Current activities at the IGN/JPL DORIS data Analysis Center

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In 2001, IGN and JPL decided to join efforts in order to develop a more operational DORIS data analysis center for research activities, using the JPL Gipsy-Oasis II software.

Available products

At present, DORIS data from all satellites available at CDDIS are processed on a daily basis using a multi-satellite processing strategy.

Scientific products presently available from 1992 to 2001 :
(cddisa.gsfc.nasa.gov/pub/doris/products/ign)

- weekly SINEX files (stations positions and Earth Rotation Parameters)
- monthly SINEX files (stations positions and Earth Rotation Parameters)
- complete EOP series (daily solutions)
- geocenter variations derived from weekly solutions
- geocenter variations derived from monthly solutions

- scale factor derived from weekly solutions
- scale factor derived from monthly solutions

Available soon :

- global solution in SINEX file (stations positions and velocities)
- precise orbits in sp1 format (for all available satellites)

Description of the estimation strategy

- DORIS data are downloaded from CDDIS and archived on a daily basis

- DORIS data are processed on a daily basis using all satellites in the same adjustment using free network approach: estimating simultaneously orbits, stations positions, EOP using loose constrains (10 m a priori for stations positions)
    → daily SINEX files

- Daily SINEX files are combined to provide weekly (resp. monthly) solutions without any additional constrain
    → weekly (resp. monthly) SINEX files

- Weekly/monthly SINEX files are
    - projected (reference frame)
    - transformed in ITRF2000 using the best possible position/velocity information
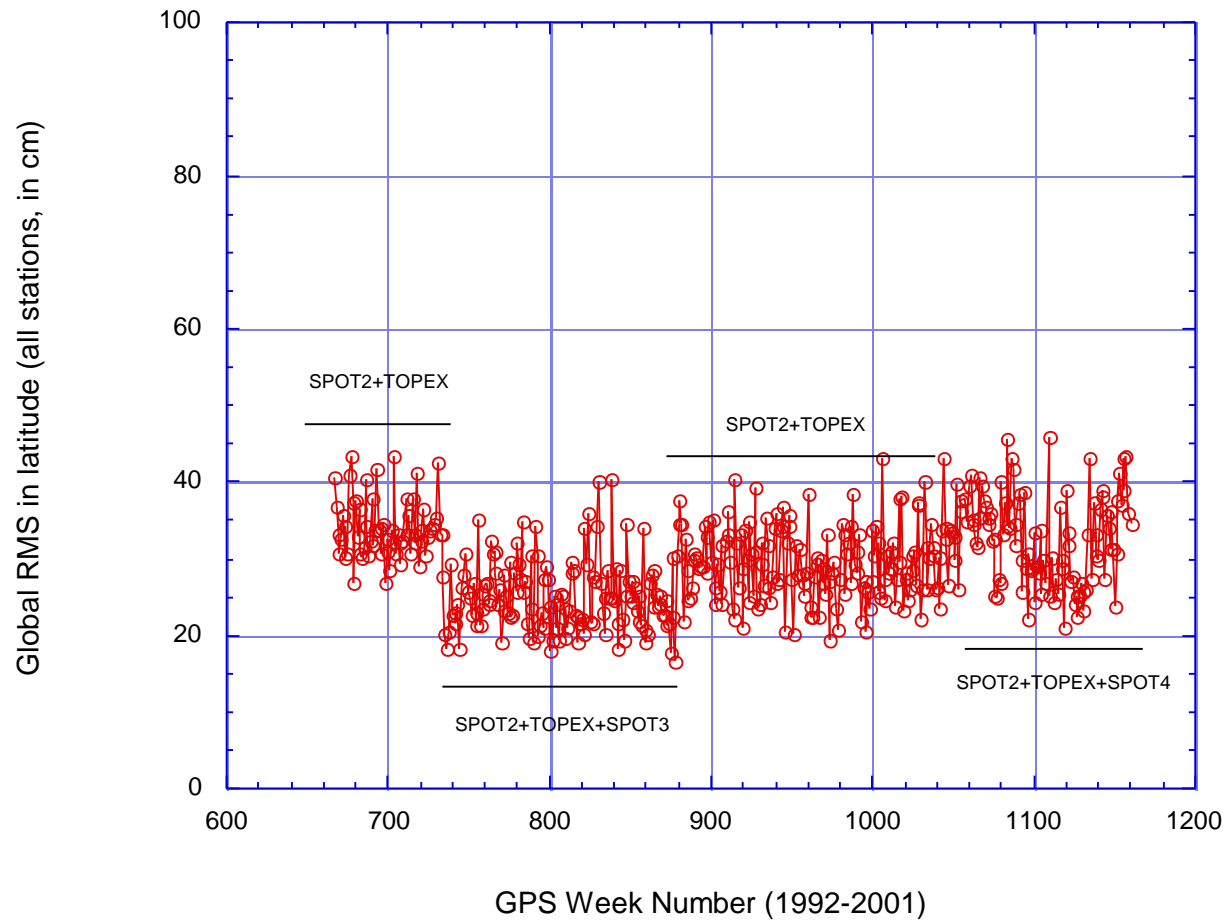
Advantages of the method:

