GNSS Products Made in Switzerland

Rolf Dach, Stefan Schaer, Daniel Arnold, Elmar Brockmann, Maciej Kalarus,
Lars Prange, Pascal Stebler, Adrian Jäggi

Astronomical Institute, University of Bern, Switzerland

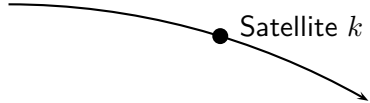
21st Swiss Geoscience Meeting 2023
17–18. November 2023, Mendrisio, Switzerland

GNSS Products Made in Switzerland

IGS: International GNSS Service

CODE: Center for Orbit Determination in Europe

Introduction: How does GNSS work?



Not in scale!

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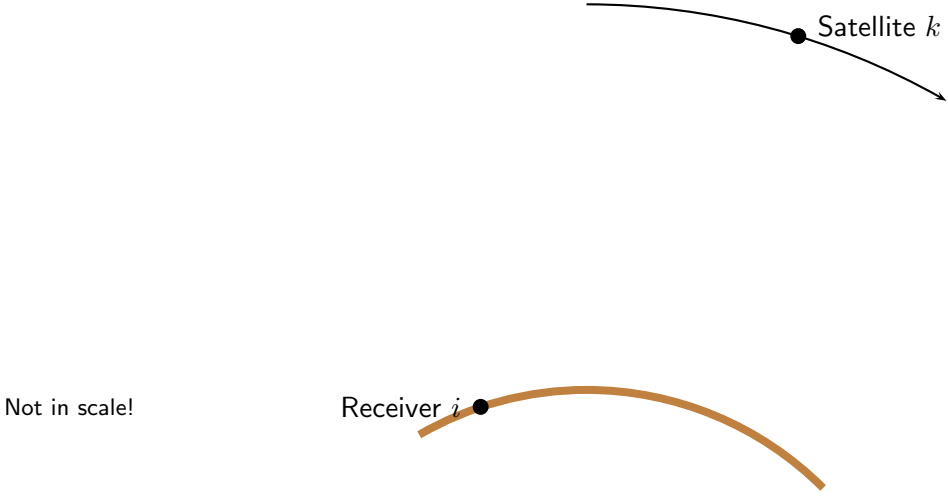

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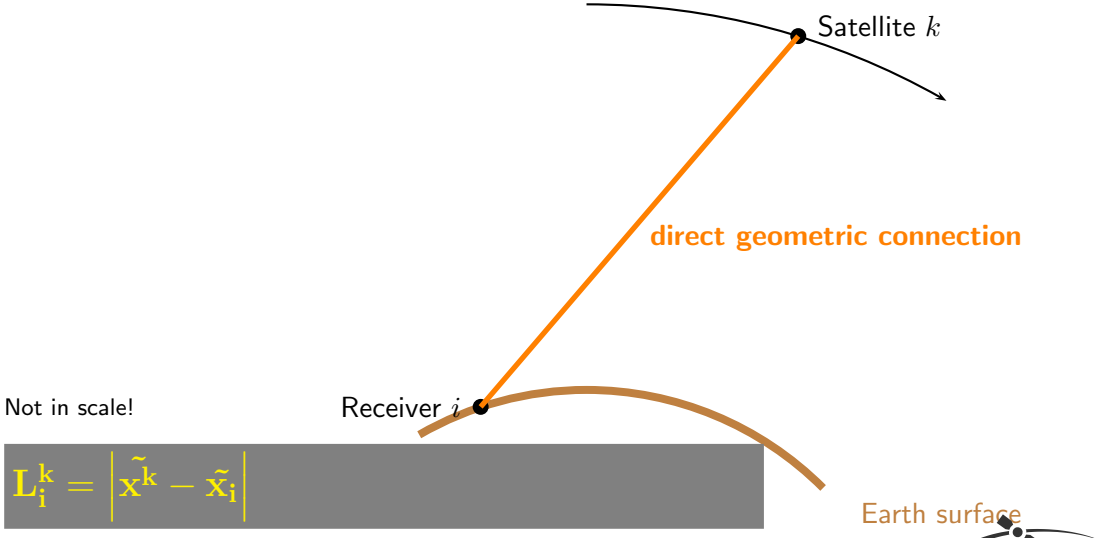

