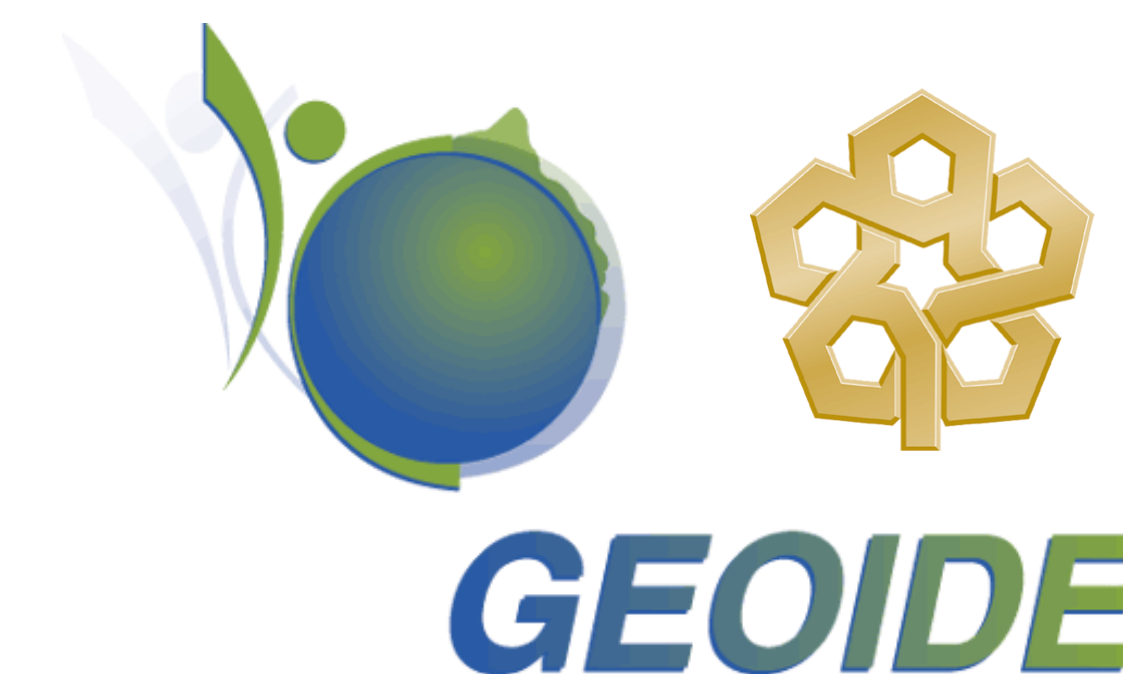




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Combination of CHAMP and GRACE satellite data for Earth monitoring

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Introduction:

- Concept of energy balance is applied for gravity field recovery.
- The basic characteristic is the use of GPS derived position and velocity data and the correction for non-gravitational forces.
- Time-wise spherical harmonic analysis on a global scale.
- CHAMP monthly solutions depend on groundtrack coverage
- Combination with GRACE satellite data yields more consistent monthly solutions
- Application in geodesy, geodynamics, geology, hydrology, glaciology, sea level, geophysical prospecting

Method:

- The energy integral approach is connecting position, velocity and accelerometry to the disturbing potential.

