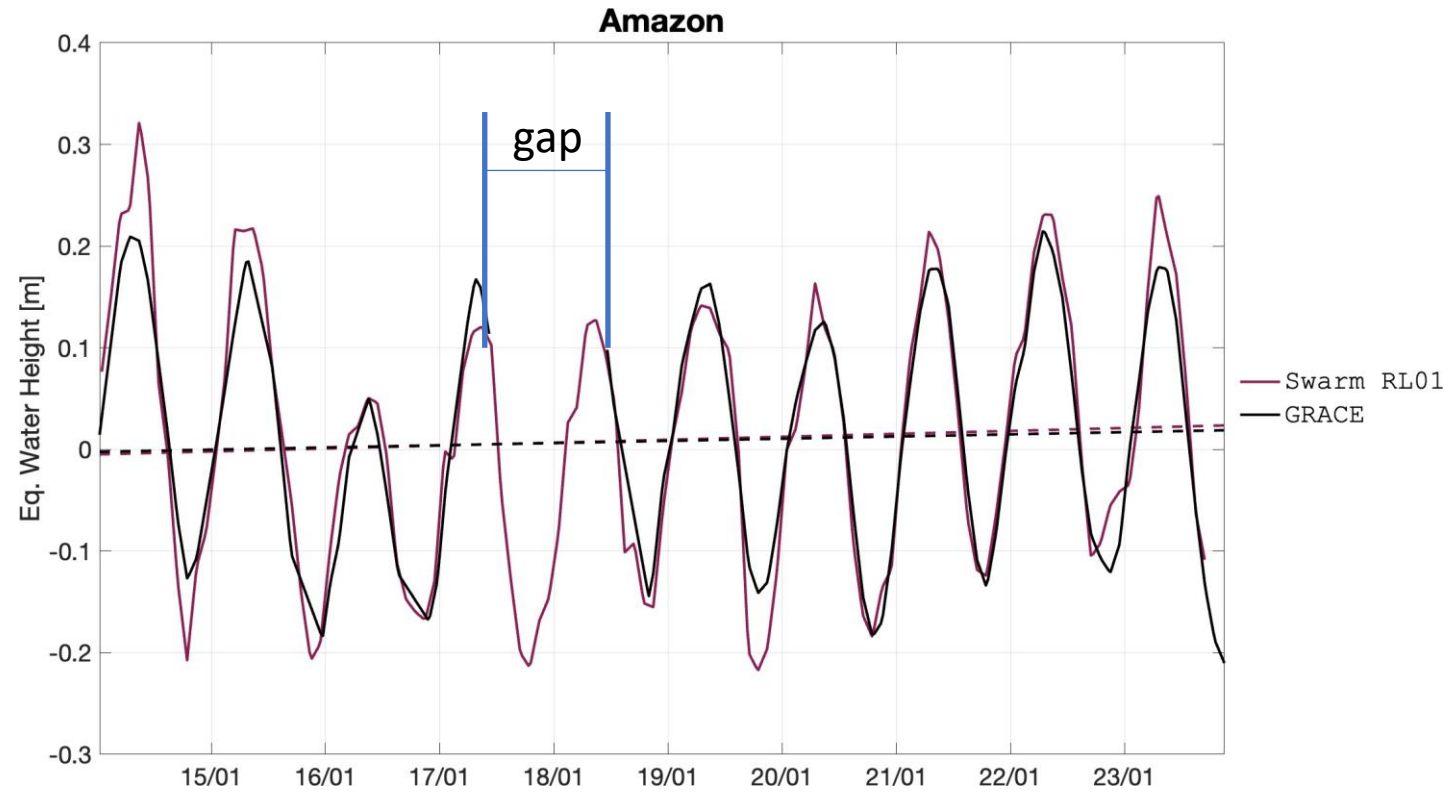
temporal STD of GRACE (2014-01 to 2023-11)  
750km Gaussian smoothing



