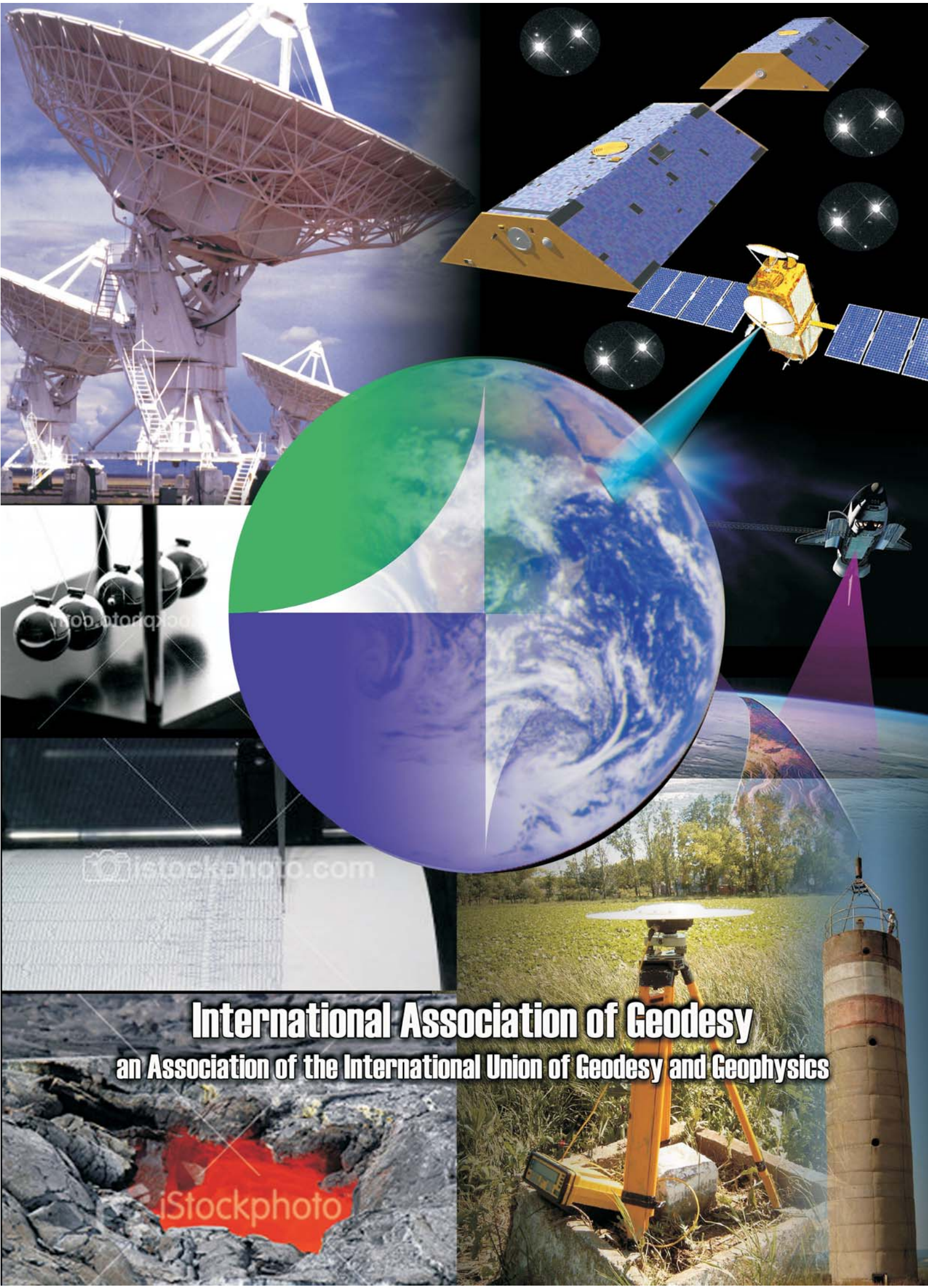
International Association of Geodesy
an Association of the International Union of Geodesy and Geophysics

Welcome message from the president

When looking up the term geodesy in one of the major Encyclopedias, it is usually defined as the science concerned with the shape, size, and gravity field of the Earth. Webster's dictionary even characterizes it as a branch of applied mathematics!
Geodesy today is much more than that. It treats the Earth as a complex dynamic system (including a body consisting of many layers, surrounded by atmosphere and oceans). Geodesy has to model the system's behavior in space and time and eventually provides the basis needed in the wide field of Earth sciences. It does, e.g., not make sense to speak of global sea level rise without making use of the cm-accurate (time-variable) terrestrial reference system, of the precise global gravity field determined from satellites equipped with Laser reflectors and/or with GNSS (Global Navigation Satellite Systems) receivers, and of the sea surface topography established by a long sequence of altimeter satellite missions.
The title page of Peter Apian's work introductio geographcia, published in 1533, proves, on the other hand, that geodesy is a rather old science (the term geodesy may not yet have existed at that time).

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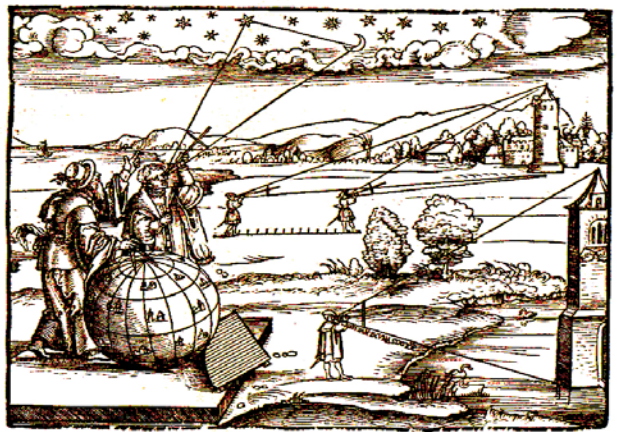


Peter Apian's *Geographia* 1533

Cover page of Peter Apian's introductio geographica (1533)

The illustration tells that: (1) State of the art measurements and their correct mathematical treatment were and are of central importance. (2) The same measurement techniques are used for the most demanding and "everyday" purposes. (3) Geodetic techniques provide the basis for applications of crucial importance and relevance to mankind, like precise positioning (from global down to the maintenance of catasters) and navigation (illustrated in the figure by the measurement of lunar distances). (4) Geodesy provides the link to astronomy (indicated by the measurement of so-called lunar distances, allowing the reconstruction of universal time in connection with the astronomical almanacs).
The space age and the development of space geodetic observation techniques associated with it revolutionized our understanding of geodesy: Distance and distance difference measurements complemented and, to a certain extent, replaced the measurement of angles, the establishment of truly global reference systems (geometric and gravitational) became possible.
Geodesy continues to provide with the state of the art measurement tools of our times the scientific basis of navigation, e.g., by the exploitation of the existing and upcoming GNSS (GPS, GLONASS, and GALILEO), the link to fundamental astronomy by making available the global terrestrial reference system, by monitoring rotational motion of our planet by the space geodetic techniques not to speak of the fact that the celestial reference system and universal time (reflecting Earth rotation) is provided by VLBI!
Geodesy of today is spectacular and opens new frontiers of knowledge. It is a fundamental science, which exactly like in the good old days is a necessity for everyday purposes and for the scientific exploration of our living planet. The foundations of our science are instrumental for the exploration of other planets and moons in our solar system.