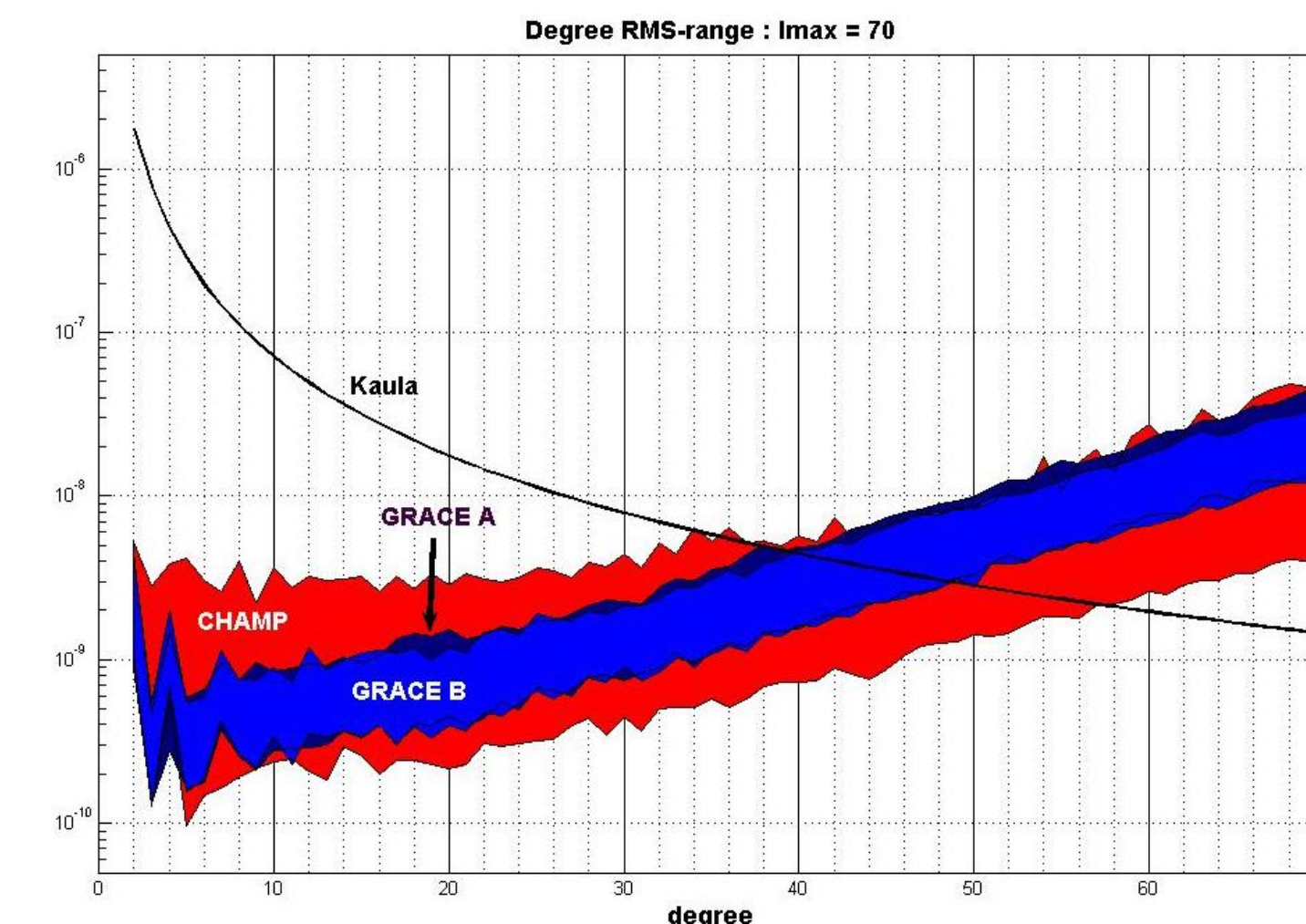
$$T + c = E_{kin} - U - Z - \int \left(f + \sum_k g_k \right) dx$$

T	=	disturbing potential
c	=	integration constant
E_{kin}	=	kinetic energy
U	=	normal gravitational potential
Z	=	centrifugal potential
$\int f dx$	=	dissipative energy
$\int \sum_k g_k dx$	=	time variable changes

- Spherical harmonic analysis yields spherical harmonic coefficients on a monthly basis

