TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

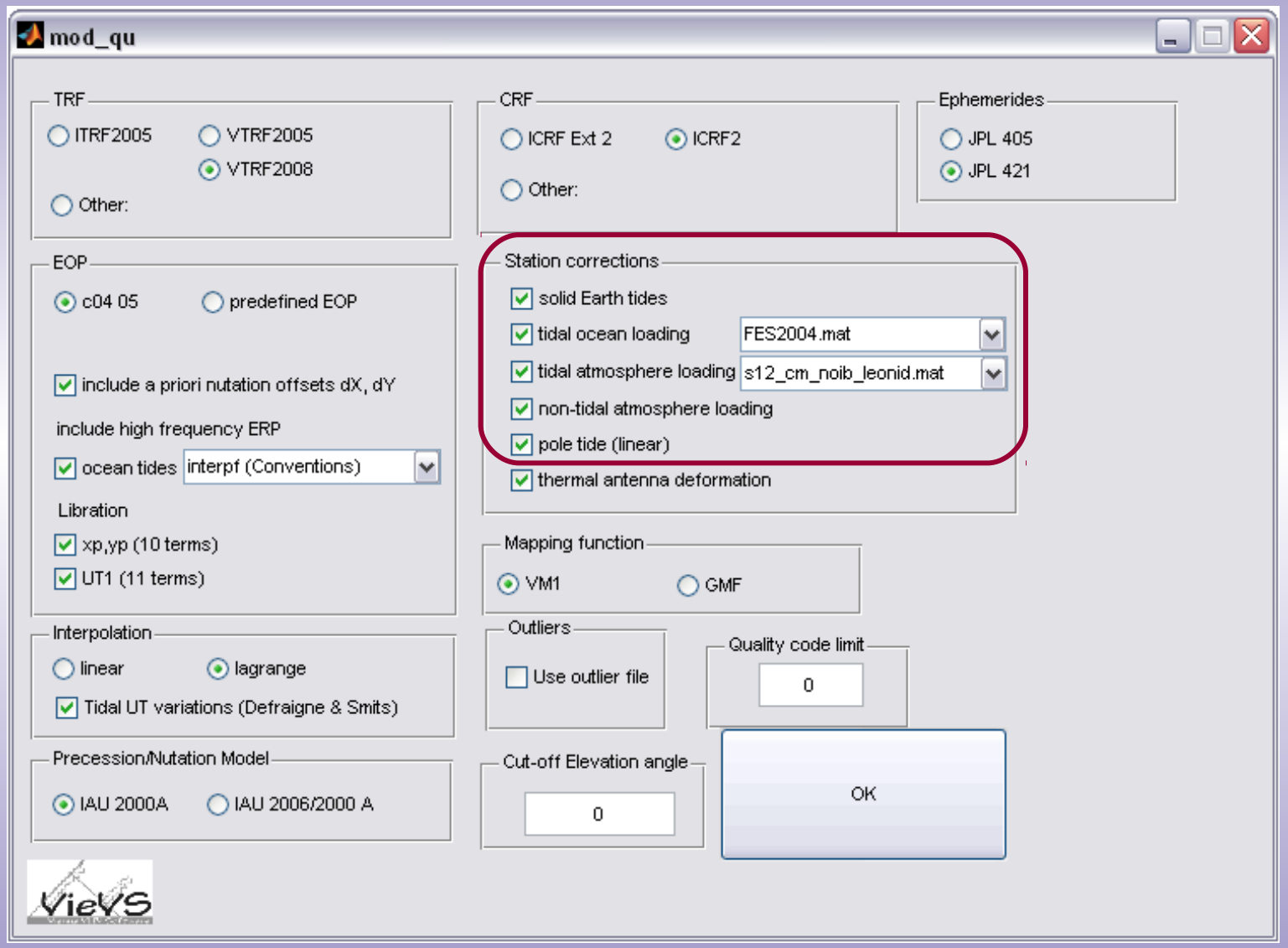
VIE_MOD
station corrections

Hana Spicakova

VieVS User Workshop

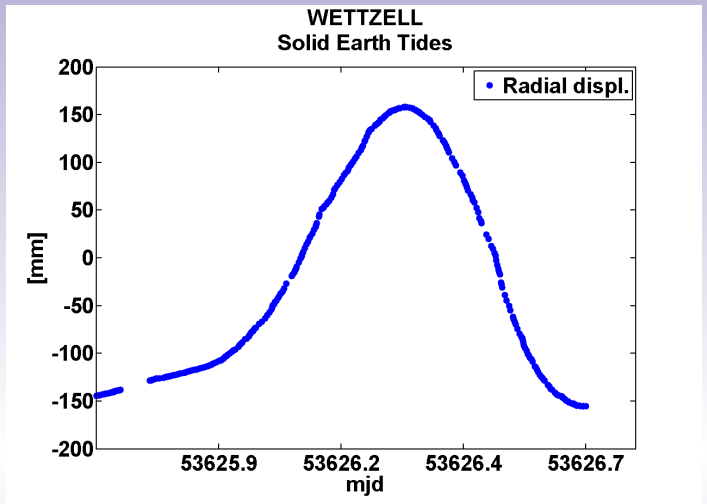
7 – 9 September, 2010

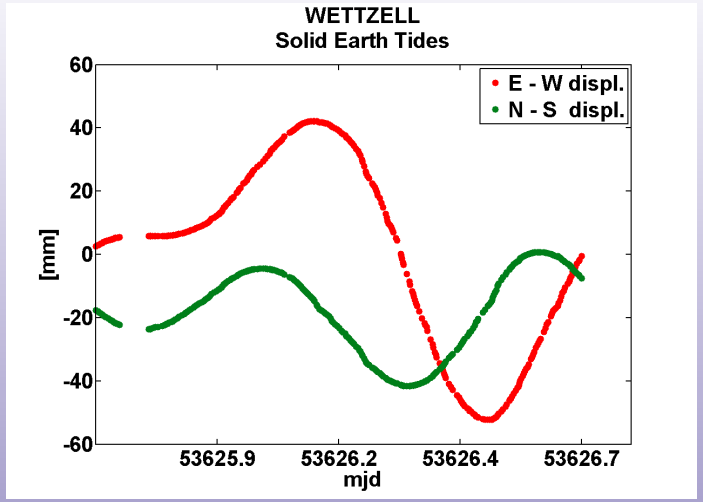
Vienna


mod_qu
TRF
ITRF2005
VTRF2005
VTRF2008
Other:
CRF
ICRF Ext 2
ICRF2
Other:
Ephemerides
JPL 405
JPL 421
EOP
c04 05
predefined EOP
include a priori nutation offsets dX, dY
include high frequency ERP
ocean tides
interpf (Conventions)
Libration
xp,yp (10 terms)
UT1 (11 terms)
Station corrections
solid Earth tides
tidal ocean loading
FES2004.mat
tidal atmosphere loading
s12_cm_noib_leonid.mat
non-tidal atmosphere loading
pole tide (linear)
thermal antenna deformation
Mapping function
VM1
GMF
Interpolation
linear
lagrange
Tidal UT variations (Defraigne & Smits)
Outliers
Use outlier file