What is Geodesy?

Quite simply: Geodesy is a science of studying the shape, size and gravity field of the Earth.

The Earth seems to be round, or not?

In reality the Earth is not perfectly round. Knowing the exact shape of the Earth helps us providing accurate maps of the Earth.

Why do we need accurate maps?

Remember the old saying:
"You can not tell where you are going unless you know where you have been."

Maps usually play an important role in our life. We need them to find our way in the world. In ancient times mankind used landmarks to find their way to friends, or other places. Such an itinerary could sound like this: "Travel toward the highest mountain peak, until You come to a big rock, then find the largest tree in the vicinity. I live under that tree".

Today we often use urban landmarks, such as shopping malls, churches, skyscrapers, etc. But what happens, if we are not familiar with the town?

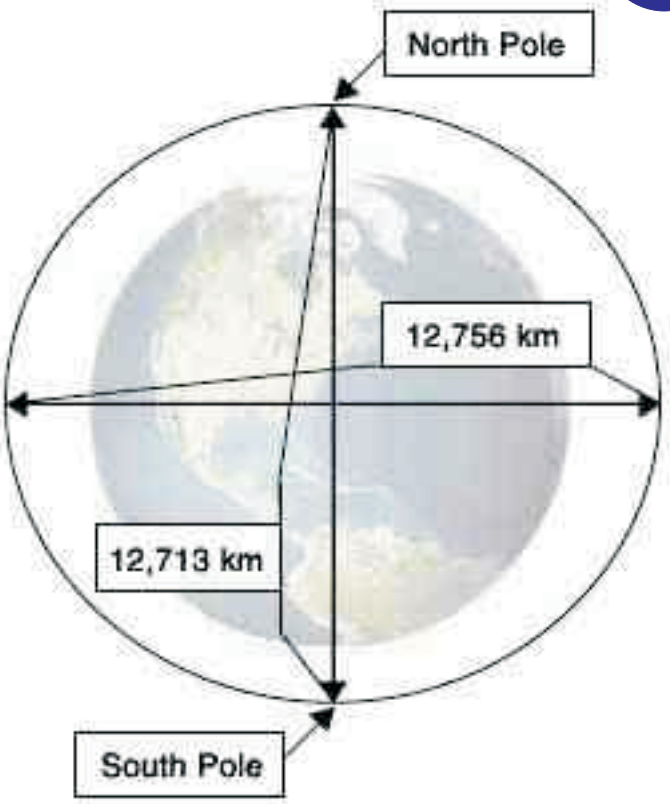
Therefore we need accurate maps, which cover a large area and show more details (landmarks, etc.).

In order to create accurate maps, we need a - so called - spatial reference system. A spatial reference system defines a coordinate system, in which all landmarks have a unique address (the co-ordinates).

To create such a spatial reference system, one should know the accurate shape of our planet.

Is the Earth really round?

During the evolution of the geodetic science, the research showed that the shape of the Earth is not round, but it 'bulges' outward all along the equator.



The Earth is not a mass of the solid rock, but is built up from a mixture of viscous and solid materials. Thus the shape of the Earth is oblate, because the centrifugal force stemming from its rotational motion pulls the masses out along the equator.

What about the hills, mountain ranges, deep sea trenches?

These 'topographic features' are really small compared to the size of our planet. Of course they are measured and drawn on maps, but in Geodesy their contribution to the shape of the globe is quite small.

These topographic features range from 9 km above the sea level (Mount Everest) and 12 km below the sea level (Mariana trench). Comparing these values to the diameter of the Earth of roughly 12756 km, the topographic variations are really small.

However as the accuracy of our observation techniques improve, the topographic features become more and more important. The gravitational effects of the masses stored in topographic features are no longer negligible for geodetic investigations.

What is Gravity? - From the Apple...

In the first Section we defined Geodesy as a science of studying the shape, size and gravity field of the Earth. But what is the gravity field, and why is it important?

Gravity in a nutshell

Gravity is a force that pulls things towards the center of the Earth.

Gravitation is a force that pulls or attracts all bodies in the universe towards each other. Planets remain on their orbits around the Sun due to this force. The gravitational force depends on the mass of the bodies.

Newton's Apple

Sir Isaac Newton suggested the idea that gravity was the force that caused apples to fall. He also figured out that the Moon would travel in a straight line without the attraction from the Earth pulling it into a curved path (the orbit).

Why do we need to study the gravity field?

Gravity affects almost everything in our lives. From clocks to hydroelectric dams, from the tides of the oceans to the blood circulation.

We study the Earth's gravitational field to learn more about our planet. Learning more about our environment can lead us to new ways of doing everyday things to make our lives easier.

Knowing more about the gravity field of the Earth can improve our lives, and help us growing and benefitting both economically and socially.

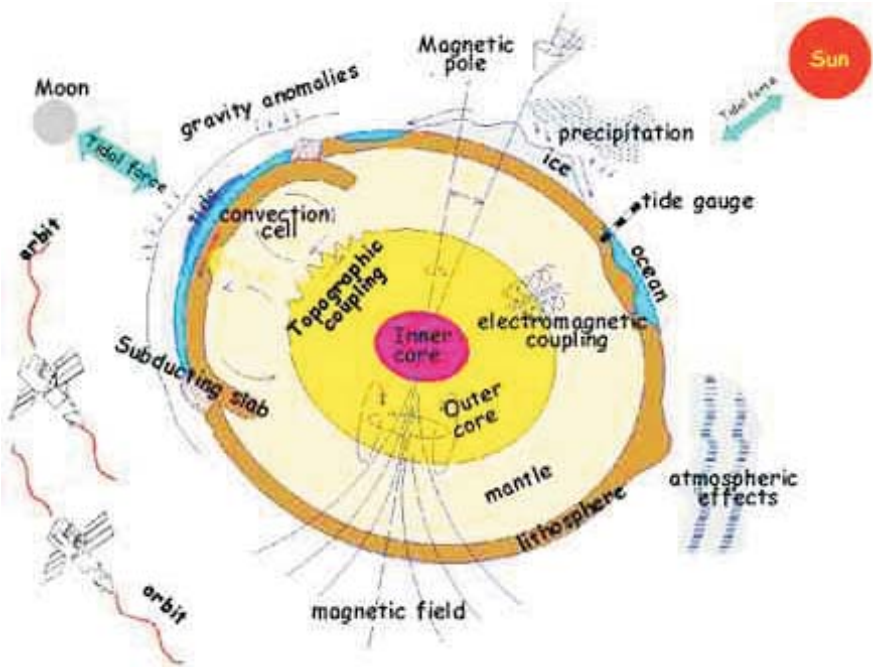
Since our planet is made of different materials, its gravity field shows local variations (called anomalies). Observing these anomalies can help us to explore the subsurface mass distribution of our planet. In this way we may look into the interior of the Earth.