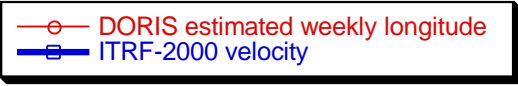Easily automated process (daily/weekly/monthly/global)

Only loose constraints added

➔ results can be used directly for Terrestrial Reference Frame Studies with other DORIS solutions as well as with different techniques (GPS, VLBI, SLR)

Weekly DORIS positioning residuals
(latitude, all stations)

Global RMS in latitude (all stations, in cm)

SPOT2+TOPEX

SPOT2+TOPEX

SPOT2+TOPEX+SPOT3

SPOT2+TOPEX+SPOT4

GPS Week Number (1992-2001)

Easter Island
DORIS Weekly Positioning (longitude)

Legend:
- DORIS estimated weekly longitude
- ITRF-2000 velocity

Estimated DORIS slope = 65.9 mm/year
ITRF-2000 velocity = 66.4 mm/s
NUVEL1-A velocity = 67.4 mm/year

X-axis: Year
Y-axis: DORIS estimated weekly longitude
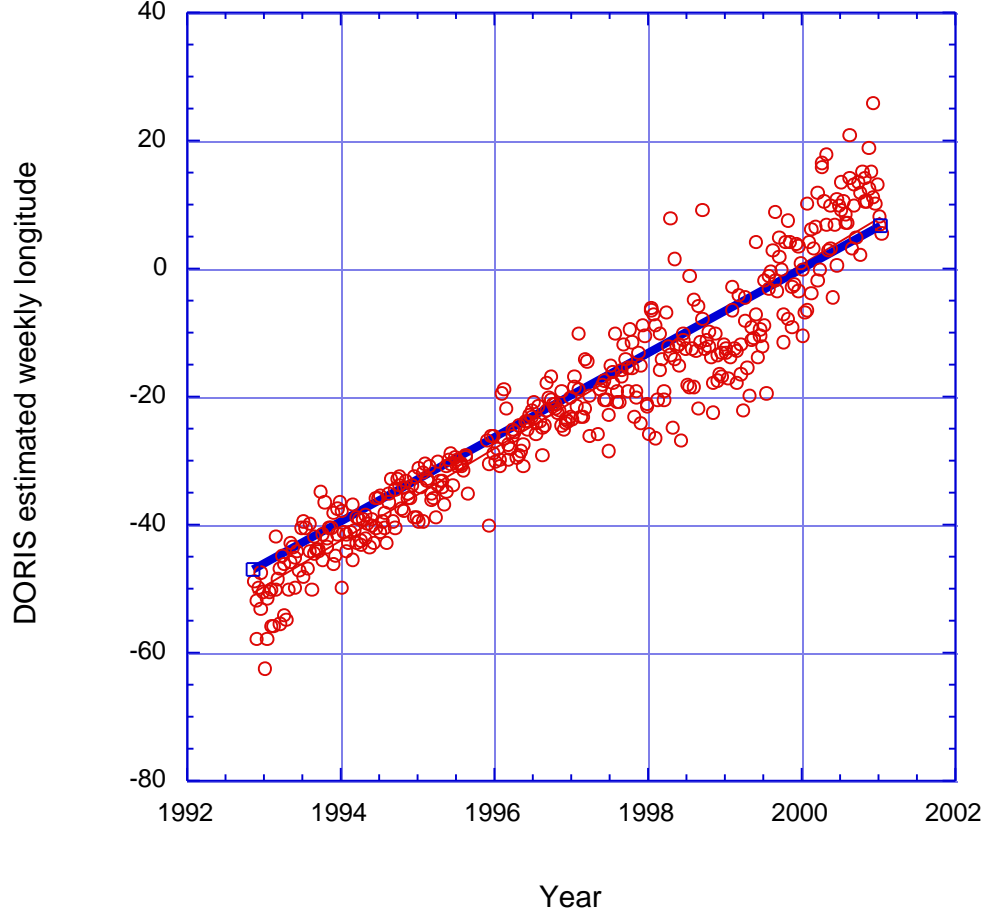
estimated slope = -16.9 mm/year
ITRF2000 estimated velocity = -8.7 mm/year
GPS/JPL estimated velocity = 8.5 mm/year
(http://sideshow.jpl.nasa.gov/mbh)