Quality code limit
0
Precession/Nutation Model
IAU 2000A
IAU 2006/2000 A
Cut-off Elevation angle
0
OK

Solid Earth tides

- caused by gravitational forces of the **Moon and Sun**
- the radial displacement can reach up to **40 cm** during one day
- the site displacement is modelled according to the IERS Conventions 2003 using multiple h and l parametres employed by Mathews et al. (1995)

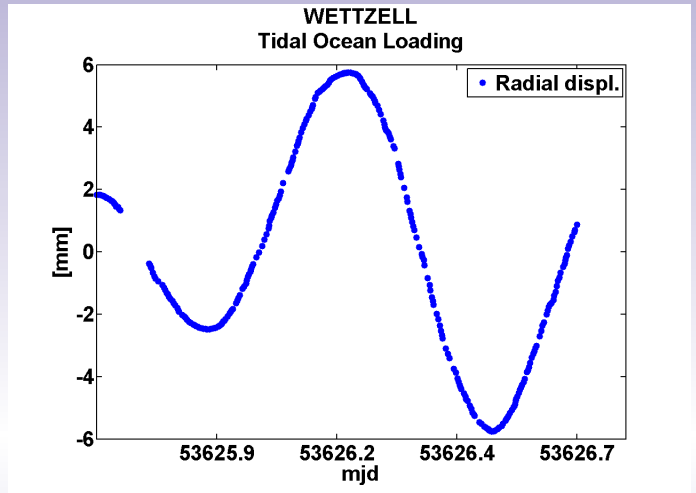


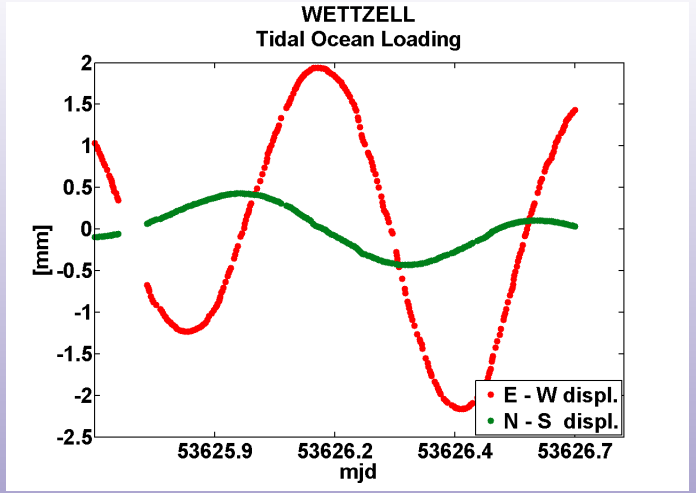


Tidal Ocean Loading

VieVS/OTIDE/

- ocean tides **redistribute water mass** and cause associated load on the crust - the deformation may reach **4 cm vertical** and 5 mm horizontal
- corrections are computed with 11 main tidal waves
- the external ocean loading files contain amplitude and phase of the tidal wave in the REN system
- now we have 5 different models in VieVS