What affects the gravity field?

The gravity field is affected by many factors, some of them are listed here:

- density variatons inside the Earth
- The oceans - the level of oceans change due to temperature, ocean currents, etc. Changes in the level of oceans change the gravity field, too.
- The Sun, Moon and other planets - the gravitational effects of the planets vary according to their position.
- Ice sheets - they compress the Earth's crust beneath them. Changes in the ice caps (e.g. melting due to greenhouse effect) may reduce this compression, thus the gravity field changes.

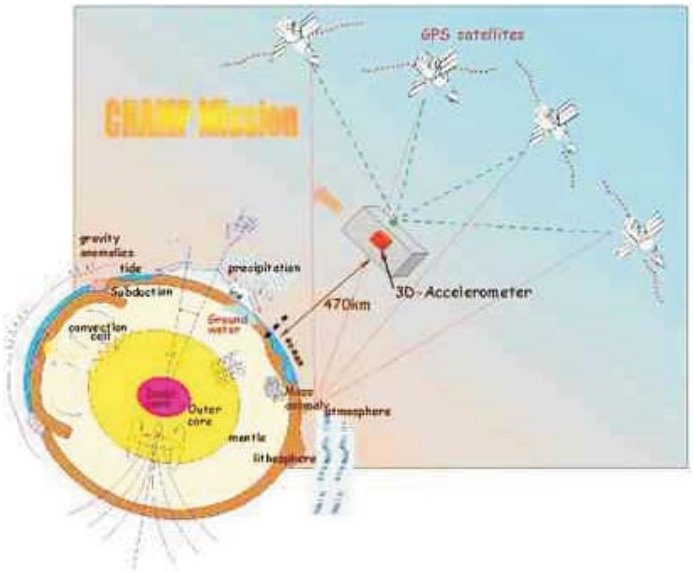
These effects are only examples. However we can see how complicated our planet is, and how these components interact with each other.

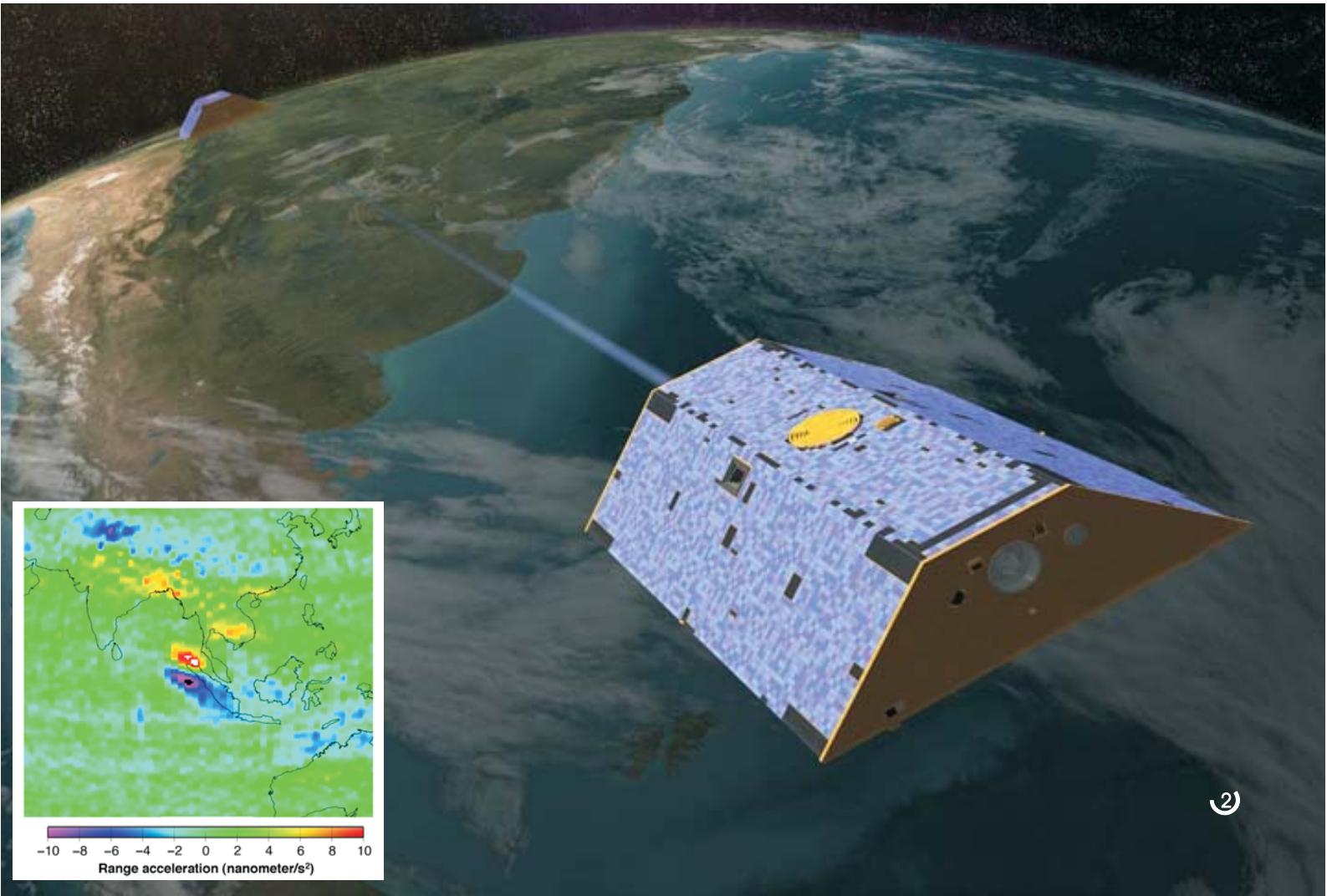


What is Gravity? - ... To the Satellites

How can the satellites help?