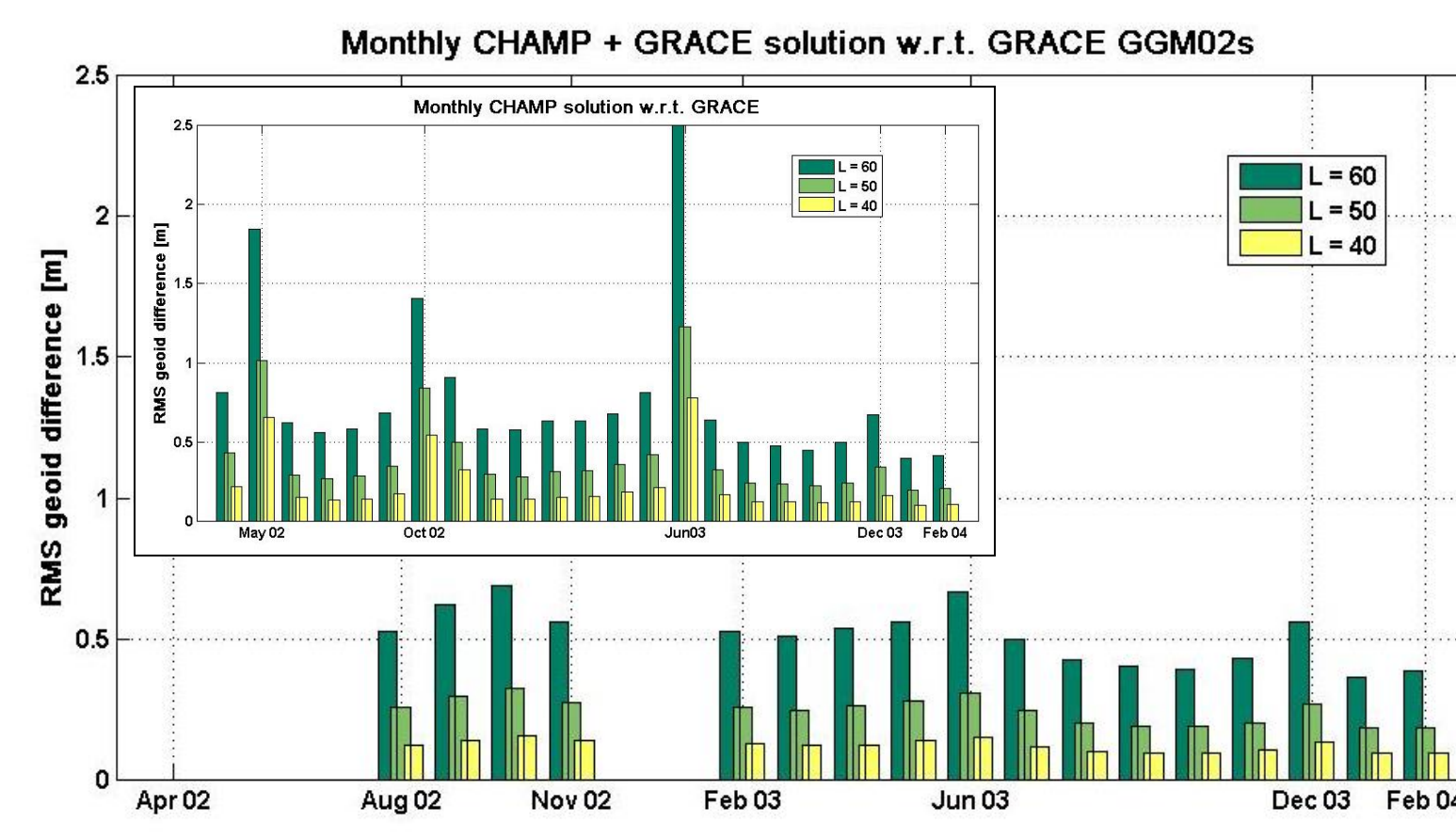
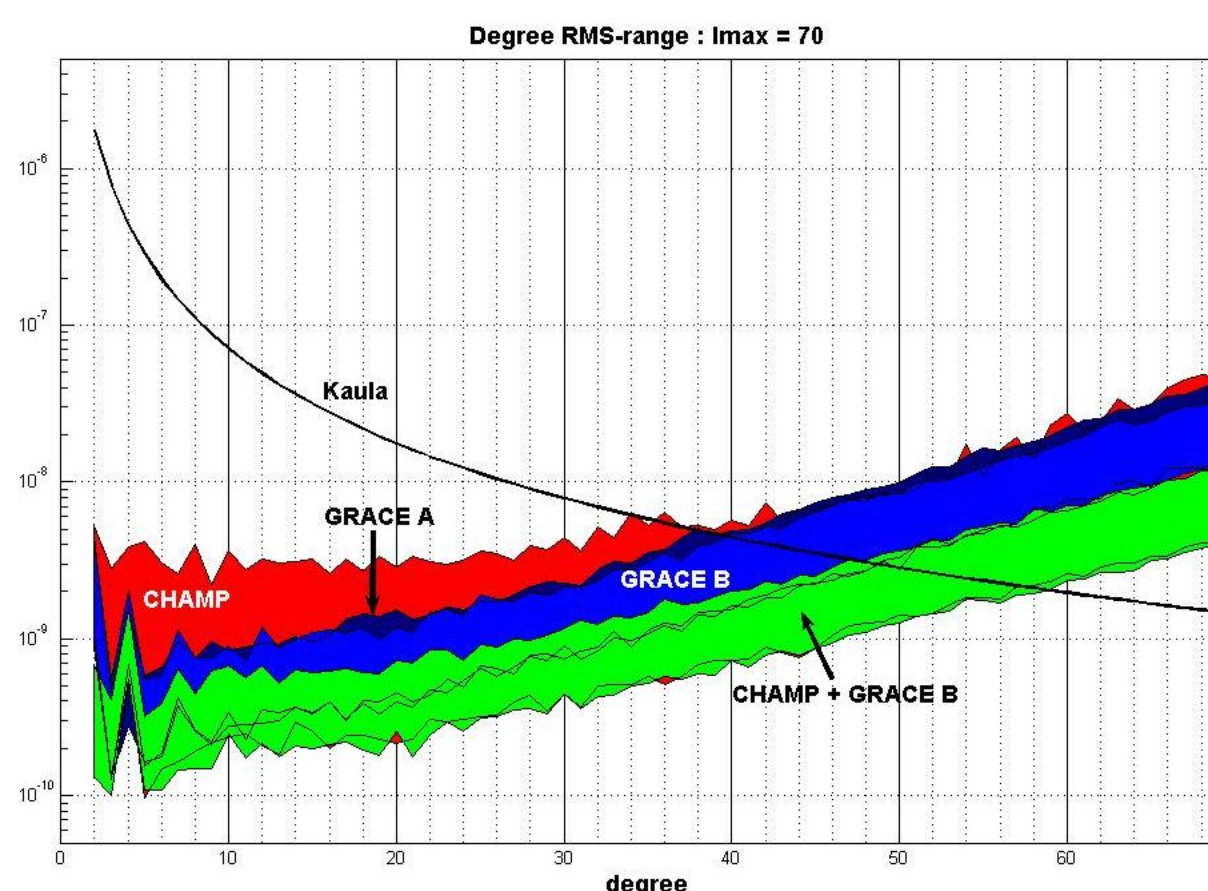
Combination with GRACE satellite data

