Bundesamt für
Kartographie und Geodäsie

The Geodetic Observatory TIGO and GGOS

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BKG

IAG Scientific Assembly 2009, Buenos Aires, Argentina

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Geodetic Observatory TIGO Concepción - Chile

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Location of TIGO

73°01' W, 36°50' S

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German-Chilean Cooperation

TIGO is

- a non-profit German-Chilean cooperation project, in frame of the *Contract on the Cooperation in Scientific Research and Technological Development,* in which are participating:
  - Universidad de Concepción (UdeC)
  - Instituto Geográfico Militar (IGM)
  - Bundesamt für Kartographie und Geodäsie (BKG, German Federal Agency of Cartography and Geodesy)
- is part of a global infrastructure, unique in Latin America

bkg www.bkg.bund.de + www.udec.cl + www.igm.cl = OBSERVATORIO GEODÉSICO TIGO CONCEPCIÓN - CHILE

www.tigo.cl

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Reference Systems

- TIGO is a fundamental station for geodesy.
- Observations by TIGO are contributing to the realization and maintenance of the most precise reference systems
  - on Earth (terrestrial reference frames)
  - in space (celestial reference frames)

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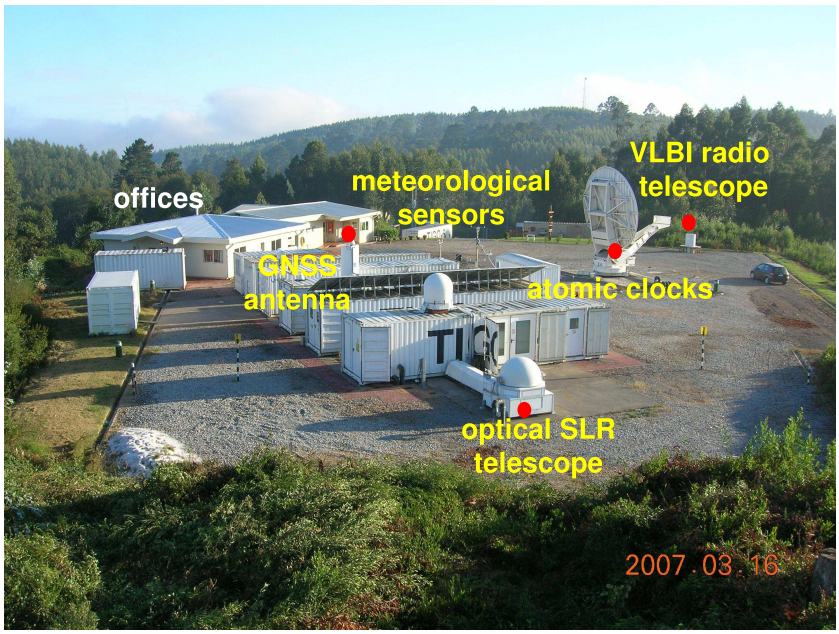
Mission of TIGO

regional GPS network and tide gauge



gravimeter seismometer

The mission of TIGO is to realize terrestial reference points in the *space* and *time domain* and in the *gravitational field* of Earth.

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International Services

Time domain:

- Universal Time Service of the Bureau International de Poids et Mesures (BIPM)

Space domain:

- International Very Long Baseline Interferometry Service (IVS)
- International Satellite Laser Ranging Service (ILRS)
- International Global Navigation Satellite System (IGS)
- International Earth Rotation and Reference System Service (IERS)

Gravity domain:

- International Gravity Field Service (IGFS)

generates ICRF + ITRF

TIGO contributes to all of these services.