Fairbanks Station (FAIA)
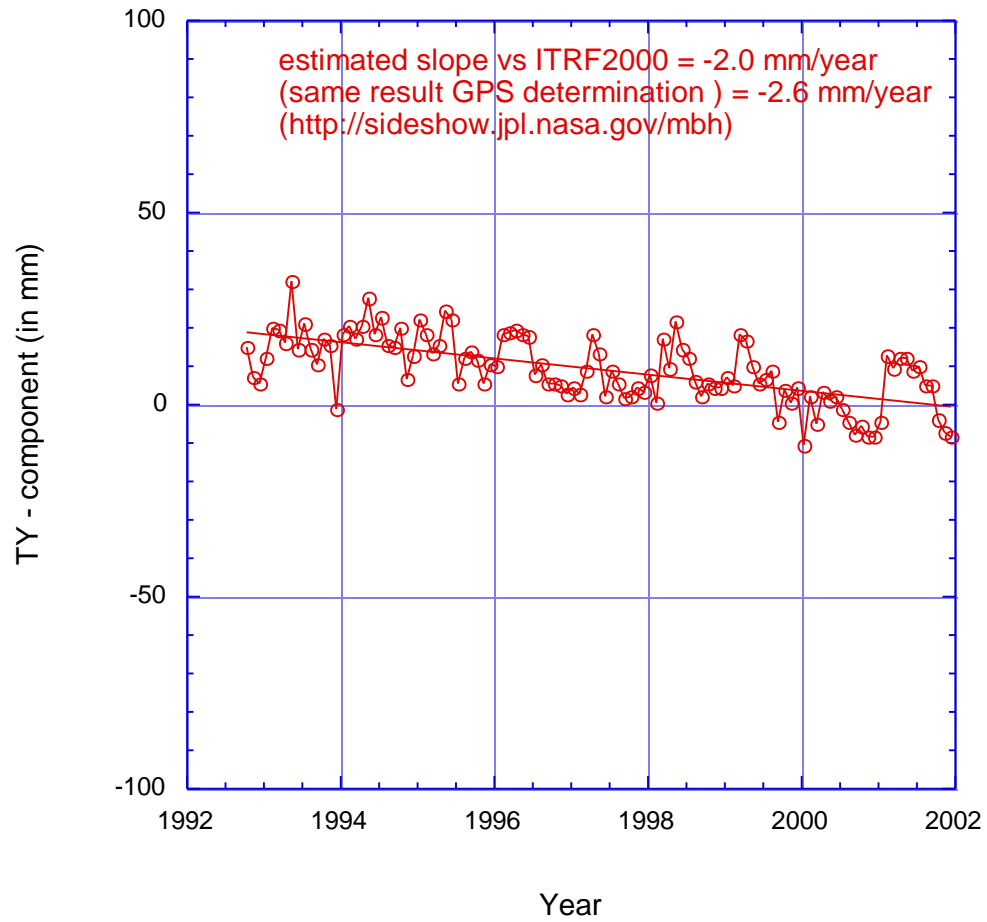**DORIS weekly latitude determination**