## Temporal gravity



# Temporal gravity: (partially) filling the gap and continuity



# The advantages of gravity



... lots of potential energy ... helps team building



The screenshot shows the homepage of the Thermosphere data website. The background is a dark image of Earth from space. At the top left is the TU Delft logo. A navigation menu at the top includes: Home, Data and models, TOLEOS project, References, Our team, Funding sources, and Contact. The main heading is 'Thermosphere data'. Below it, a paragraph states: 'Free thermosphere density and wind data download from the CHAMP, GRACE, GRACE-FO, GOCE, and Swarm missions.' Two update notices follow: 'Update on March 22, 2024: Uploaded POD-derived Swarm density data (version 01) covering February 2024.' and 'Update on February 28, 2024: Uploaded POD-derived Swarm density data (version 01) covering January 2024.' A note advises: 'We advise accessing our anonymous FTP server (ftp://thermosphere.tudelft.nl) using an FTP client.' At the bottom are two blue buttons: 'Download data' and 'TOLEOS project'. A small 'Screenshot' label is in the bottom right corner of the image.



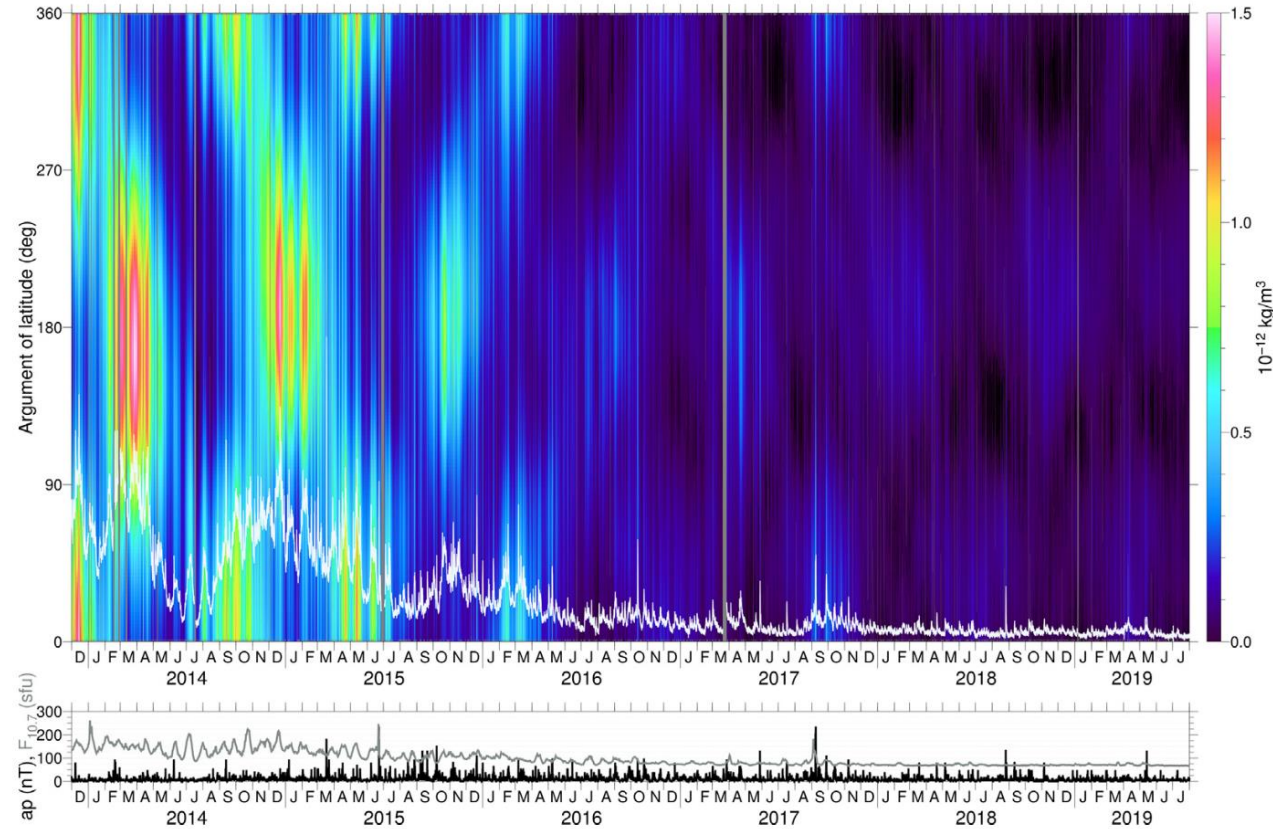


Fig. 7. Time series of estimated density for Swarm-B (top), and solar activity proxy  $F_{10.7}$  and geomagnetic index  $ap$  (bottom). The white line indicates the mean orbit density, with values that refer to the scaling of the color bar. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

<https://doi.org/10.1016/j.asr.2020.01.004>

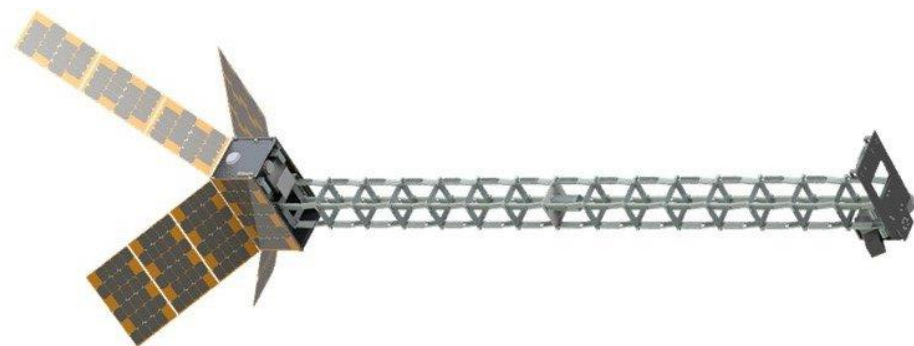


... nice atmosphere ... high density of scientists

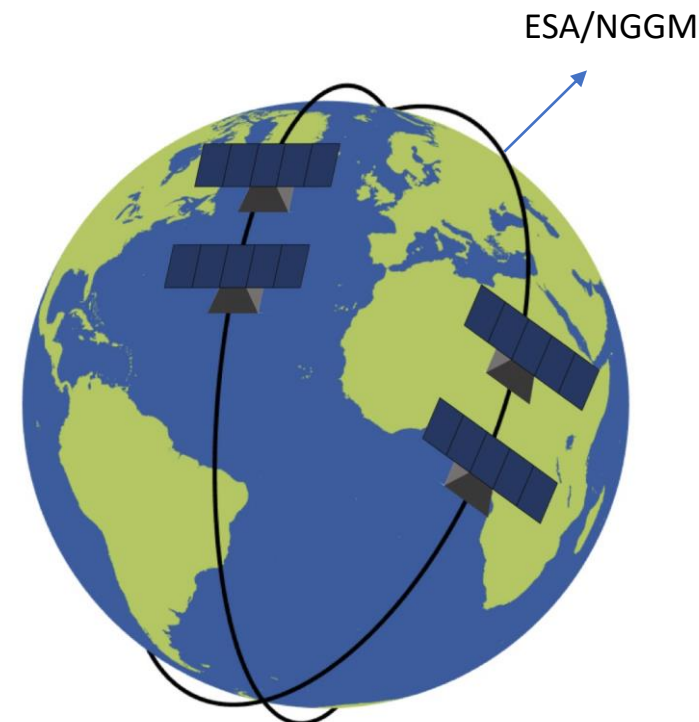


## Mega constellations





NanoMagSat 2028



MAGIC 2032



... Swarm swings ...  
and still going strong!