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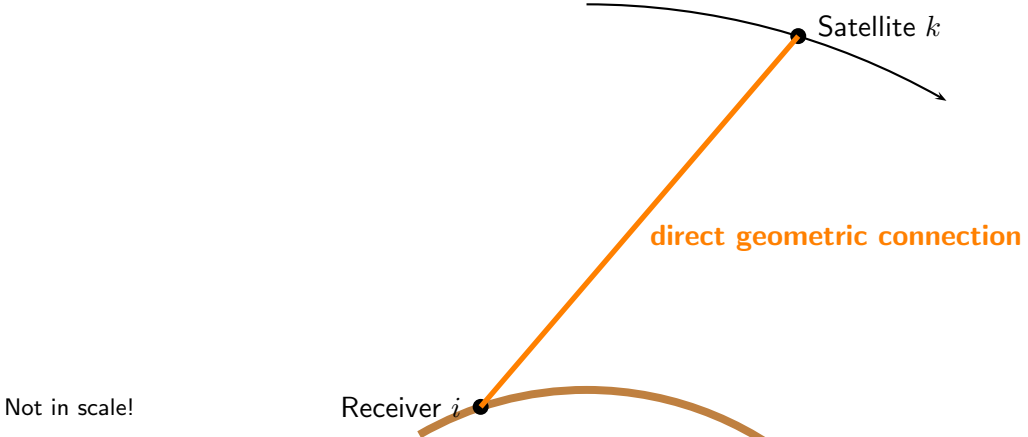

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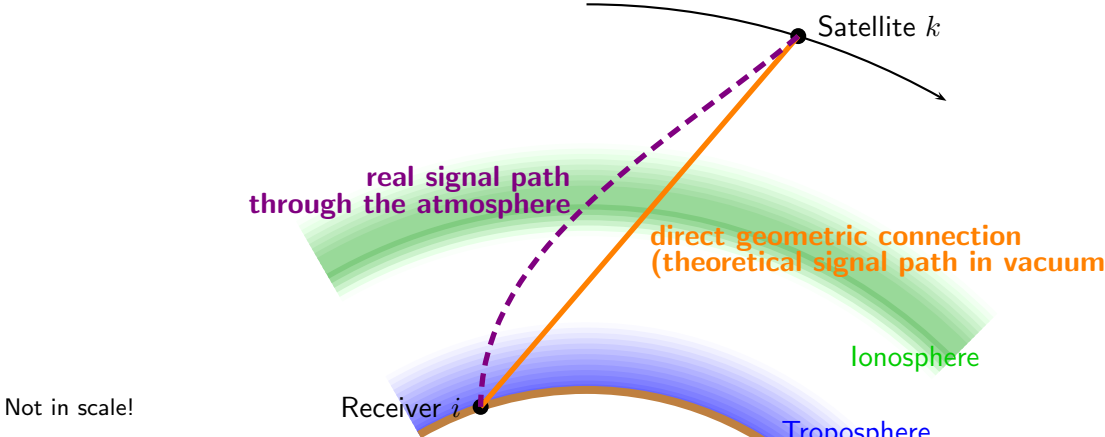

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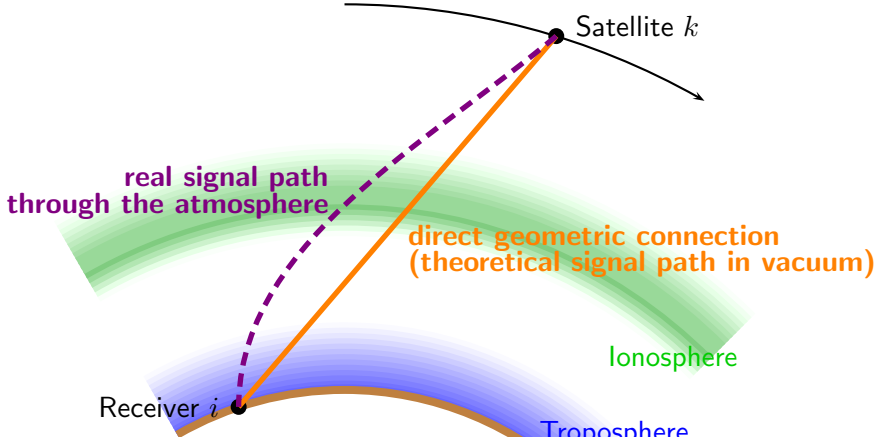

