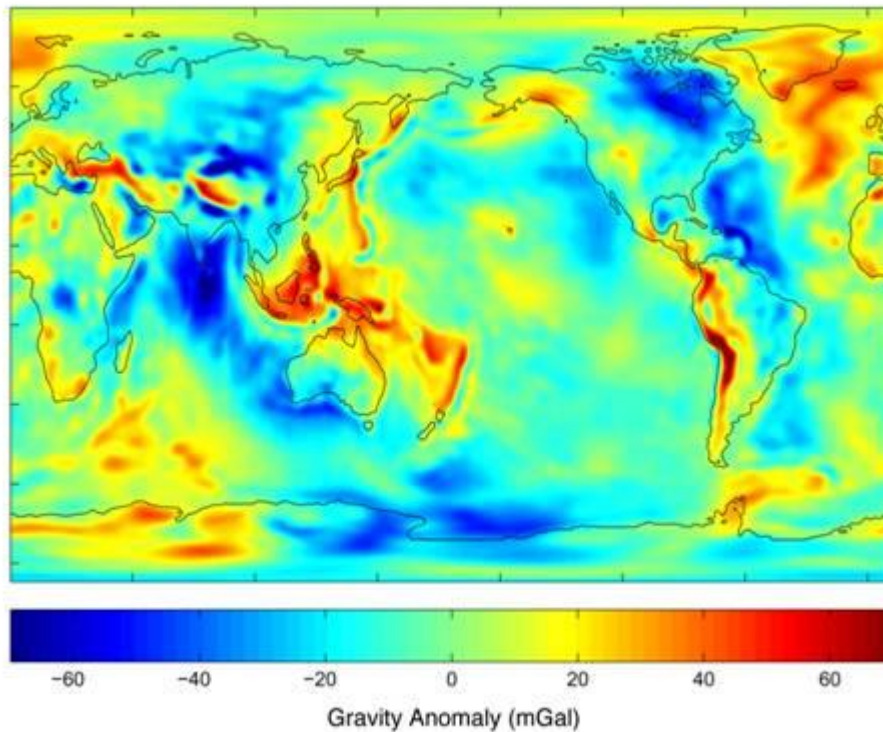


GEOLOGICAL MAPPING



GRACE Gravity Model 01 based on 111 days of GRACE data. (Source: University of Texas Center for Space Research and NASA)

PRODUCT DESCRIPTION

Category

- | | |
|---|---|
| <input type="checkbox"/> Topographic information | <input type="checkbox"/> Surface deformation |
| <input type="checkbox"/> Impact assessment | <input type="checkbox"/> Precision ortho-images |
| <input type="checkbox"/> Change detection / continuous monitoring | <input checked="" type="checkbox"/> Terrain information |
| <input checked="" type="checkbox"/> Land cover / use | <input type="checkbox"/> Water quantity & quality |
| <input checked="" type="checkbox"/> Near surface geology | |

Uses

Lithology mapping
Gravitational mapping

Challenges addressed

Exploration – Geological Mapping

Geo-information needs

E-2: Geological mapping of sub-surface expressions

Description

In It is important for mining companies to establish the likelihood of mineral being present. Therefore, an understanding of the geological structure of prospective areas is important. Additionally, magnetic and gravitational field data to get some insights on internal structures of the ground is needed. With this information it is possible to construct an image of the structures in a region.

Information on Earth's gravitational field supports such analysis using special satellites. NASA GRACE mission (2002–2017) and the follow-up mission GRACE-FO (launched in 2018) provide information on the Earth's gravitational field.

Known restrictions / limitations

The resolution of the accessible data as well as spatial coverage of the imagery can be a limiting factor of the product.

NASA's GRACE missions provide data on Earth's gravitational field. However, resolution is quite coarse. The first GRACE mission (2002–2017) provided a resolution of 300 km, the follow-up mission, GRACE-FO, launched in 2018, now provides a resolution of 100 km. Concerning change products consistent data from the same sources and the same period for the entire region is needed.

Lifecycle stage and demand

Exploration	Environmental Assessment & Permitting	Design, Construction & Operations	Mine Closure & Aftercare
■■■■■		■■■	

Exploration:

At this stage of mining, information is important to support decision-making. It is important to gain knowledge on the general geological structure and additional information such as gravitational fields as well as the internal structure of the ground. Geology structures are used to construct an image of the structures in a region and establish the likelihood of mineral being present.