Latitude (in cm)
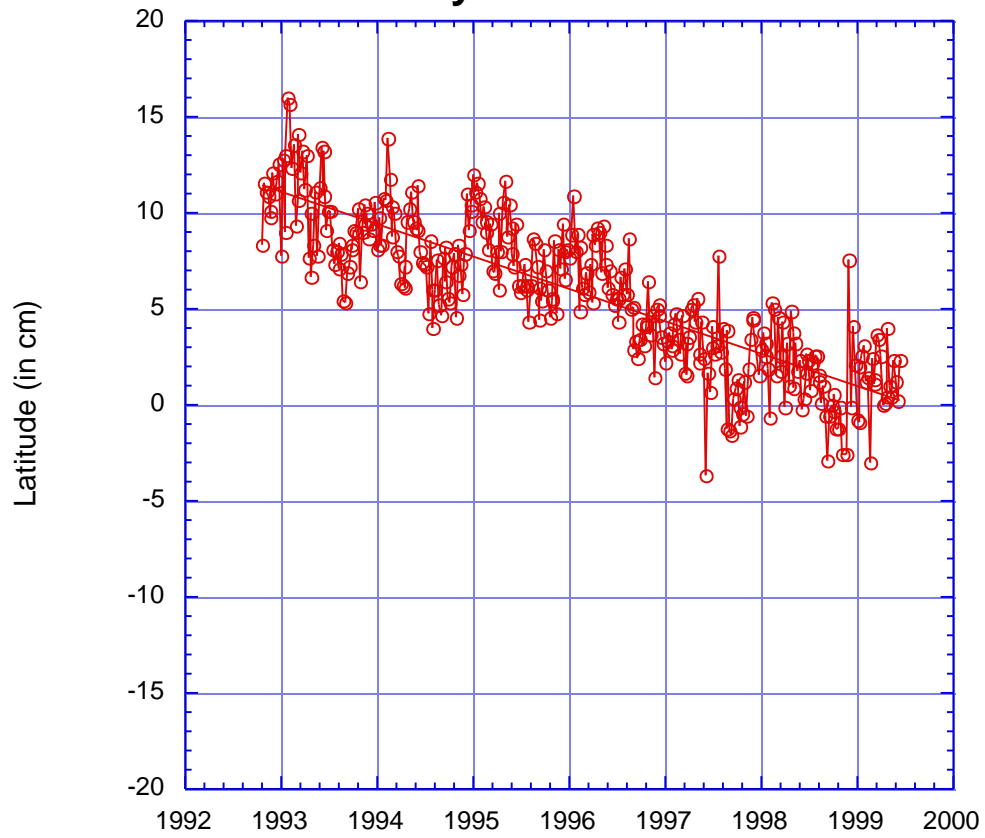
estimated slope = + 4.2 mm/year
ITRF2000 vertical velocity = + 2.1 mm/year
post-glacial rebound model = + 2.1 mm/year

Syowa Station (Antartica)
DORIS weekly altitude determination

Altitude (in cm)