- GRACE system viewed as two single satellite systems

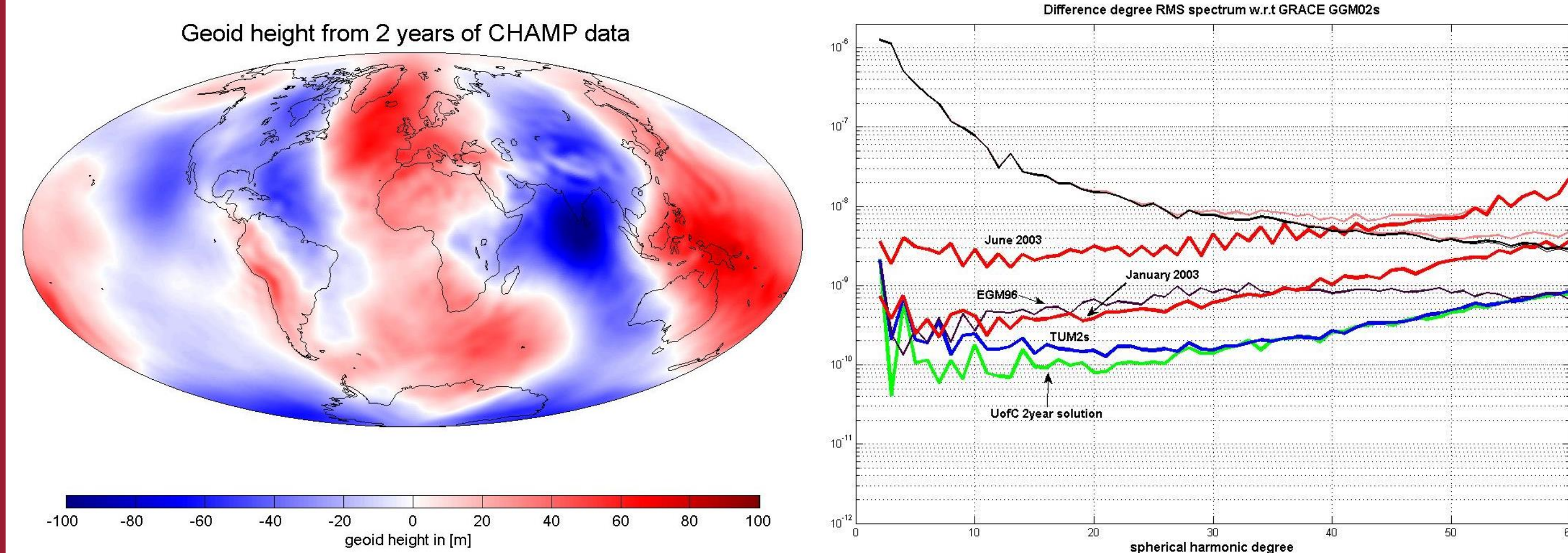


Improvement in monthly solution:

