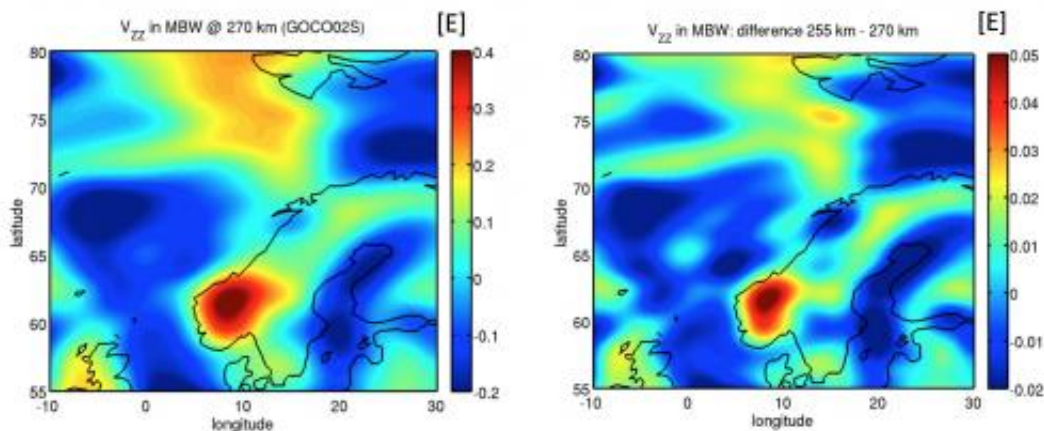


GOCE's second mission improving gravity map

November 16 2012



The image on the left shows GOCE's gravity measurements over northern Europe, acquired from its previous altitude. The image on the right depicts the expected measurements over the same area after the satellite has been lowered by 15 km. An increased signal and improved spatial resolution is evident. Credit: ESA / GOCE+ Theme 2

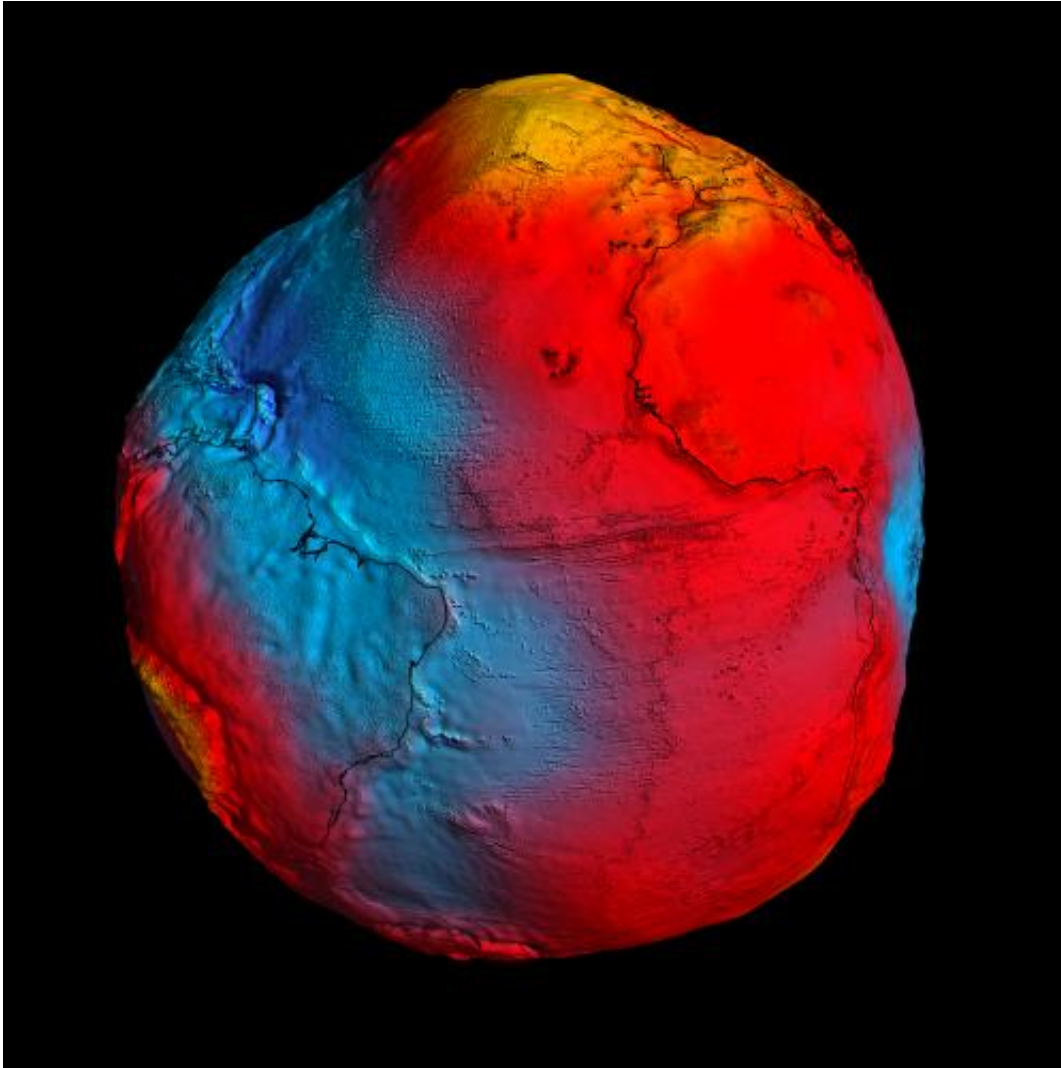
(Phys.org)—ESA's GOCE gravity satellite has already delivered the most accurate gravity map of Earth, but its orbit is now being lowered in order to obtain even better results.