If we want to study the gravity field globally, terrestrial gravity measurements have some huge limitations. Terrestrial gravity measurements do not cover the whole globe homogeneously. Moreover, in some places of the world, these observations are highly confidential.
Satellite missions such as CHAMP, GRACE and GOCE help us studying the global gravity field of the Earth. These Low-Earth Orbiters (LEOs) provide us a global, homogeneous coverage of gravity observations.





Applications and Relevance of Geodesy to the Society

To be written later!.

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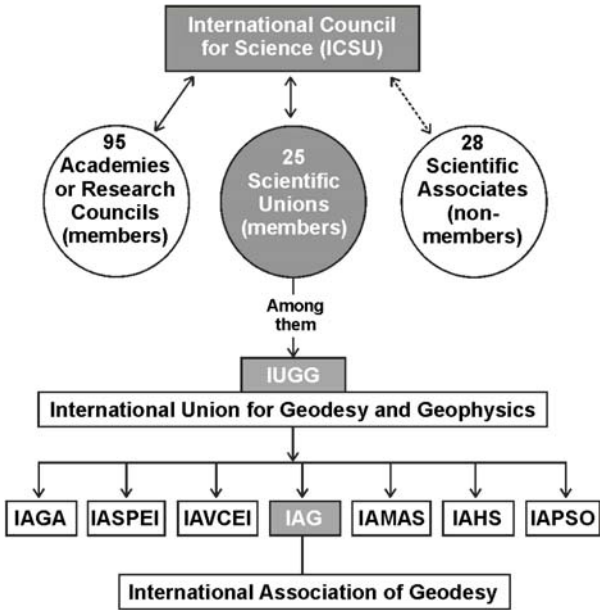
The International Association of Geodesy

The International Association of Geodesy (IAG) is a scientific organization in the field of geodesy. It promotes scientific cooperation and research in geodesy on a global scale and contributes to it through its various research bodies. It is an active member 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
- Services
- Inter-commission Committees
- the Communication and Outreach Branch, and
- IAG Projects

IAG Mission

The Mission of the Association is the advancement of geodesy, an Earth science that includes the study of the planets and their satellites.
The IAG implements its mission by:
- advancing geodetic theory through research and teaching,
- by collecting, analysing and modeling observational data,
- by stimulating technological development and
- by providing a consistent representation of the figure, rotation and gravity field of the Earth and planets and their temporal variations.

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,
- To promote the development of geodetic activities in the world, especially in developing countries.

IAG Commission 1
Reference Frames

URL: http://iag.dgfi.badw.de/

In our everyday life, the determination of our positions becomes more and more important. In order to define our positions, we need to use a spatial reference system (a coordinate system).
IAG Commission 1 deals with the geodetic reference frames. These reference frames are the basis for three-dimensional, time dependent positioning in global, regional and national geodetic networks, cadastre, engineering, precise navigation, geo-information, geodynamics, sea-level studies and other geosciences.

The geodetic reference frames are necessary to consistently estimate unknown parameters using geodetic observations, e.g., Station coordinates, crustal motions, Earth Orientation parameters.

Continuous observations of e.g. GPS satellites, or radiotelescope observations of distant quasars enables us to define not only reference frame, but also to derive other parameters, such as:

- crustal motions: by estimating the coordinates of the continuously operating GPS reference stations, one can derive the long-term changes in the coordinates. The changes can be caused by the motion of the tectonic plates, hence the velocities of the tectonic plates can also be estimated using these observations.

- Earth Orientation Parameters: reference frames also vital for the determination of the Earth Orientation Parameters, such as the direction of the rotation axis of the Earth and its variation.

Commission 1 is focused on the scientific research associated with the definition and realization of global and regional reference frames as well as the development of analysis and processing methods for relevant geodetic observations.

Image source: National Radio Astronomy Observatory/Associated Universities, Inc./National Science Foundation

IAG Commission 2
Gravity Field

URL: http://www.ceegs.ohio-state.edu/iag-commission2

Knowledge of the gravity field in space and its temporal variations is of prime importance for geodesy, navigation, geophysics, geodynamics, and related disciplines. We could see that the gravity field is affected by many things. The observation of the gravity field, the analysis and modeling of the observations can help us to find answers for important questions, such as:

How does the density variations of subsurface masses look like?

This answer is particularly important for the exploration of natural resources (such as oil, gas etc.). Continuous observation of gravity signals in active volcanos helps us to discover subsurface mass changes, which can be a warning signal for an eruption.

What kind of temporal variations can be found in the gravity signals?

Temporal variations in the gravity field can have many reasons, such as seasonal changes is the hydrographic systems, changes in the Earth's rotation, mass redistribution in the interior of the Earth, tectonical movements, melting of the ice caps, etc. One can see that many issues of our environments can be investigated by studying the gravity field.

The Gravity Field Commission fosters and encourages research in the areas of

- gravimetry and gravity networks,
- spatial and temporal gravity field and geoid modeling,
- dedicated satellite gravity mapping missions and
- regional geoid determination.