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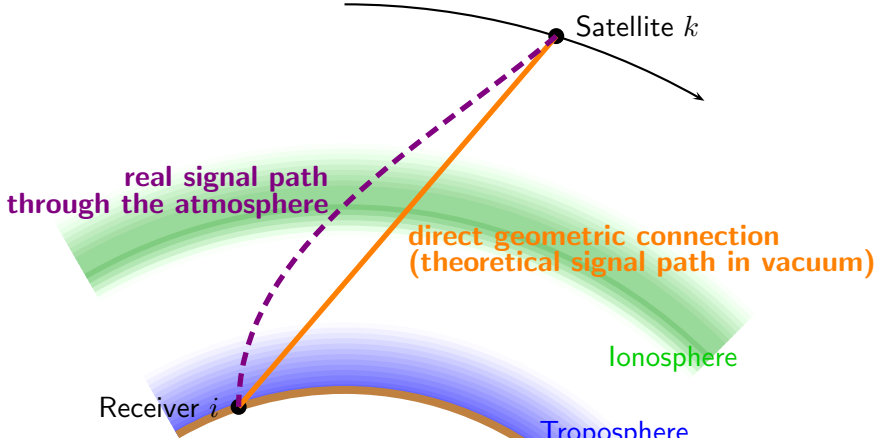

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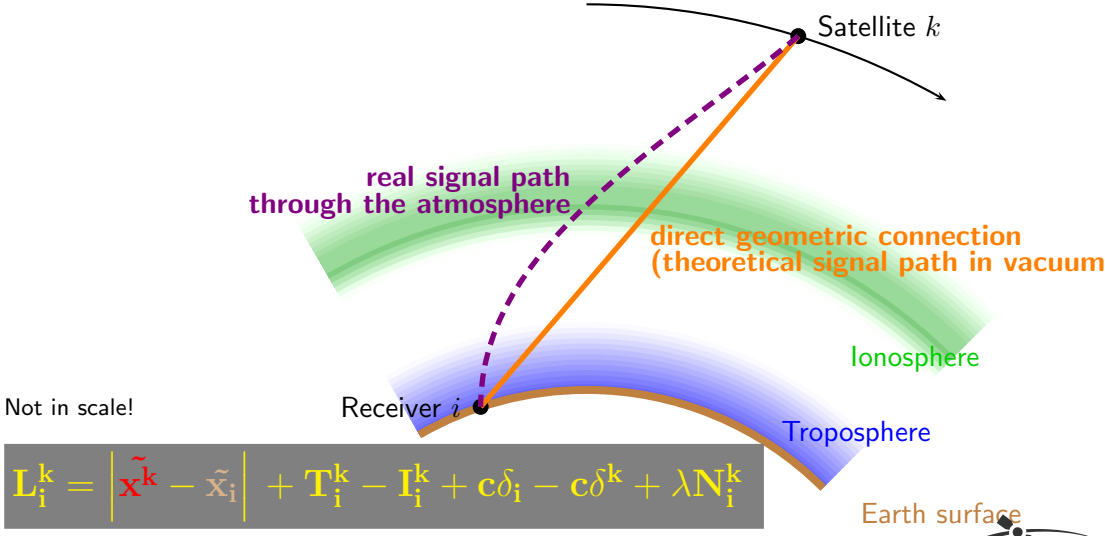

