



The International Association of Geodesy

What is Geodesy?

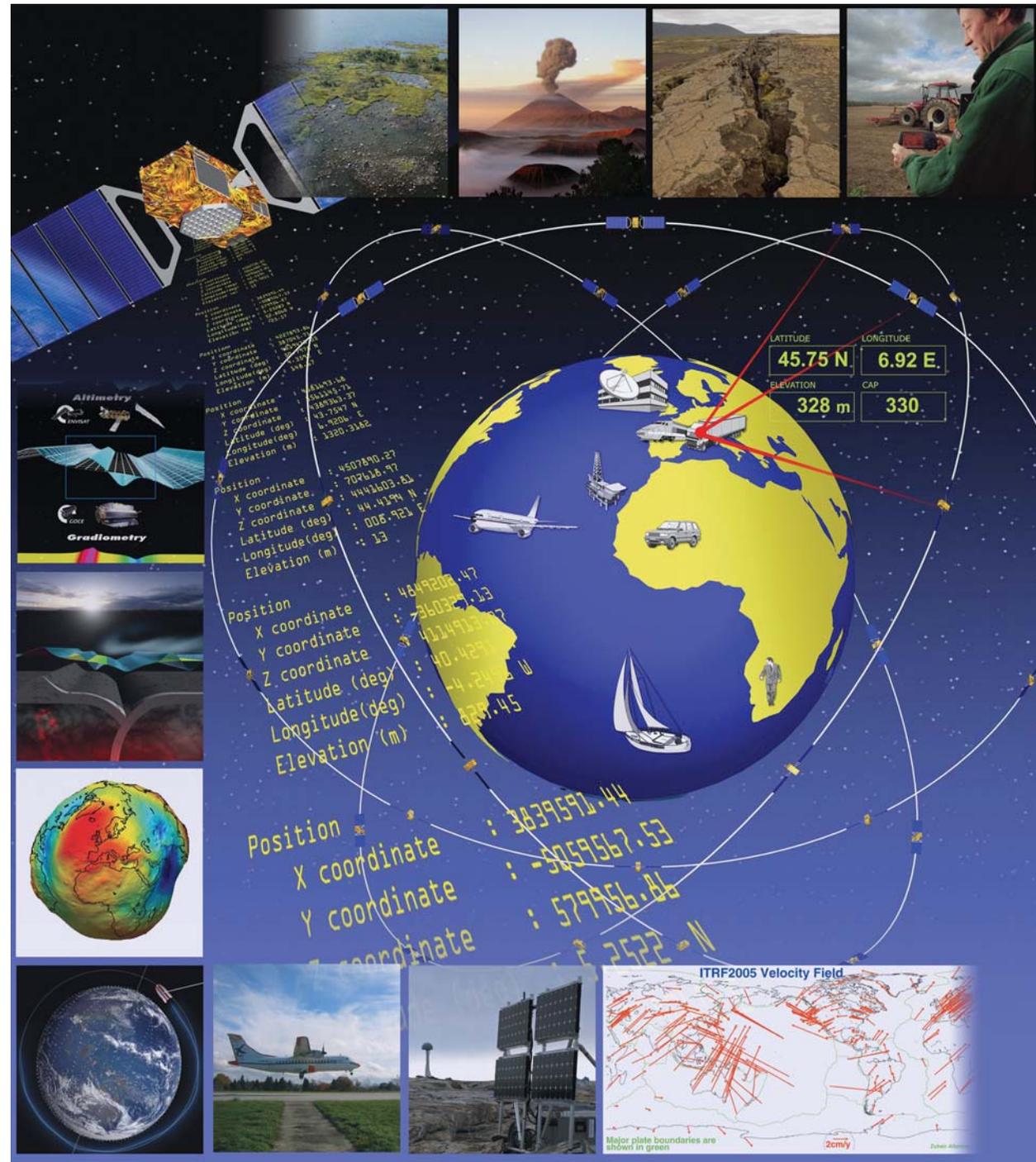
The classical definition of Geodesy is the science concerned with the Shape, Size, and the Gravity Field of the Earth.