Design, Construction & Operations:

Information on geological structure helps to plan and design the infrastructure and other mining activities in the design and construction phase of mining. During operations monitoring of changes in lithology and soils helps to observe facilities and operations to detect probable damages or dangers.

Geographic coverage

Globally available.

EARSC Thematic Domain

DOMAIN	Land
Sub-domain	Geology
Product description	Map geological features

PRODUCT SPECIFICATIONS

Input data sources

Sampling of available products:

<i>Satellite</i>	<i>GRACE</i>	<i>GRACE-FO</i>	<i>GOCE</i>
Status	Archive	In operation	Archive
Operator	NASA	NASA	ESA
Data availability	Commercial, on demand	Commercial, on demand	Public
Resolution (m)	300 km	100 km	
Coverage	Global	Global	
Frequency (days)			
Launch year	2002 – 2017	2018	2009–2013
Website	link	link	link

Minimum Mapping Unit (MMU)

Variable, depending on source data resolution.

Accuracy / constraints

Thematic accuracy:

Detection of different surface materials.

Spatial accuracy:

Dependent on input pixel resolution.

Accuracy assessment approach & quality control measures

N/A

Frequency / timeliness

Observation frequency:

Every one or more days, depending on satellite.

Timeliness of delivery:

Within ten (working) days of sensing.

Availability

GRACE (2002–2017) and GRACE-FO (since 2018) data can be accessed through the operator/vendor.

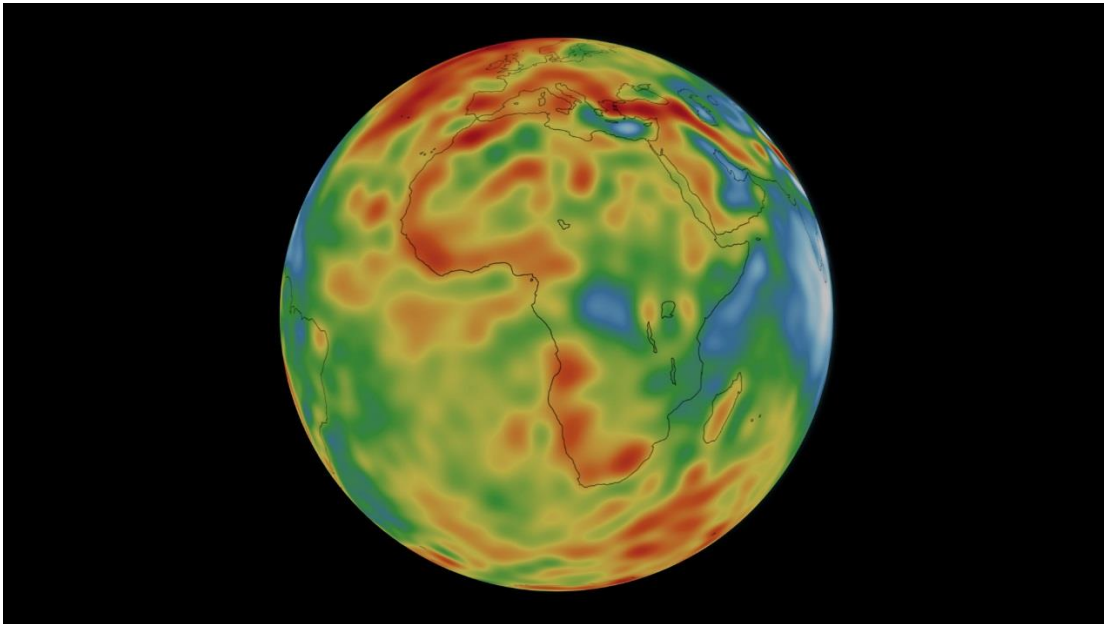
Delivery / output format

Data type: Raster formats

File format: Geotiff

Further delivery formats: Report

USE CASE



Source: NASA/JPL-Caltech, <https://gracefo.jpl.nasa.gov/resources/52/grace-fo-gravity-data-over-africa/>

This image is based on NASA's GRACE-FO mission and shows gravity field over Africa.