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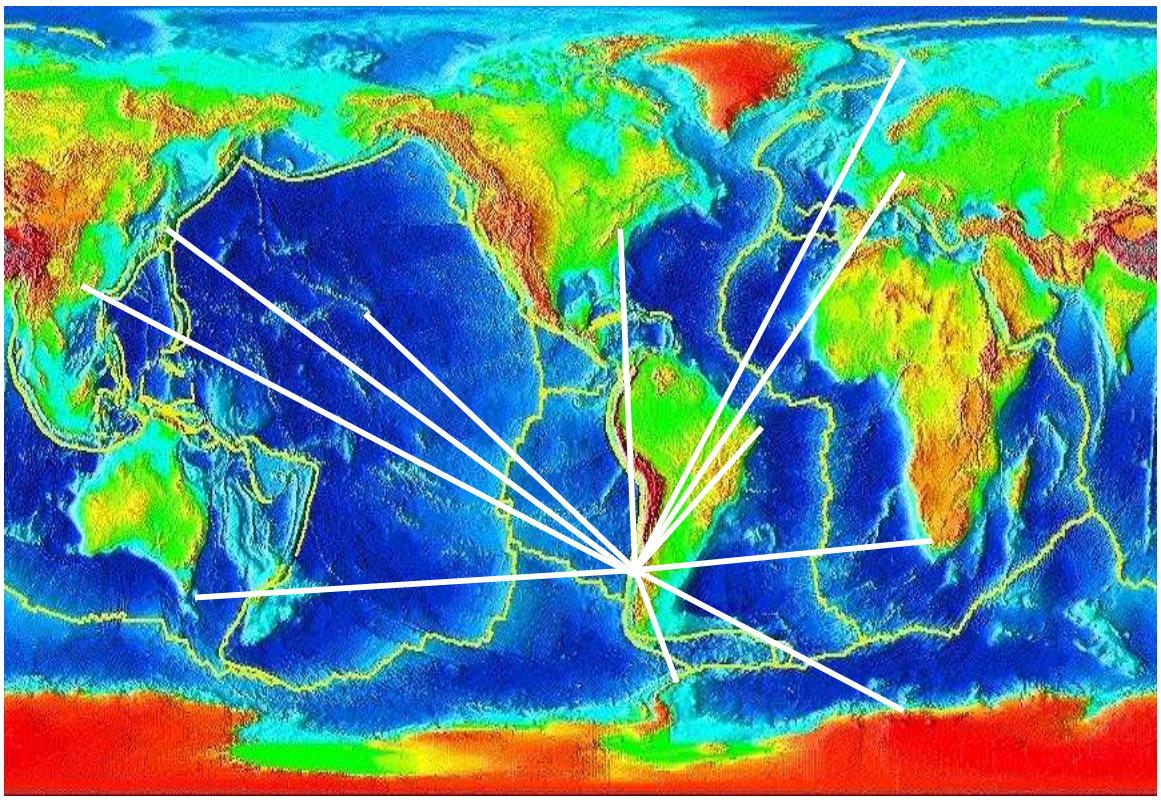
Monitoring Baselines to all Continents



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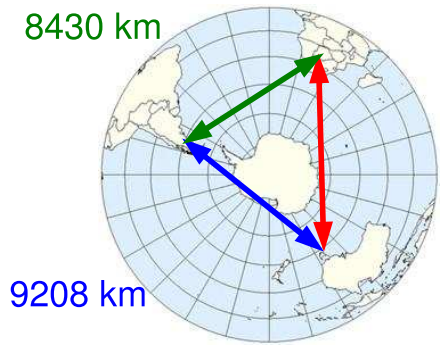
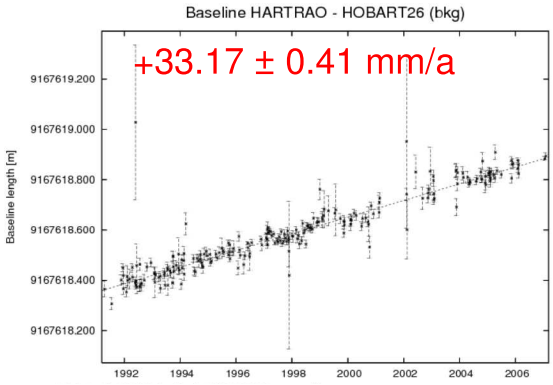
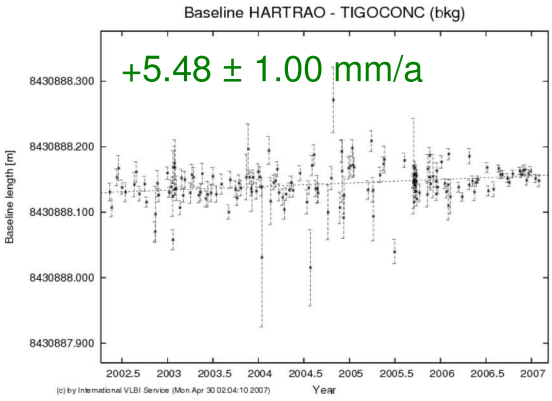
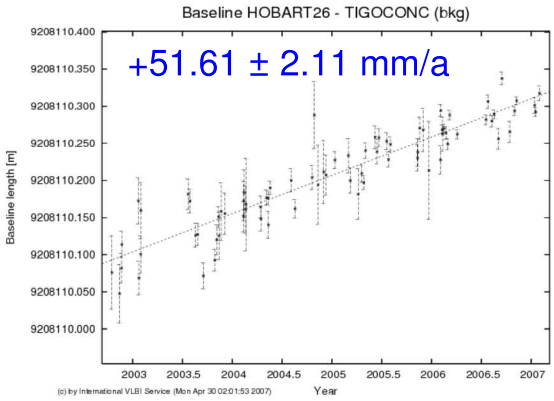
Monitoring Plate Tectonics