Geodesy today is much more than that. It is a geo-science that treats the Earth as a complex dynamic system, a body consisting of many layers, surrounded by the atmosphere and the oceans. Geodesy deals with:

- the monitoring of the solid Earth (e.g. tectonic and non-tectonic displacements);
- the monitoring of variations in the liquid Earth (sea level rise, ice sheets);
- monitoring variations in the Earth's rotation (polar motion, the length of the day);
- determining orbits for scientific satellites (including Earth Observation Satellites);
- monitoring the atmosphere with satellite geodetic techniques (ionosphere, troposphere);
- monitoring the temporal variations in the gravity field of the Earth;
- determining positions, and their changes with time, of points on or above the surface of the Earth with the utmost precision.

Geodesy continues to provide the scientific basis of Navigation by the exploitation of the existing and planned Global Navigation Satellite Systems (GNSS), such as GPS, GLONASS, GALILEO, COMPASS. Its activities have a link to fundamental Astronomy via the global terrestrial reference system.

Geodesy is experiencing spectacular growth and each year new frontiers of Earth science knowledge are being explored, such as temporal variations of positions and gravity (land deformations, post glacial rebound, sea level rise, etc.). It is contributing to both everyday mapping and navigation purposes, and to the deeper understanding of our living planet, the Earth.



The Association

The International Association of Geodesy (IAG) is the scientific organization responsible for the field of Geodesy. The origin of IAG goes back to 1862, the year, in which the "Mitteleuropäische Gradmessung", predecessor of IAG, was established. It promotes scientific cooperation and geodetic research on a global scale, and contributes to it through its various research bodies. It is an active member Association of the International Union of Geodesy and Geophysics (IUGG), which itself is a member of the International Council for Science (ICSU).

The scientific work of the Association is performed within a component structure consisting of:

- Commissions,
- Inter-commission Committees,
- Services,
- the Communication and Outreach Branch (COB), and
- the Global Geodetic Observing System.

IAG's Mission

The mission of the Association is the advancement of Geodesy.

IAG implements its mission by:

- advancing geodetic theory through research and teaching,
- collecting, analysing and modelling observational data,
- stimulating technological development, and
- providing a consistent representation of the figure, rotation and gravity field of the Earth and planets, and their temporal variations.

The official IAG Website:

<http://www.iag-aig.org>

The website of the IAG Office:

<http://iag.dgfi.badw.de>

IAG objectives

- To foster geodetic research and development,
- to support and maintain geodetic reference systems,
- to provide observational and processed data, standards, methodologies and models,
- to stimulate development of space techniques to increase the resolution of geodetic data,
- to initiate, coordinate and promote international cooperations, and
- to promote the development of geodetic activities across the globe, especially in developing countries.

IAG Meetings

The IAG holds its own "General Assembly" every four years in conjunction with the General Assembly of the IUGG, at the same time and the same place. In addition,

the Association organizes "Scientific Assemblies", independently from the IUGG, generally in the mid-term between General Assemblies. Other meetings that the IAG sponsors or supports include numerous international symposia and workshops covering broad fields of Geodesy and closely associated sciences and engineering.

IAG Publications

The IAG publications include:

- the Journal of Geodesy,
- the IAG Symposia series,
- the Geodesist's Handbook,
- the "Travaux de l'Association Internationale de Géodésie",
- the IAG special publications,
- the IAG Newsletter.

The structure of IAG



Why is Geodesy fundamental to Society?

Traditionally, Geodesy has been viewed as a service science, providing important utility to other geosciences, and supporting many applications. In the past, the main “customers” of Geodesy came from the surveying and mapping profession, while today Geodesy serves all Earth sciences, including the geophysical, oceanographic, atmospheric, hydrological and environmental science communities.

Moreover Geodesy has served society by providing reference frames for a wide range of practical applications, such as navigation on land, sea and in the air, and from construction of infrastructure to the determination of reliable boundaries of real estate properties. In the past these reference frames were created on a national

or regional level. Today, GNSS provides access to precise point coordinates in a global reference frame anytime and anywhere on the Earth’s surface with centimetre-level accuracy.