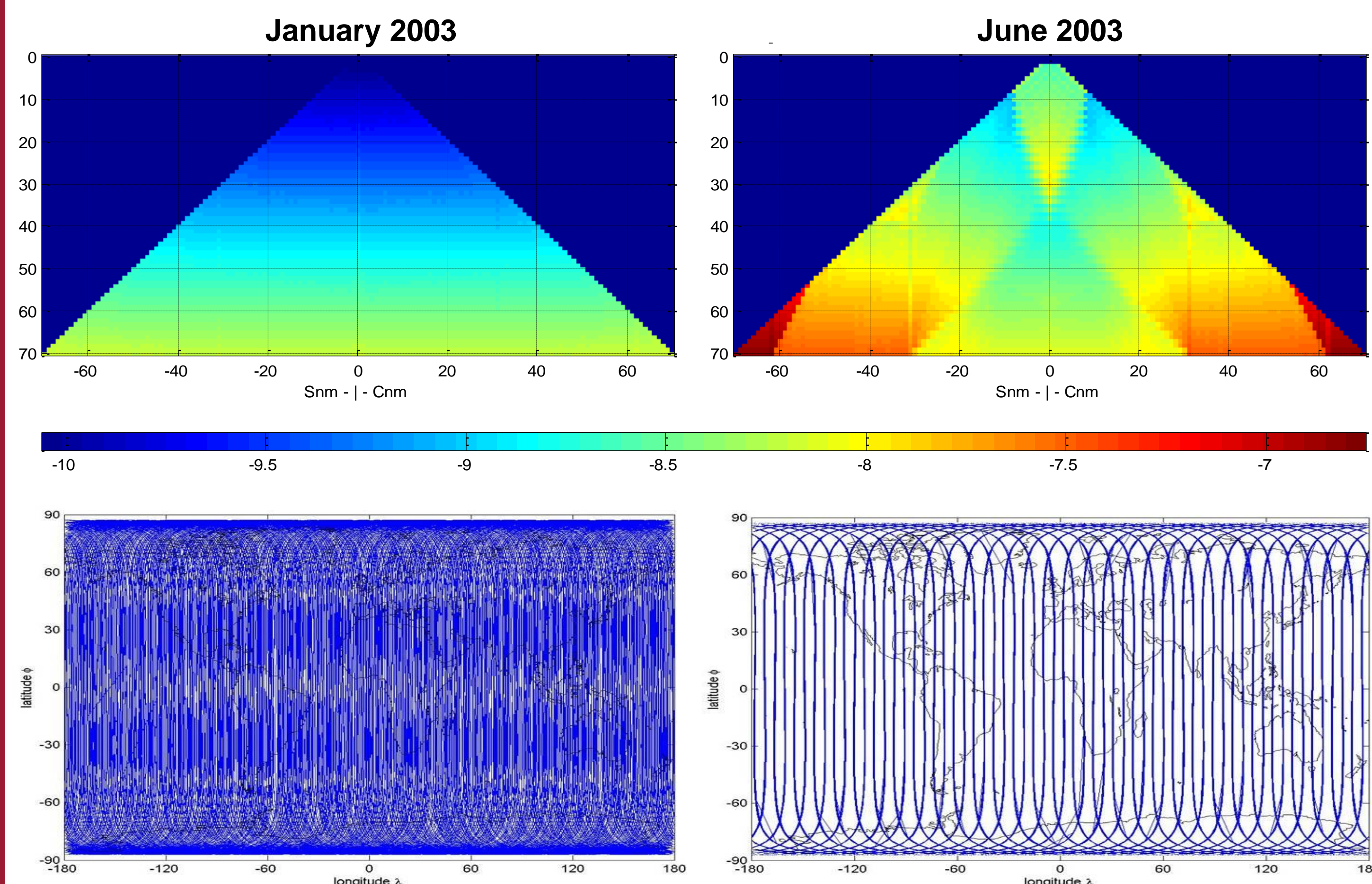
- More measurements and better groundtrack coverage yield more homogeneous and consistent monthly solutions
- Combination needs sophisticated tools, e.g. variance-component estimation