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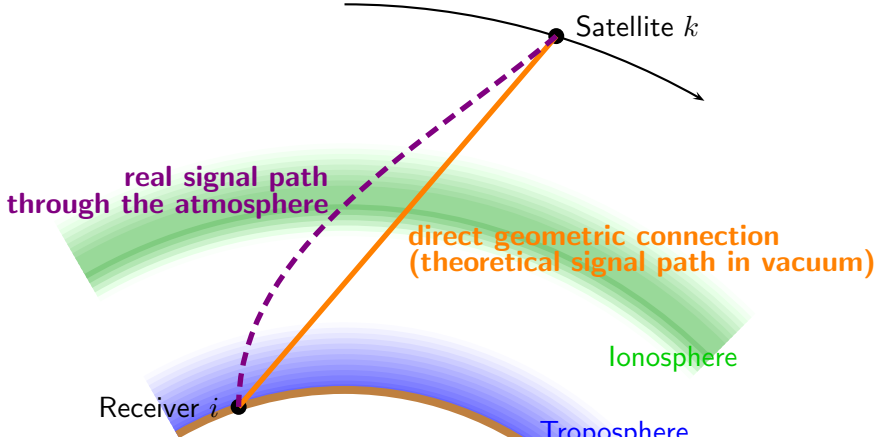

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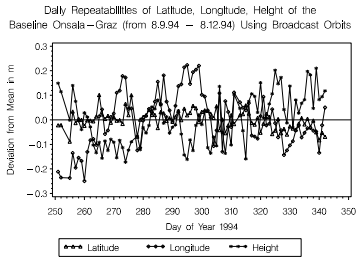
IGS: Motivation



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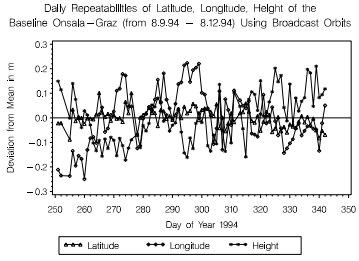

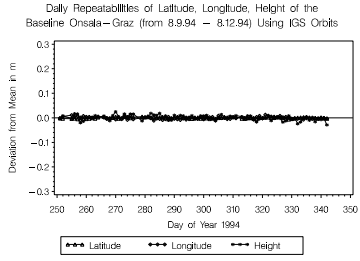

- Repeatability (north, east, up) when processing 90 days of GPS observations at Graz (Austria) and Onsala (Sweden) (1200 km baseline) with broadcast orbits (left) and with IGS orbits (right).
- Towards the end of the 1980ties it was recognized that the error of the broadcast orbit was the accuracy limiting factor.

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IGS: International GPS Service for Geodesy and Geodynamics

- Planning phase 1989 and 1991 initiated by Ivan I. Mueller,
- IGS stations ⇒ data centers ⇒ analysis centers ⇒ product combination
- First test campaign in Summer 1992
- Since 01. January 1994 operational service of the IAG
- Regular comparison and combination of the AC contributions

IGS: Development

- International GPS Service for Geodesy and Geodynamics
  January 1994

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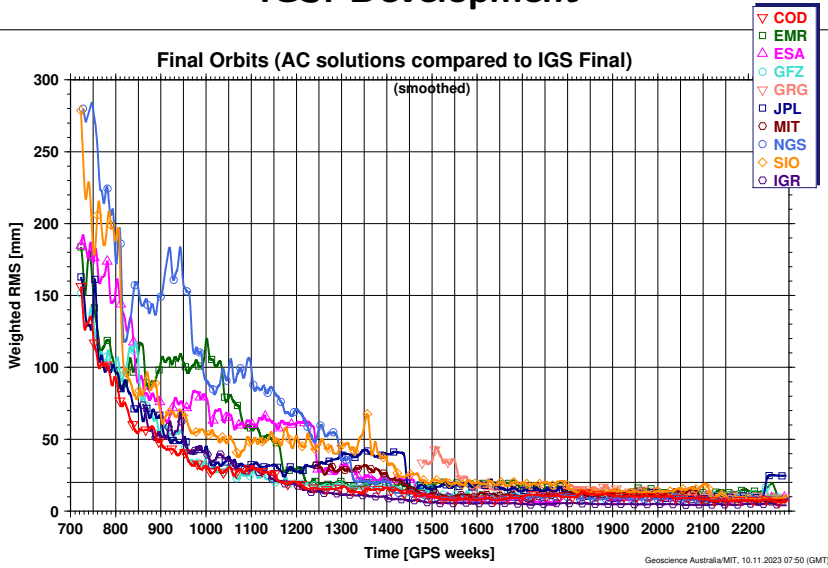