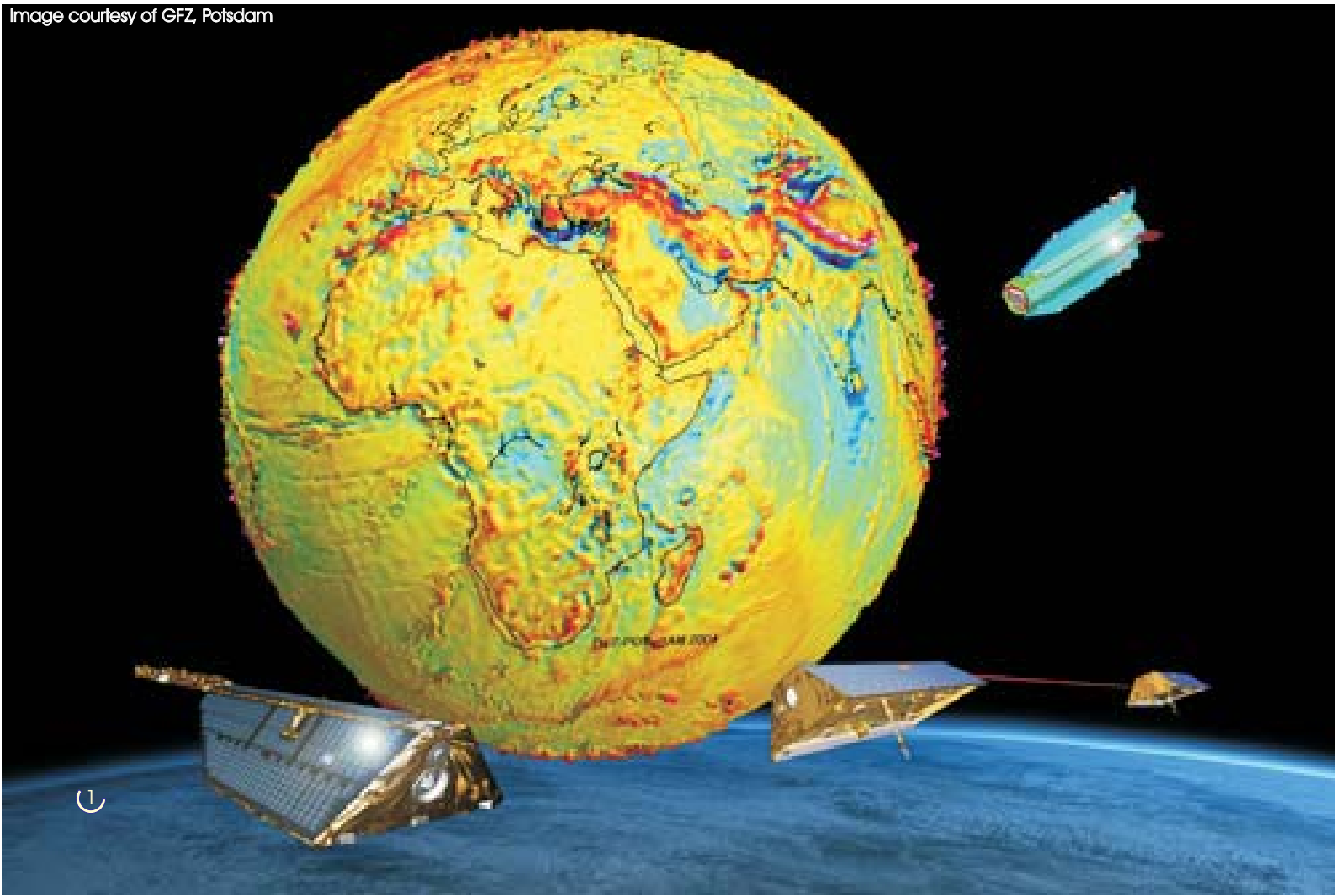


Image courtesy of GFZ, Potsdam

IAG Commission 3
Geodynamics and Earth Rotation

URL: http://www.astro.oma.be/IAG/index.html

The Earth is a 'living' planet, it is continuously changing on its surface, as well as in its interior. Geodynamics studies the deformations of the Earth's crust, which is mainly caused by the motion and collision of tectonic plates. A better knowledge on the movements of tectonic plates helps us to understand the evolution of earthquakes.

On the other hand, the movements of the tectonic plates are driven by material flows in the Earth's interior. However such mass transports are not limited only to the Earth's interior. Mass transports in the atmosphere-hydrosphere-solid Earth-core system, or the "global geophysical fluids", will cause observable geodynamic effects on a broad time scale. Although relatively small, these global geodynamic effects have been measured by space geodetic techniques to increasing, unprecedented accuracy, opening up important new avenues of research that will lead to a better understanding of global mass transport processes and the Earth's dynamic responses.

Since the Earth is not a solid object, it changes its shape if the gravitational field changes. The variations of the Earth's gravity field and the deformation of the Earth's body induced by the tidal forces, i.e., the forces acting on the Earth due to differential gravitation of the celestial bodies, such as the Sun, Moon and the planets is called Earth Tides. The investigation of Earth Tides are also an important issue for Commission 3.

Commission 3 works to develop cooperation and collaboration in computation, in theory and in observation of Earth rotation and geodynamics, and to ensure development of research in geodynamics and Earth rotation.

Photo: NASA - Johnson Space Center - Earth Science and Image Analysis

IAG Commission 4
Positioning and Applications

URL: http://www.gmat.unsw.edu.au/iag/iag_comm4.htm

Commission 4 focuses on the determination of positions using various instruments, such as inertial navigation systems (INS), global navigational satellite systems (GNSS), etc.

Commission 4 carries out research and other activities that address the broader areas of multi-sensor system theory and applications, with a special emphasis on integrated guidance, navigation, positioning and orientation of airborne and land-based platform. Highly accurate positioning systems have various ways of applications, such as guiding airplanes to carry out automatic landings, driving cars automatically, etc.

The Global Navigation Satellite Systems (such as GPS, Glonass, and the emerging Galileo) can also be used to monitor the changes in the atmosphere. Due to the fact that the GNSS signals travel through the atmosphere, they can be used to derive some important parameters, such as:

- the total electron content of the ionosphere, or
- the precipitable water vapour in the atmosphere.

Recent advances in tomographic modelling and the availability of spaceborne Global Positioning System (GPS) observations has also allowed 3-D profiling of electron density and atmospheric refractivity. Future plans for the GALILEO system will allow further opportunities for exploiting Global Navigation Satelliote Systems (GNSS) as an atmospheric remote sensing tool.

Commission 4 also promotes research in to the development of a number of geodetic tools that have practical applications to engineering and mapping.

Photo: NASA

Intercommission Committee on Theory

To be written bz P. Xu.

IAG Services

The International Association of Geodesy provides various services in the field of geodesy for the community.

IGFS (International Gravity Field Service)
URL: http://www.igfs.net

IGFS is a unified service which takes care as far as possible of data collection, validation, archiving and dissemination, as well as software collection, evaluation, dissemination for the purpose of determining, with various degrees of accuracy and resolution, the surface and gravity potential of the Earth or any of its functionals. The necessary temporal variations are also studied. The determination of such a surface, from both physical (geoid) and the geometrical (DTMs) viewpoints, is part of the field of action of this service.

BGI (International Gravimetric Bureau)
URL: http://bgi.cnes.fr

The main task of BGI is to collect, on a worldwide basis, all existing gravity measurements and pertinent information about the gravity field of the Earth, to compile them and store them in a computerized data base in order to redistribute them on request to a large variety of users for scientific purposes. The data consist of : gravimeter observations (mainly location - three coordinates, gravity value, corrections, anomalies ...), mean or point free air gravity values, gravity maps, reference station descriptions, publications dealing with the Earth's gravity.
BGI also has at its disposal through one of this host agencies : grids of satellite altimetry derived geoid heights, presently from the Geosat, Topex-Poseidon, ERS1 and ERS2 missions ; spherical harmonic coefficients of current global geopotential models ; mean topographic heights.
BGI is one of the offices of the Federation of Astronomical and Geophysical Data Analysis Services (FAGS).

IGeS (International Geoid Service)
URL: http://www.iges.polimi.it

The main tasks of IGeS are to collect data referring to the geoid on a worldwide scale, when possible to validate them and to disseminate them upon request among the scientific community: other auxiliary data can also be collected by IGeS, when useful for the geoid determination, and might be made available with the sharp exclusion of gravity anomalies data.