http://vlbi.geod.uni-bonn.de/IVS-AC/index.html

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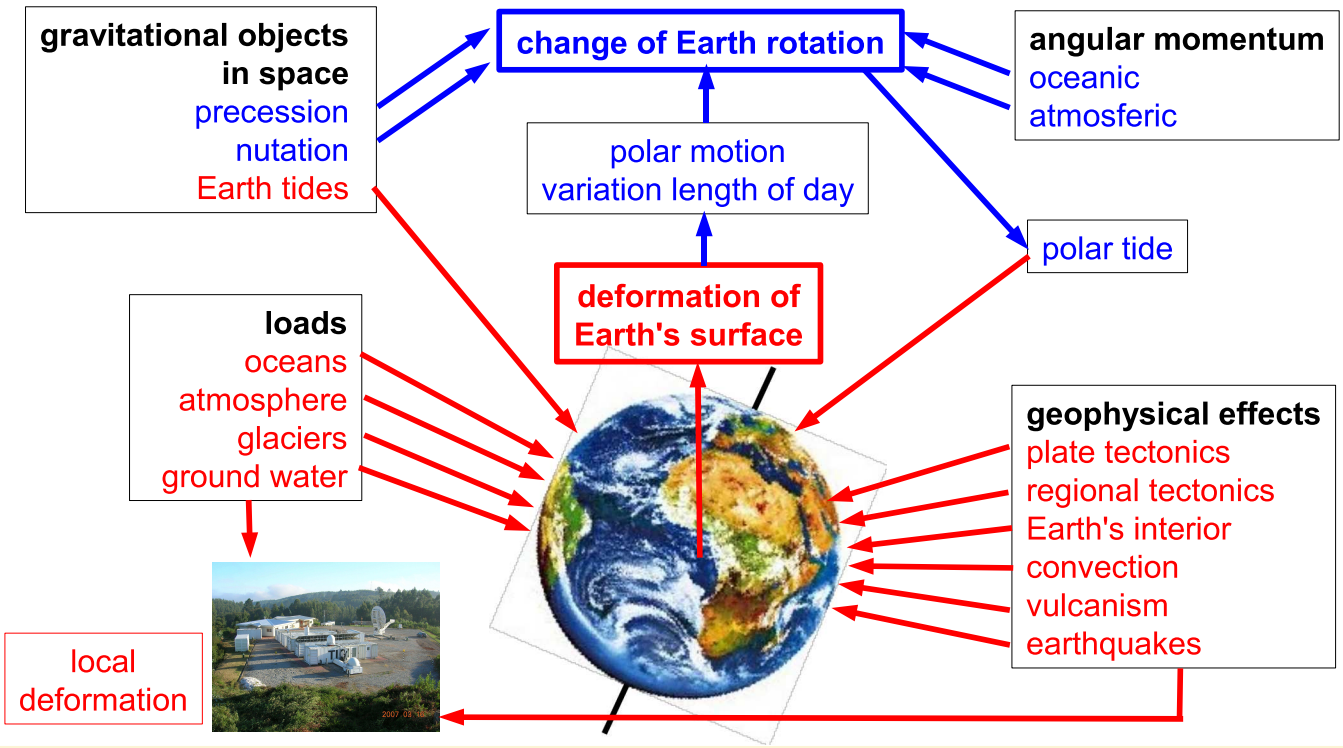
System Earth's Geophysical Phenomena