A deeper understanding of the Earth is not possible without sufficient observations of a large set of parameters characteristic for various Earth system processes. Earth observations are not only necessary for a scientific understanding of the Earth, but they are also fundamental for many societal benefit areas, ranging from disaster prevention and mitigation to the protection of the biosphere, the environment and human health. Thus this science contributes to a prosperous global society.

Geodesy is fundamental in meeting these global challenges. It provides the foundation in which all Earth observation systems are ultimately built. But Modern Geodesy does more: with its “three pillars” of geokinematics, Earth gravity field, and Earth rotation, it also provides comprehensive observations of changes in the Earth’s shape, gravity field and rotation. These fundamental geodetic quantities are intimately related to mass transport in the fluid envelope of the solid Earth and its interior, as well as to the dynamics of the Earth System.

New geodetic techniques are leading to fundamen-

tal changes not only in all areas of navigation and transport, but also for applications in process control (e.g. farming, construction, mining, resource management), construction and monitoring of infrastructure (e.g., offshore platforms, reservoirs, dams, bridges and other large engineering structures), surveying and mapping, and Earth observation.

Geodetic techniques are crucial in the assessment of geohazards and anthropogenic hazards, and they play a pivotal role in early warning systems helping to mitigate the consequences of such disasters. Geodesy therefore contributes to increased security, to a better use of resources, and in general to the progress towards the sustainable development.

Global Navigation Satellite Systems assisting “precision farming”. Precision farming helps to reduce the amount of fertilizers and chemicals used in agriculture.



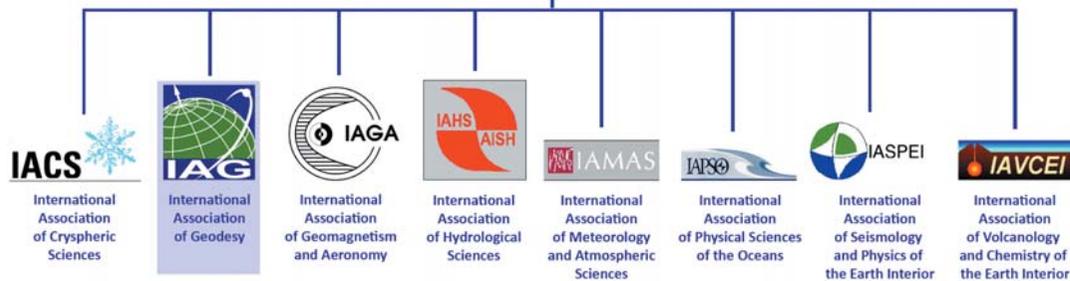
The Kvarken Archipelago (right). In western Finland is an outstanding example of post-glacial uplift. The ground is still rising about 8mm a year, thus new land is emerging from the water.

Photo: FBI

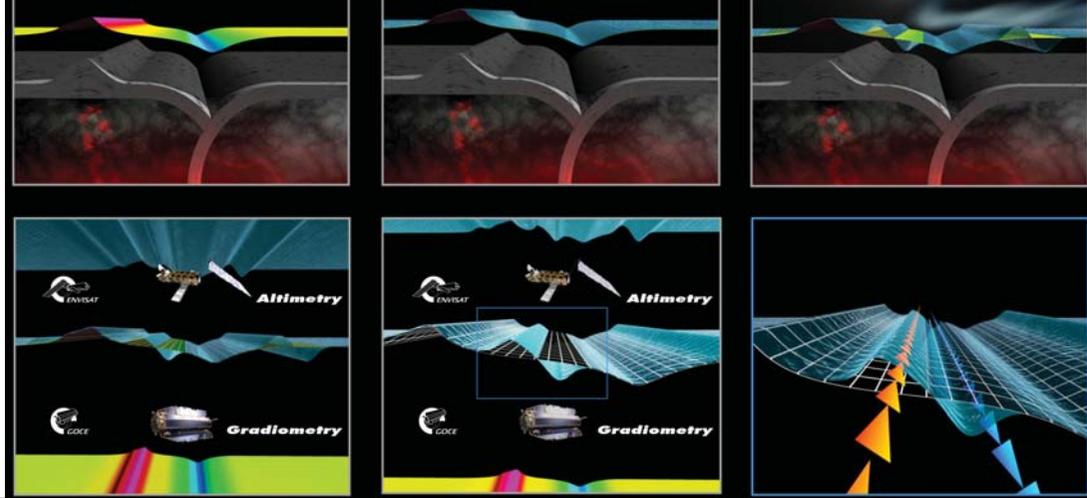
International Union of Geodesy and Geophysics (IUGG)