ICET (International Centre for Earth Tides)
URL: http://www.astro.oma.be/ICET

As World Data Centre C, ICET collects all available measurements on Earth tides, evaluate these data by convenient methods of analysis in order to reduce the very large amount of measurements to a limited number of parameters which should contain all desired and needed geophysical information and compare the data from different instruments and different stations distributed over the world, evaluate their precision and accuracy from the point of view of internal errors as well as external ones.

PSMSL (Permanent Service for Mean Sea Level)
URL: http://www.pol.ac.uk

Since 1 January 1988 the Bureau International des Poids et Mesures (BIPM) is fully responsible for the maintenance of the International Atomic Time (TAI) and of Coordinated Universal Time (UTC). The BIPM is in charge of establishing TAI and UTC (except for the UTC leap second occurrence and announcement, in charge of IERS), providing the data making TAI and UTC available in the standard laboratories and participating to the worldwide coordination for time comparisons.

ICGEM (Int. Center for Global Gravity Field Models)
URL: http://icgem.gfz/potsdam.de/ICGEM/ICGEM.html

The Center collects, validates all existing global gravity field models as well as the relating software. It provides an on-line interface to download these models, too.

IDEMS (Int. Digital Elevation Model Service)
URL: http://www.cse.dmu.ac.uk/EAPRS/iag

The IDEMS collects and validates digital representations of the global topography (DEMs).

IBS (IAG Bibliographic Service)
URL:http://www.leipzig.ifag.de/mires/EasyQuery_F.jsp?lang=en&QNM=IAGQuery.jsp

The service is based on the literature database geodesy, photogrammetry and cartography (GEOPHOKA), which is maintained by the BKG, Germany.

IERS (International Earth Rotation and Reference Systems Service)
URL: http://www.iers.org

The IERS was established as the International Earth Rotation Service in 1987 by the International Astronomical Union and the International Union of Geodesy and Geophysics and it began operation on 1 January 1988. In 2003 it was renamed to International Earth Rotation and Reference Systems Service.
The primary objectives of the IERS are to serve the astronomical, geodetic and geophysical communities by providing the following:
• The International Celestial Reference System (ICRS) and its realization, the International Celestial Reference Frame (ICRF).
• The International Terrestrial Reference System (ITRS) and its realization, the International Terrestrial Reference Frame (ITRF).
• Earth orientation parameters required to study earth orientation variations and to transform between the ICRF and the ITRF.
• Geophysical data to interpret time/space variations in the ICRF, ITRF or earth orientation parameters, and model such variations.
• Standards, constants and models (i.e., conventions) encouraging international adherence.

IDS (International DORIS Service)
URL: http://ids.cls.fr

The primary objective of the IDS is to provide a service to support, through DORIS data and data products, geodetic and geophysical accuracy to satisfy the objectives of a wide range applications and experimentations.

ILRS (International Laser Ranging Service)
URL: http://ilrs.gsfc.nasa.gov

The ILRS collects, merges, analyzes and distributes Satellite Laser Ranging (SLR) and Lunar Laser Ranging (LLR) observation data sets of sufficient accuracy to satisfy the objects of a wide range of applications and experimentation. The basic observable is the precise time-of-flight of a laser pulse to and from a retroreflector-equipped satellite. These data sets are used by the ILRS to generate a number of fundamental data products, including: Earth orientation parameters (polar motion and length of day); Station coordinates and velocities of the ILRS tracking systems;

Time-varying geocenter coordinates; Static and time-varying coefficients of the Earth's gravity field; Centimeter accuracy satellite ephemerides; Fundamental physical constants; Lunar ephemerides and librations; Lunar orientation parameters.

IVS (International VLBI Service for Geodesy and Astrometry)
URL: http://ivscc.gsfc.nasa.gov

IVS coordinates VLBI observing programs, sets performance standards for VLBI stations, establishes conventions for VLBI data formats and data products, issues recommendations for VLBI data analysis software, sets standards for VLBI analysis documentation, and institutes appropriate VLBI product delivery methods to ensure suitable product quality and timeliness. IVS closely coordinates its activities with the astronomical community because of the dual use of many VLBI facilities and technologies for both astronomy and astrometry/geodesy.

IGS (International GNSS Service)
URL: http://igscb.jpl.nasa.gov

The Global Positioning System (GPS) provides unprecedented potential for precise ground and space based positioning, timing and navigation anywhere in the world. Extremely precise use of GPS, particularly for Earth Sciences applications, stem largely from activities of the International GNSS Service (IGS). More than 200 organizations in 80 countries contribute daily to the IGS, which dependent upon a cooperative global tracking network of over 350 GPS stations (counted in Oct. 2003). Data is collected continuously and archived at distributed Data Centers. Analysis Centers produce the most accurate GPS data products. IGS data and data products are made accessible to users reflecting the organizations' open data policy. IGS is proud to be a recognized scientific service of the IAG since 1994 and a member of the Federation of Astronomical and Geophysical Data Analysis Services (FAGS) since 1996.

BIPM (Time Section of the Int. Bureau of Weights and Measures)
URL: http://www.bipm.org

BIPM maintains the Coordinated Universal Time (UTC), which is the time scale that forms a basis for the dissemination of time signals.