The [Gravity field](#) and steady-state Ocean Circulation Explorer (GOCE) has been orbiting Earth since March 2009, reaching its ambitious objective to map our planet's gravity with unrivalled precision.

Although the planned mission has been completed, the [fuel consumption](#) was much lower than anticipated because of the low [solar activity](#) over the last two years. This has enabled ESA to extend GOCE's life, improving the quality of the [gravity model](#).

To be able to measure the strength of Earth's gravity, the satellite was flying in an extraordinarily low orbit about 255 km high – about 500 km lower than most [Earth observation satellites](#).

Based on a clear preference from the GOCE user community, ESA's Earth Scientific Advisory Committee recommended lowering the orbit to 235 km starting in August.



The colours in the image represent deviations in height (-100 m to $+100$ m) from an ideal geoid. The blue colours represent low values and the reds/yellows represent high values. Credit: ESA/HPF/DLR

Lowering the orbit increases the accuracy and resolution of GOCE's measurements, improving our view of smaller ocean dynamics such as eddy currents.

The control team began the manoeuvres in August, lowering GOCE by about 300 m per day.

After coming down by 8.6 km, the satellite's performance and new environment were assessed. Now, GOCE is again being lowered while continuing its gravity mapping. Finally, it is expected to reach 235 km in February.

As the orbit drops, [atmospheric drag](#) increasingly pulls the satellite towards Earth. But GOCE was designed to fly low, the tiny thrust of its ion engine continuously compensating for any drag.

The expected increase in data quality is so high that scientists are calling it GOCE's 'second mission.'

"For us at ESA, GOCE has been a fantastic mission and it continues to surprise us," said Volker Liebig, ESA's Director of Earth Observation Programmes.

"What the team of ESA engineers is now doing has not been done before and it poses a challenge. But it will also trigger new research in the field of gravity based on the high-resolution data we are expecting."

The first 'geoid' based on GOCE's gravity measurements was unveiled in June 2010. It is the surface of an ideal global ocean in the absence of tides and currents, shaped only by gravity.

A geoid is a crucial reference for conducting precise measurements of [ocean circulation](#), sea-level change and ice dynamics.

The mission has also been providing new insight into air density and wind in space, and its information was recently used to produce the first global high-resolution map of the boundary between Earth's crust and mantle.

Provided by European Space Agency

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