Year
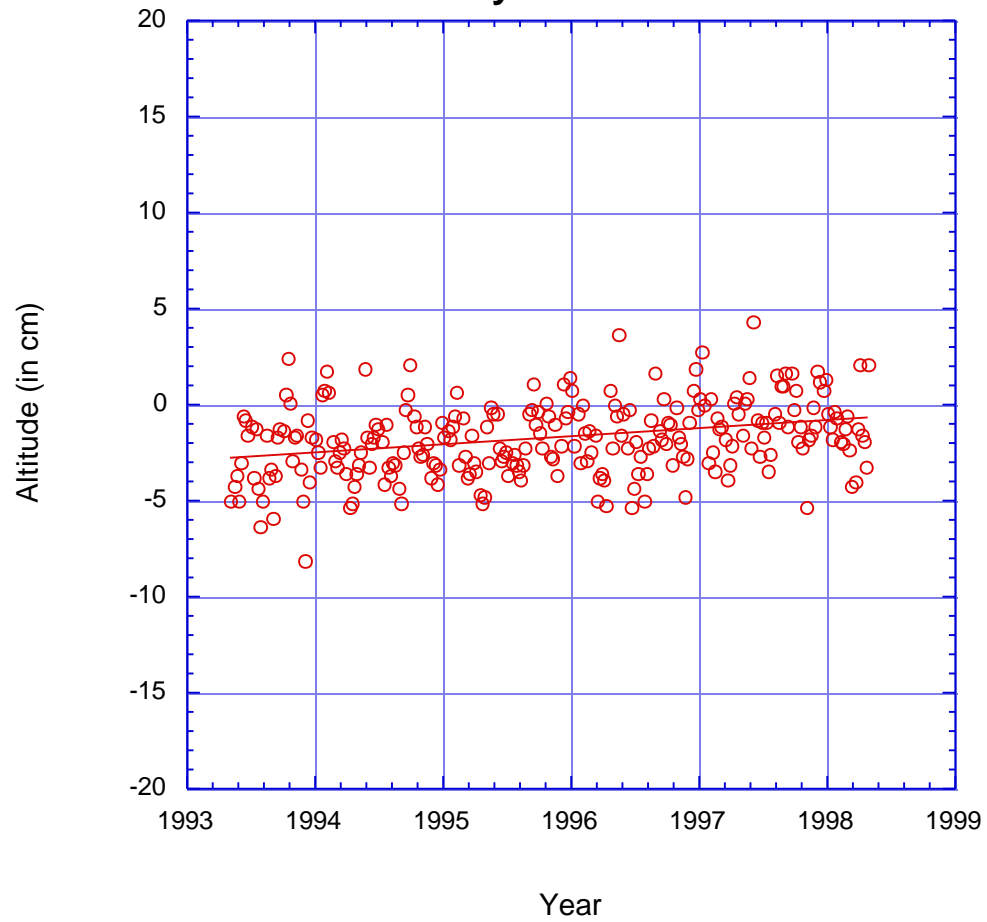
Each point corresponds to the estimated TY translation
between the weekly free network solution
and the global reference frame solution in ITRF2000
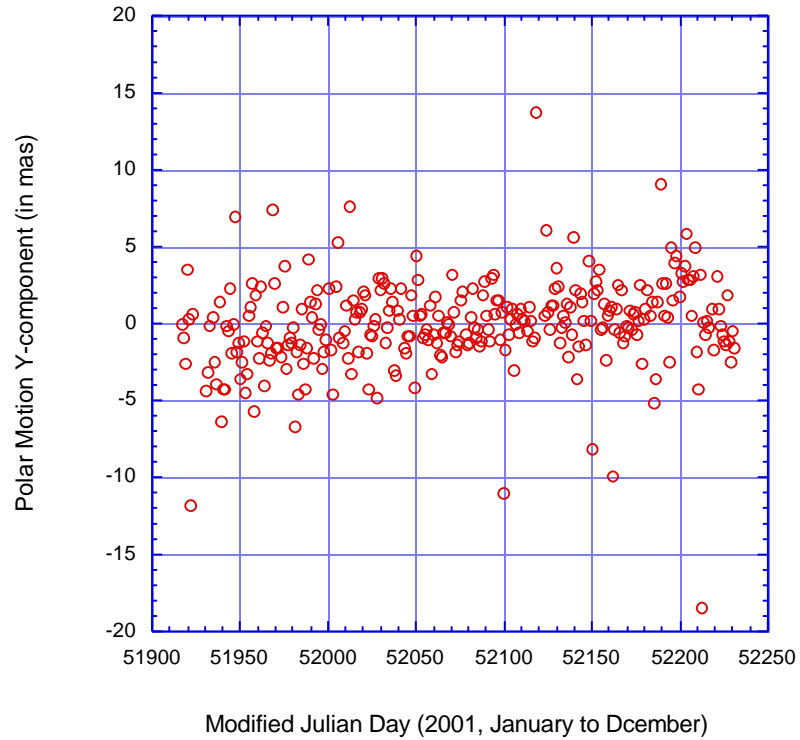at the epoch of the measurements