The IAG Project,
GGOS - Global Geodetic Observing System

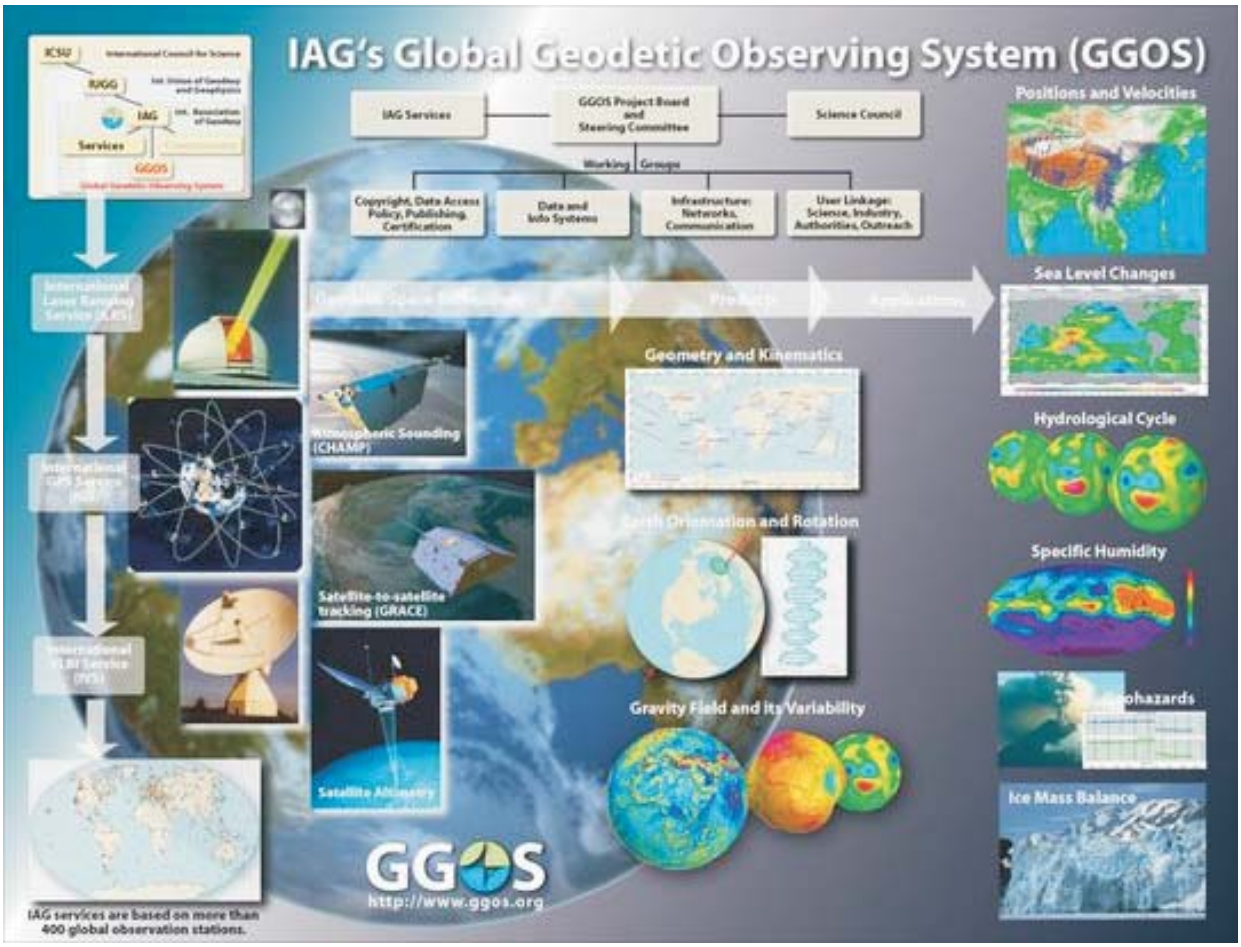
URL: http://www.ggos.org

GGOS is the Global Geodetic Observing System of the International Association of Geodesy (IAG). It 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.
GGOS integrates different geodetic techniques, different models, different approaches in order to ensure a long-term, precise monitoring of the geodetic observables in agreement with the Integrated Global Observing Strategy (IGOS). GGOS provides the observational basis to maintain a stable, accurate and global reference frame and in this function is crucial for all Earth observation and many practical applications.

GGOS contributes to the emerging Global Earth Observing System of Systems (GEOSS) not only with the accurate reference frame required for many components of GEOSS but also with observations

Related to the global hydrological cycle, the dynamics of atmosphere and oceans, and natural hazards and disasters. GGOS acts as the interface between the geodetic services and external users such as GEOSS, IGOS-P, and United Nations authorities. A major goal is to ensure the interoperability of the services and GEOSS.

With this the geodetic community can provide the global geosciences community with a powerful tool consisting mainly of high quality services, standards and references, and of theoretical and observational innovations.



IAG Publications

The IAG Publications include the Journal of Geodesy, the Geodesists' Handbook, the IAG Newsletter, the "Travaux de l'Assocation Internationale de Geodesique", IAG Special Publications, and the IAG Symposia series.

The Journal of Geodesy

The Journal of Geodesy is an international journal concerned with the study of scientific problems of geodesy and related interdisciplinary sciences. Peer-reviewed papers are published on theoretical or modeling studies, and on results of experiments and interpretations. Besides original research papers, the journal includes commissioned review papers on topical subjects and special issues arising from chosen scientific symposia or workshops.

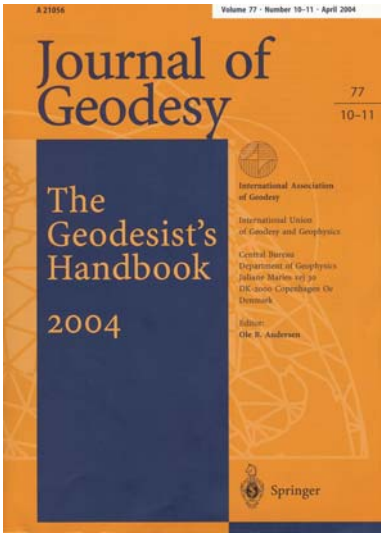
The journal covers the whole range of geodetic science and reports on the theoretical and applied studies in research areas such as positioning, reference frames, geodetic networks, modeling and quality control, space geodesy, remote sensing, gravity field and geodynamics. The Journal of Geodesy is the continuation of the previous Bulletin Geodesique and Manuscripta geodaetica.

The Geodesists' Handbook

Every four years after every General Assembly, the IAG publishes the Geodesists' Handbook, a special issue of the Journal of Geodesy. This issue provides the actual information on the Association, including the reports of the President and Secretary General presented at the previous General Assembly, the resolutions taken at that assembly, and the Association structure for the running period, as well as relevant scientific information.

The IAG Newsletter

The IAG Newsletter is published and distributed monthly both in paper from and electronically. News items are available at the IAG website: http://www.iag-aig.org.



Travaux de l'Association Internationale de Geodesique

After each General Assembly, a collection of the reports by the Association components is published in the "Travaux de l'Association Internationale de Geodesique". This publication is supplied free of charge to the officers of the Association and to the adhering body of each member country.

IAG Symposia series and special publications

Proceedings of IAG symposia may be published in the IAG Symposia Series. All manuscripts are subject to a refereeing process. At every General Assembly each member country is encouraged to supply a National Report on geodetic work done since the previous General Assembly. Links to these and other scientific reports, journals, reports of institutes and meritorious PhD theses are listed at the IAG website.

IAG Meetings

The IAG holds its own General Assemblies in conjunction with the ordinary General Assemblies of the IUGG, at the same time and in the same country. In addition the Association may hold Scientific Assemblies, independently from IUGG, generally in the mid-term between the ordinary General Assemblies. Other meetings include numerous international symposia and workshops covering broad fields of geodesy and neighbouring sciences.

IAG Membership

The membership of the IAG comprises of countries and individuals. Any member country of the IUGG is regarded as a National Member of the IAG and may, through its adhering body, appoint a National Delegate to the Association. National Delegates represent their countries in IAG Council meetings and act as correspondents for their countries between General Assemblies. Individual scientists may become Members, Candidate members, or Fellows. The IAG Executive Committee, upon the recommendation of the Secretary General accepts individuals as Members. Applications for individual membership are made to the Bureau.