(<http://www.iugg.org>)

IAG is one of the member Associations of the IUGG



Geodesy helps to understand ocean currents by mapping the sea surface topography using Altimetry and modelling the gravity field using Gradiometry (Photo:ESA)



IAG Services

The IAG is the home of a number of scientific services whose goals are to provide the user community with various geodetic products and/or information and to foster international cooperation:



BGI (Bureau Gravimetrique International)

URL: <http://bgi.cnes.fr>

BGI collects existing gravity measurement on a worldwide basis.



BIPM - Section Time, Frequency and Gravimetry

URL: <http://www.bipm.org/en/scientific/tfg/>

BIPM is responsible for the maintenance of the International Atomic Time (TAI) and the Coordinated Universal Time (UTC).



IAS (International Altimetry Service)

URL: <http://ias.dgfi.badw.de>

The IAS provides a point of contact for general information on satellite altimetry.



IBS (IAG Bibliographic Service)

URL: <http://www.bkg.bund.de>

IBS maintains a literature database for geodesy, photogrammetry and cartography (GEOPHOKA).



ICET (International Centre for Earth Tides)

URL: <http://www.astro.oma.be/ICET>

ICET collects and analyses measurements on Earth Tides.

ICGEM (International Centre for Global Gravity Field Models)

URL: <http://icgem.gfz-potsdam.de/ICGEM>

ICGEM collects existing gravity field models and provides services to utilize these models.



IDEMS (International Digital Elevation Model Service)

URL: <http://www.cse.dmu.ac.uk/EAPRS/iag>

IDEMS collects and validates digital models of the global topography.



IDS (International DORIS Service)

URL: <http://ids.cls.fr>

IDS provides DORIS data and data products for a wide range of scientific and practical applications.



IERS (International Earth Rotation and Reference Systems Service)

URL: <http://www.iers.org>

IERS provides and maintains the International Celestial Reference System and Frame, the Int. Terrestrial Reference System and Frame, and it provides Earth orientation parameters, standards, and models.



IGeS (International Geoid Service)

URL: <http://www.iges.polimi.it>

IGeS collects software and data referring to the geoid.



IGFS (Int. Gravity Field Service)

URL: <http://www.igfs.net>

IGFS is responsible for the collection, validation, archiving and dissemination of gravity data.



IGS (International GNSS Service)

URL: <http://www.igs.org>

IGS provides important data and products for the use of GNSS for Earth science, as well as many societal applications.



ILRS (Int. Laser Ranging Service)

URL: <http://ilrs.gsfc.nasa.gov>

ILRS collects, analyses and distributes Satellite and Lunar Laser Ranging data.



IVS (Int. VLBI Service for Geodesy and Astrometry)

URL: <http://ivsc.gsfc.nasa.gov>

IVS coordinates Very Long Baseline Interferometry (VLBI) observing programmes, sets standards, develops conventions for VLBI observations.



PSMSL (Permanent Service for Mean Sea Level)

URL: <http://www.pol.ac.uk/psmsl>

PSMSL is responsible for the collection, analysis and interpretation of sea level data from a global network of tide gauges.

The Global Geodetic Observing System (GGOS)



URL: <http://www.ggos.org>

GGOS is an official component of IAG as well as a participating organization of the Group on Earth Observations (GEO).

GGOS provides observations of the three fundamental geodetic observables and their variations, that is the Earth's shape, the Earth's gravity field, and the Earth's rotational motion. Thus GGOS ensures the basis to maintain a stable, accurate and global reference frame, which is crucial for all Earth observation.

GGOS contributes to the Global Earth Observing System of Systems (GEOSS) not only with the global reference frame, but also with observations related to the global hydrological cycle, the dynamics of the atmosphere and oceans and geohazards.