DORIS Geocenter Variations
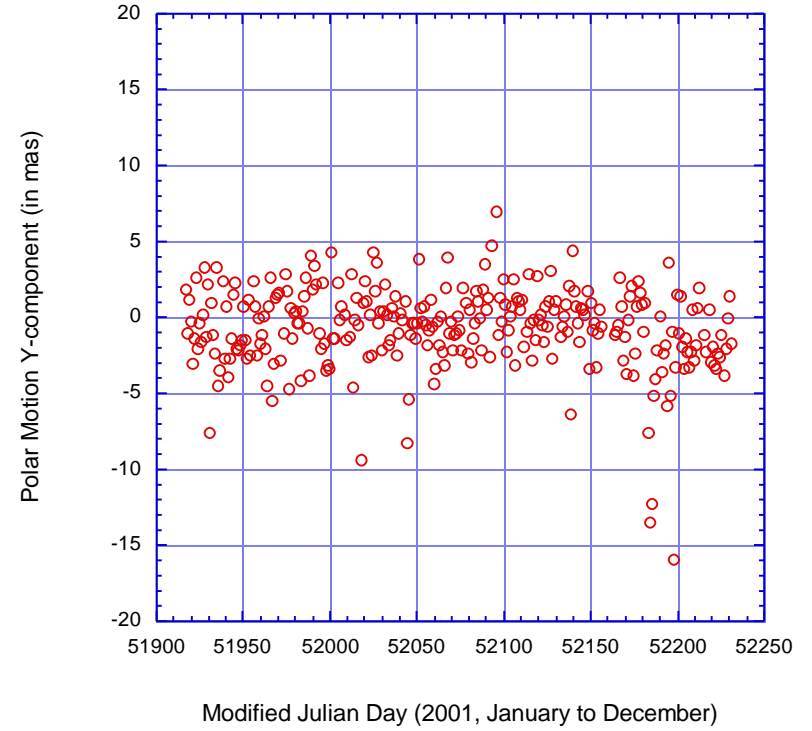**Monthly determinations**

estimated slope vs ITRF2000 = -2.0 mm/year
(same result GPS determination) = -2.6 mm/year
(http://sideshow.jpl.nasa.gov/mbh)

TY - component (in mm)

Year

RMS = 3.2 mas

DORIS EOP compared to IGS SPOT4 only

Polar Motion Y-component (in mas)

Modified Julian Day (2001, January to Dcember)

RMS = 2.8 mas

DORIS EOP compared to IGS SPOT2 only

Polar Motion Y-component (in mas)

Modified Julian Day (2001, January to December)

DORIS EOP compared to IGS
TOPEX/POSEIDON only
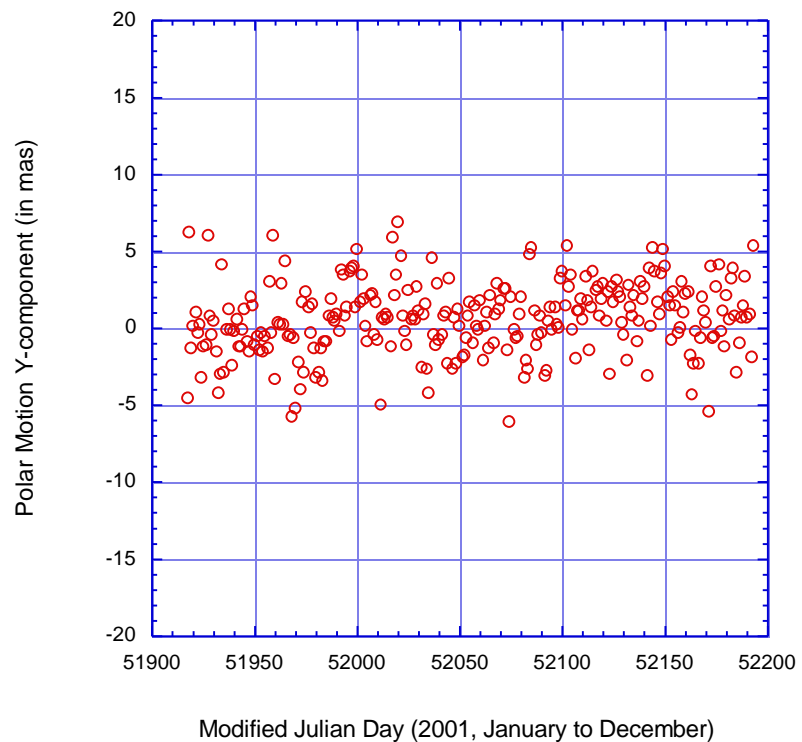
DORIS EOP compared to IGS
SPOT2+SPOT4+TOPEX

Polar Motion Y-component (in mas)

Modified Julian Day (2001, January to December)

Polar Motion Y-component (in mas)

Modified Julian Day (2001, January to December)

**TOPEX DORIS daily overlaps
(radial component)**

Mean radial RMS = 1.8 cm

Radial RMS (in m)

Day of Year (in 2002)