Benefits of individual membership include substantial reduction on the individual subscription rate to the Journal of Geodesy, the right to participate in the IAG election process both as a nominator and a nominee (provided IUGG laws are observed), application to become a member of the IAG Commission of choice, and a reduction of the registration fee for IAG meetings. The individual members also receive the IAG Newsletter published monthly. Donations in addition to the membership fee are used for the IAG Fund to support young scientists. Discounts and in some instances full remission can be obtained by application.

Past officers of the Association shall be eligible for appointment as Fellows and shall be invited to become such. The IAG Executive Committee makes these appointments. Persons elected as officers of the Association, or nominated as members of its components, shall automatically become Candidate Members at the next General Assembly. Persons from member countries who apply, indicating previous participation in Association activities, or providing a recommendation from their national adhering body or a recommendation from an officer or a Fellow of the Association, shall be eligible to become Candidate Members upon recommendation by the Bureau.

Communication and Outreach Branch

The Communication and Outreach Branch (COB) was created in the frame of the new Statutes and By-Laws by the IAG Council at its special meeting in Budapest, 7 September 2001.

The Communication and Outreach Branch provides the Association with communication, educational/public information and outreach links to the membership, to other scientific Associations and to the world as a whole.

The responsibilities of the COB include e.g. promotion of IAG (at meetings and conferences); membership development; maintenance of the IAG Website; publications (newsletters); creation of a resource base for educators, developing countries and our global community.

INTERNATIONAL ASSOCIATION OF GEODESY

Membership Application Form 2005

Please complete and send to: IAG Central Bureau, c/o University of Copenhagen, Department of Geophysics, Juliane Maries Vej 30, DK-2100 Copenhagen O, Denmark. Fax: +45 35365357 http://www.gfy.ku.dk/~iag/

For office use only | Date received | Membership number

Personal details — Please use BLOCK CAPITALS

Surname/Last/Family Name | Other Names | Title (Prof/Dr/Mrs/Ms etc) | Date of Birth dd/mm/yyyy

Address (to which correspondence will be sent) | Telephone | Fax | E-mail | Postcode/zip | Country

Class of membership (tick one)

Individual one year (USD 50) | Individual four year (USD 150) | Individual at reduced fee Application submitted separately

Free Student | University/College and signature of department head

Free Retired | upon accepting e-mail communication only

Concessionary – Retired (USD 30) | upon requesting communication by regular mail

I represent the institution | Institution name: | and I want to pay for the membership of | persons, the names of which will be submitted by special letter.

IAG Fund (voluntary)

I wish to contribute to the IAG Fund: | Annual basis | One-and-for-all | Amount (USD)

Payment details (tick one)

Cheque

Credit Card Number

Name on card | Expiry date

Bank transfer | Bank:

IAG Links to other Associations

The International Union of Geodesy and Geophysics (IUGG) is a scientific organisation dedicated to promoting and co-ordinating studies of the Earth and its environment in space.

The International Association of Geomagnetism and Aeronomy (IAGA) is the premier international scientific association promoting the study of terrestrial and planetary magnetism and space physics.

The objectives of the International Association of Hydrological Sciences (IAHS) are to promote the study of hydrology as an aspect of the earth sciences and of water resources; to study the hydrological cycle on the Earth and the waters of the continents; the surface and groundwaters, snow and ice, including their physical, chemical and biological processes, their relation to climate and to other physical and geographical factors.

The International Association of Meteorology and Atmospheric Sciences (IAMAS) provides the scientific community with platforms to present, discuss and promote the newest achievements in meteorology, atmospheric science and related fields. It also facilitates and coordinates research which requires international cooperation.

The objects of the International Association for the Physical Sciences of the Oceans (IAPSO) are: to promote the study of scientific problems relating to the ocean and interactions taking place at its boundaries, chiefly insofar as such study may be carried out by the aid of mathematics, physics and chemistry.

The purpose of the International Association of Seismology and Physics of the Earth's Interior (IASPEI) is: to promote the study of problems relating to earthquakes, to the propagation of seismic waves, and to the internal structure, properties and processes of the Earth.

The International Association of Volcanology and Chemistry of the Earth's Interior (IAVCEI) represents the primary international focus for research in volcanology; efforts to mitigate volcanic disasters; research into closely related disciplines, such as igneous geochemistry and petrology, geochronology, volcanogenic mineral deposits, and the physics of the generation and ascent of magmas in the upper mantle and crust.

IAG Sister Societies

The International Federation of Surveyors (FIG) is an international, non-government organisation whose purpose is to support international collaboration for the progress of surveying in all fields and applications.

The International Society for Photogrammetry and Remote Sensing (ISPRS) is anorganization devoted to the development of cooperation for the advancement of photogrammetry and remote sensing and their applications to obtain reliable information from noncontact imaging and other sensor systems about the Earth and its environment.

The mission of the International Cartographic Association (ICA) is to promote the discipline and profession of cartography in an international context. Cartography deals with the conception, production, dissemination and study of maps.

The mission of the International Hydrographic Organization (IHO) is to ensure the provision of adequate and timely hydrographic information for world-wide marine navigation and other purposes.

Important Links

Official IAG Website:	http://www.iag-aig.org
Website of the Central Bureau:	http://www.gfy.ku.dk/~iag

Commissions:

Commission 1 - Reference Frames
Commission 2 - Gravity Field
Commission 3 - Geodynamics and Earth Rotation
Commission 4 - Positioning and Applications

Services:

International Eart Rotation and Reference Frames Service	**http://www.iers.org**
International Laser Ranging Service (ILRS)	http://ilrs.gsfc.nasa.gov
International VLBI Service (IVS)	http://ivscc.gsfc.nasa.gov
International GNSS Service (IGS)	http://igscb.jpl.nasa.gov
International DORIS Service (IDS)	http://ids.cls.fr
Time Section of the Int. Bureau of Weights and Measures	http://www.bipm.org
International Gravity Field Service (IGFS)	**http://www.igfs.net**
International Gravitmetric Bureay (BGI)	http://bgi.cnes.fr
International Geoid Service (IGeS)	http://www.iges.polimi.it
International Centre for Earth Tides (ICET)	http://www.astro.oma.be/ICET
Permanent Service for Mean Sea Level (PSMSL)	http://www.pol.ac.uk
International Center for Global Earth Models (ICGEM)	http://
International DEM Service	http://
IAG Bibliographic Service	http://www.leipzig.ifag.de/mires/EasyQuery_F.jsp?lang=en&QNM=

IAG Central Bureau

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