The CODE Analysis Center

- CODE, Center for Orbit Determination in Europe, is one of at present ten Analysis Centers of the IGS. CODE is formed as a joint venture of
  - the Astronomisches Institut, Universität Bern (AIUB),
  - the Bundesamt für Landestopografie (swisstopo),
  - the Bundesamt für Kartographie und Geodäsie (BKG), and
  - the Institut für Astronomische und Physikalische Geodäsie of TU München (IAPG, TUM).

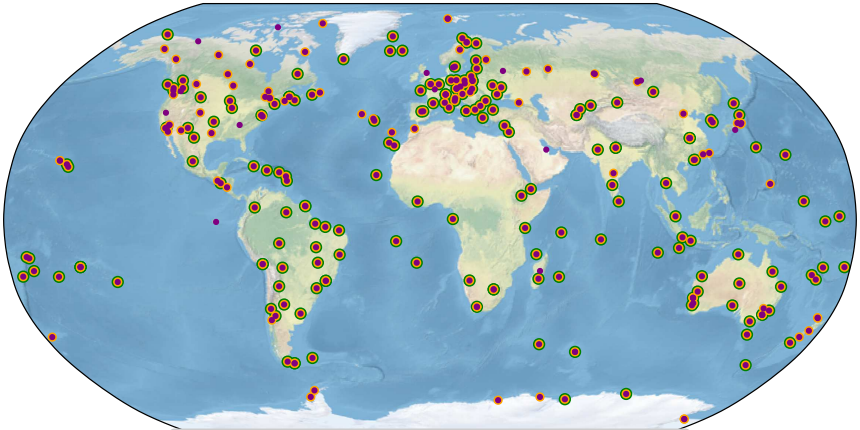
AIUB

Bundesamt für Kartographie und Geodäsie

Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
Confederaziun svizra

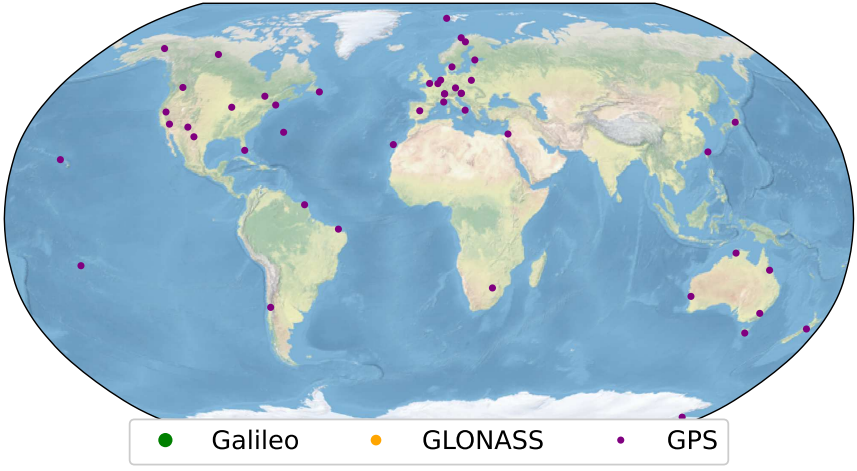
Technische Universität München

The CODE Analysis Center



Network of about 250 stations used for the GNSS processing at CODE. Status: November 2023