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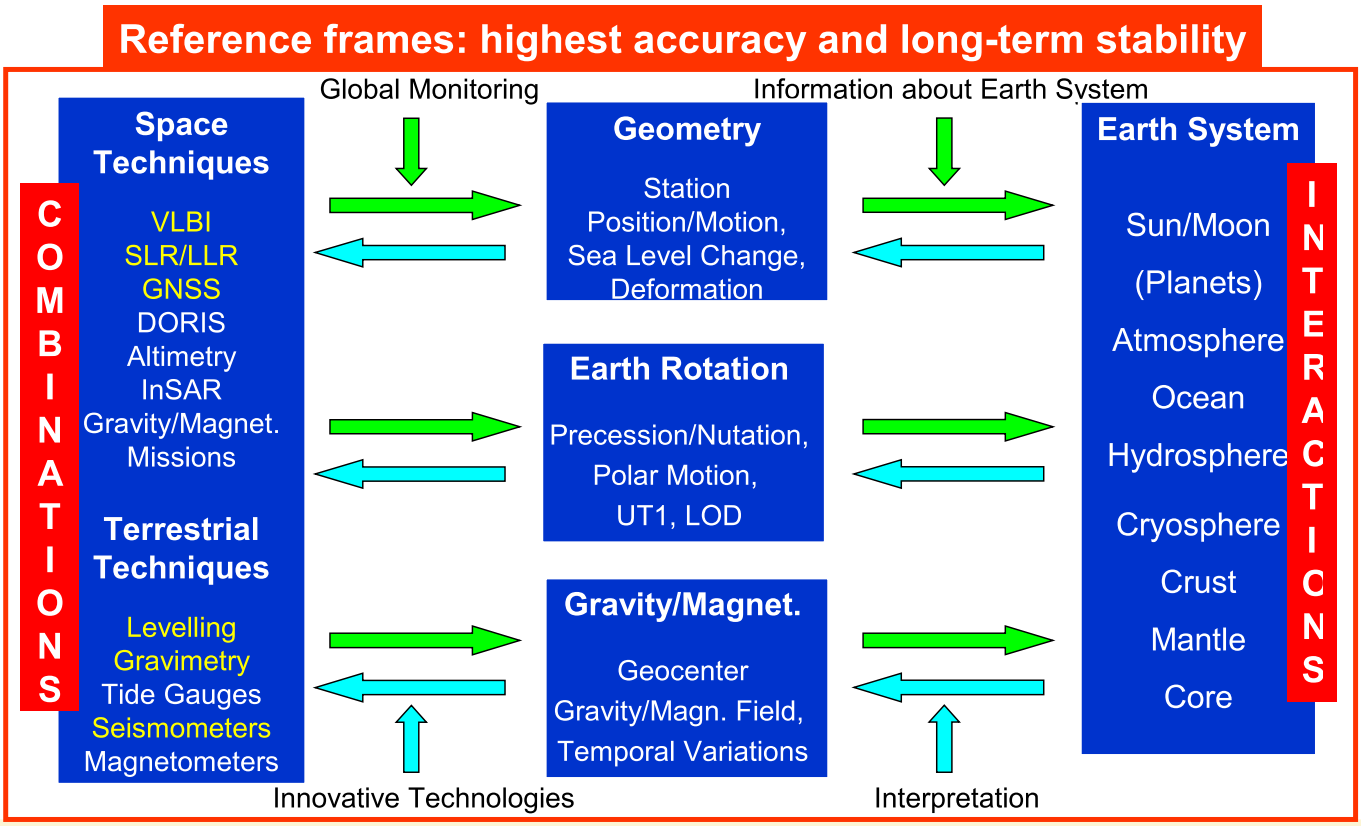
Global Geodetic Observing System
Monitoring & Modelling of System Earth



Rothacher et al.