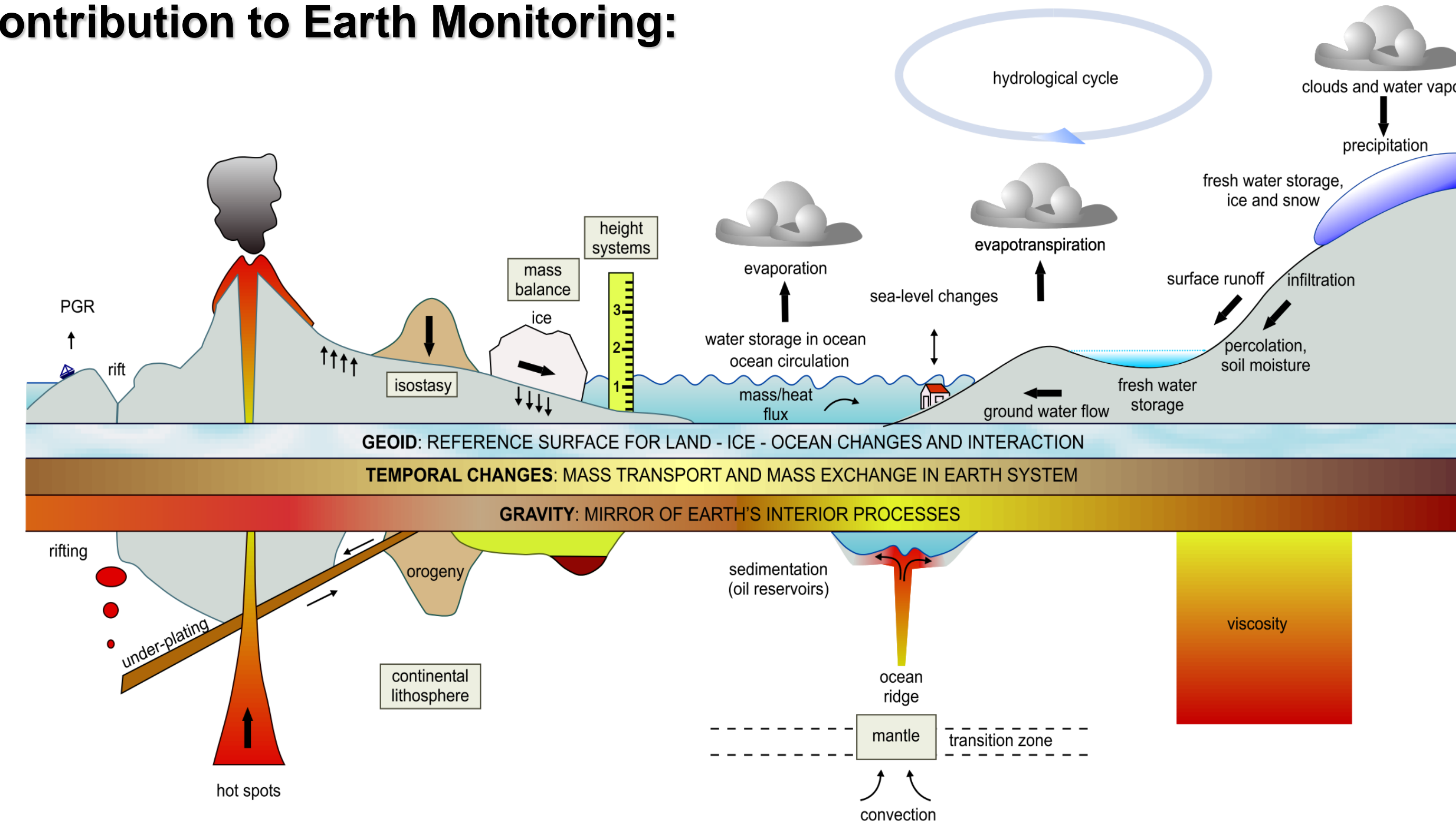
CHAMP-only solutions:



- Recovery of time variable signal from a time variable groundtrack pattern
- Poor groundtrack coverage yields degradation of monthly solutions



Contribution to Earth Monitoring:



Partner:

- National Resources Canada
- Geodetic Survey Division, Canada
- Institute for Astronomical and Physical Geodesy, Technical University Munich
- Institute of Geodesy, University Stuttgart
- GeoForschungsZentrum Potsdam
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