The CODE Analysis Center



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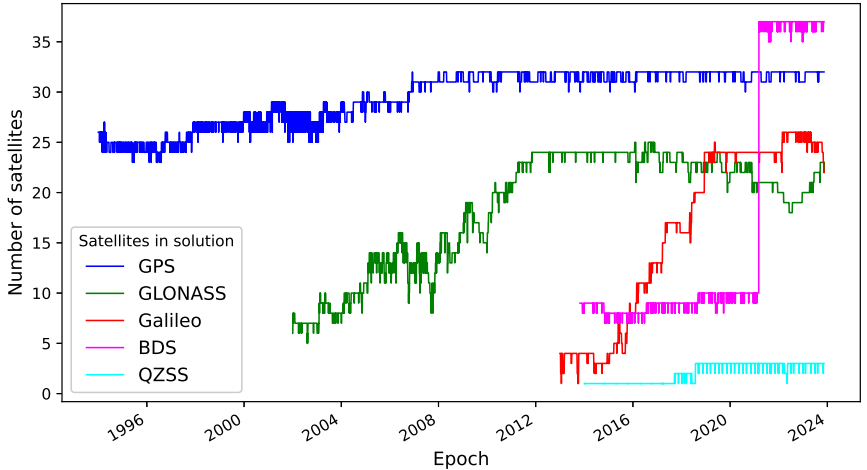
CODE GNSS Satellite Orbits



Number of satellites provided by CODE in its final/MGEX orbit

CODE GNSS Satellite Orbits


GPS Block IIR


GLONASS-M


Galileo IOV


BeiDou3 CAS


GPS Block IIM


GLONASS-K1


Galileo FOC


BeiDou3 SECM


GPS Block IIIA


GLONASS-K2


BeiDou3 GEO

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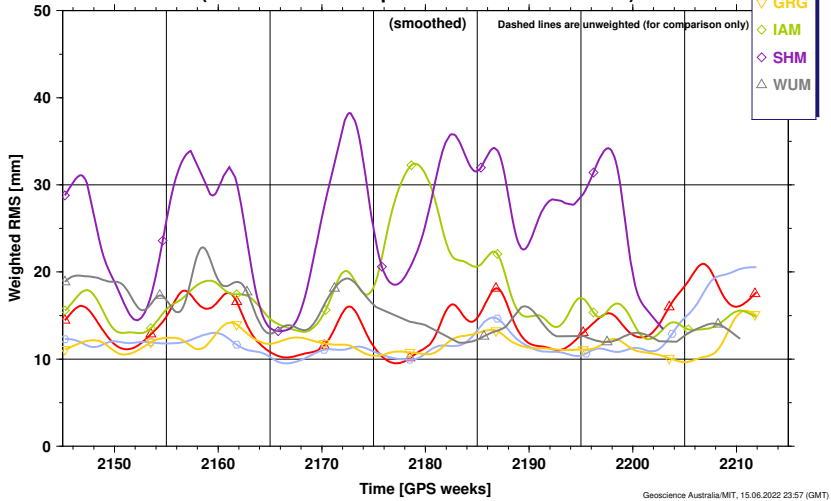
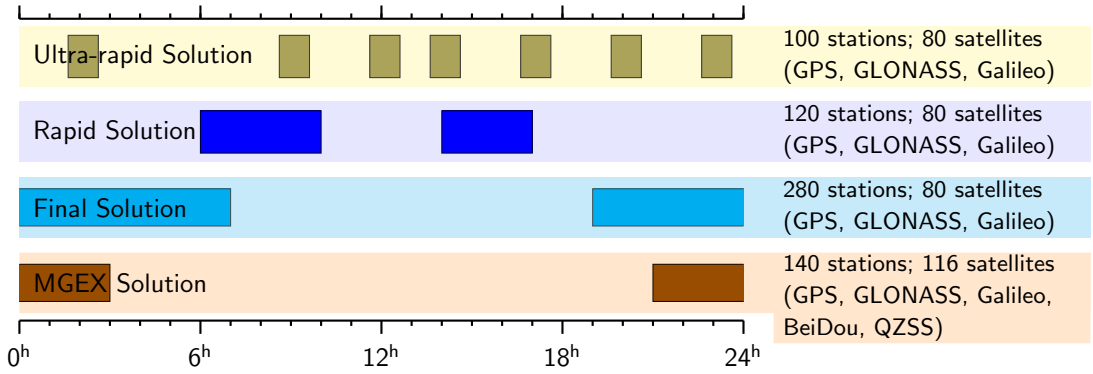