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GGOS: Future Core
Ground-Based Infrastructure

Core Network (~40 Stations):

- 2-3 VLBI telescopes for continuous observations
- SLR/LLR telescope for tracking of all major satellites
- At least 3 GNSS antennas and receivers (controlled equipment changes)
- DORIS beacon of the most recent generation
- Ultra-stable oscillator for time and frequency keeping and transfer
- Terrestrial survey instruments for permanent/automated local tie monitoring
- Superconducting and absolute gravimeter (gravity missions, geocenter)
- Meteorological sensors (pressure, temperature, humidity)
- Seismometer for combination with deformation from space geodesy and GNSS seismology
- Additional sensors: water vapor radiometer, tiltmeters, gyroscopes, ground water sensors, …

General Characteristics: highly automated, 24-hour/365 days, latest technologies

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TIGO vs. GGOS: Future Core Ground-Based Infrastructure

TIGO	GGOS Core Network (~40 Stations):
(ok)	• 2-3 VLBI telescopes for continuous observations
ok	• SLR/LLR telescope for tracking of all major satellites
ok	• At least 3 GNSS antennas and receivers (controlled equipment changes)
-	• DORIS beacon of the most recent generation
ok	• Ultra-stable oscillator for time and frequency keeping and transfer
(ok)	• Terrestrial survey instruments for permanent/automated local tie monitoring
ok	• Superconducting and absolute gravimeter (gravity missions, geocenter)
ok	• Meteorological sensors (pressure, temperature, humidity)
ok	• Seismometer for combination with deformation from space geodesy and GNSS seismology
(ok)	• Additional sensors: water vapor radiometer, tiltmeters, gyroscopes, ground water sensors, …

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Conclusions

- TIGO is part of a global infrastructure at a remote location.
- The concept of a fundamental station for geodesy as realized by TIGO is adopted by GGOS as "Future Core Ground-Based Infrastructure".
- GGOS requests state-of-the-art technology.
- Existing and new network stations for the international services need funds to make GGOS possible.

How do International Services address the needs of GGOS?

- Example IVS

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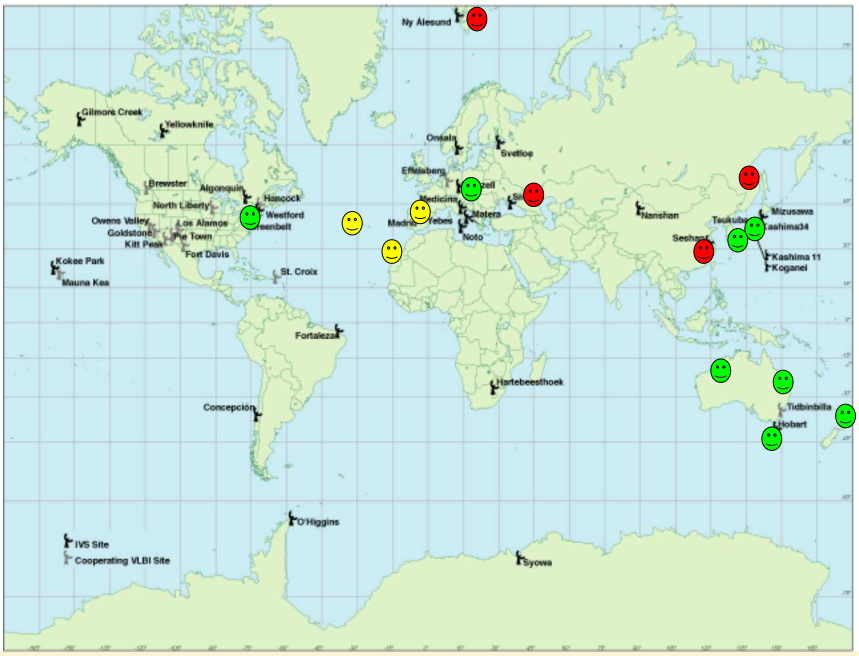
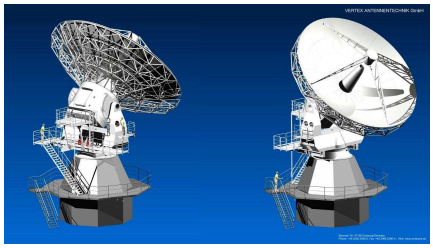
IVS: VLBI2010

VLBI2010:

- continuous VLBI observation
- ±1 mm globally (adopting goal of GGOS)

New VLBI radio telescopes for IVS





Twin Telescope Wettzell

Warkworth,
New Zealand

under construction in preparation planning phase

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