CODE Processing for the IGS



IGS-related processes running at CODE analysis center

R. Dach and CODE AC team: GNSS Products Made in Switzerland
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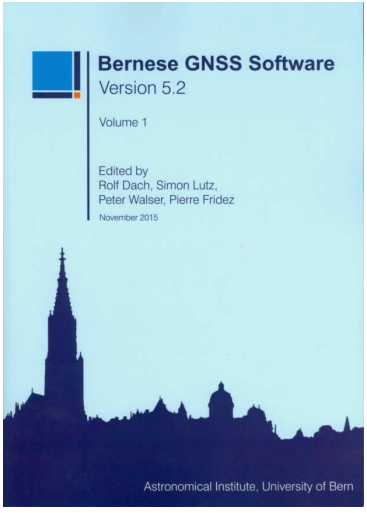
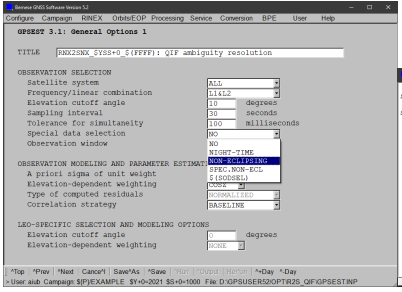
The Bernese GNSS Software



All processing at CODE analysis center are based on the Bernese GNSS Software package, developed at AIUB.



The IGS Family

IGS: Family: 350 institutions from 188 countries

The IGS Family

IGS: Family: learn more at `www.igs.org`

The IGS Family

Acknowledge their work by referencing

The IGS Family

Join the IGS family – we are open

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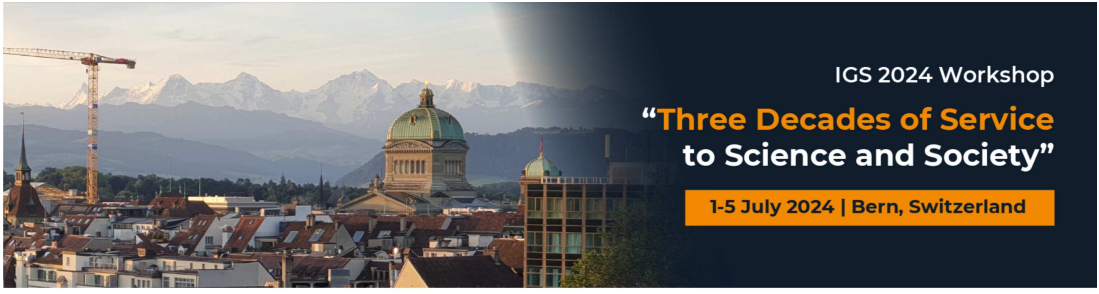

IGS 2024 Workshop

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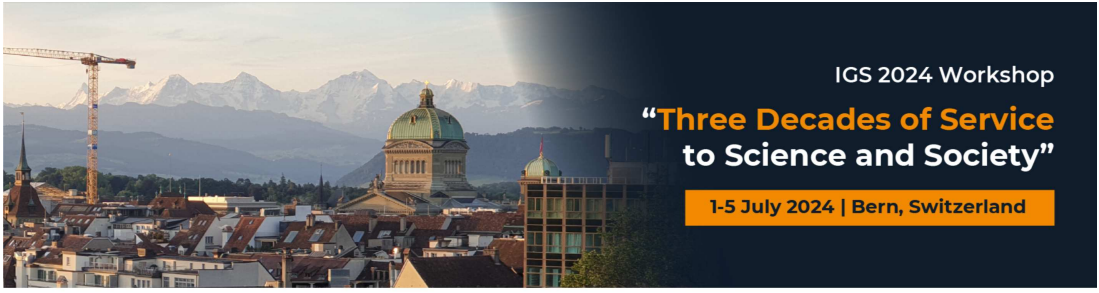

IGS 2024 Workshop

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We are looking for supporting staff (contact `rolf.dach@unibe.ch` or your supervisor)

THANK YOU

for your attention

Publications of the satellite geodesy research group:

http://www.bernese.unibe.ch/publist