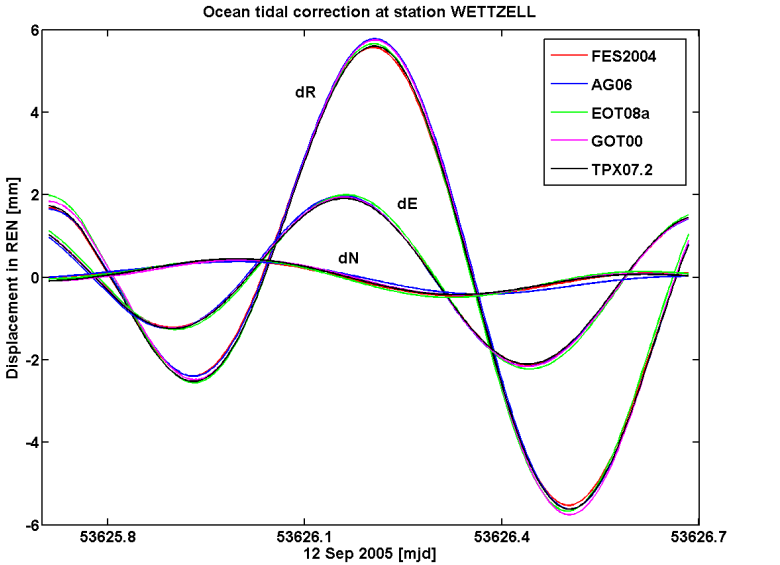


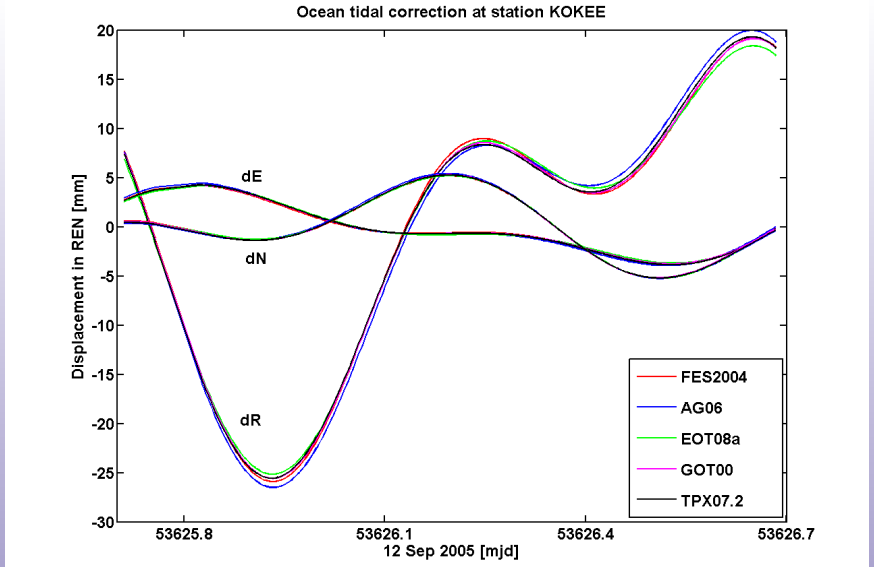


Tidal Ocean Loading (comparison)

model	reference	input	resolution
TPX07.2	Egberg et al. (2002)	inverse hydrodynamic solution from T/P altimetry+GRACE	0.25° x 0.25°
GOT00	Ray (1999)	T/P	0.5° x 0.5°
FES2004	Letellier (2004)	numerical model	0.125° x 0.125°
EOT08a	Savcenko et al. (2008)	Multi-mission altimetry	0.125° x 0.125°
AG06	Andersen (2006)	Multi-mission altimetry	0.5° x 0.5°

DEFAULT

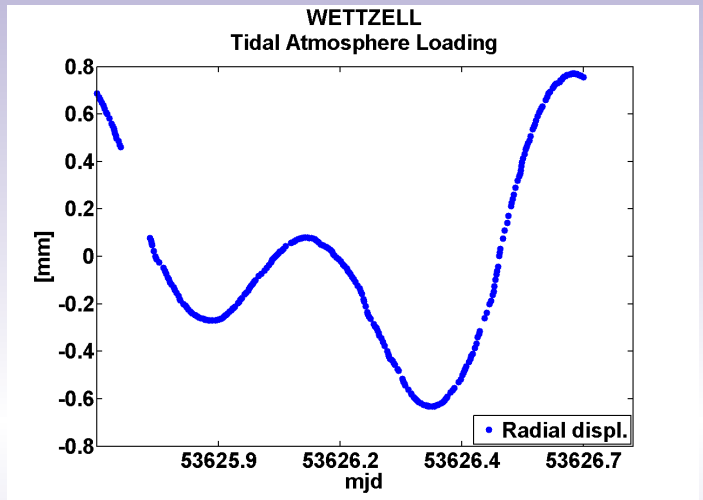


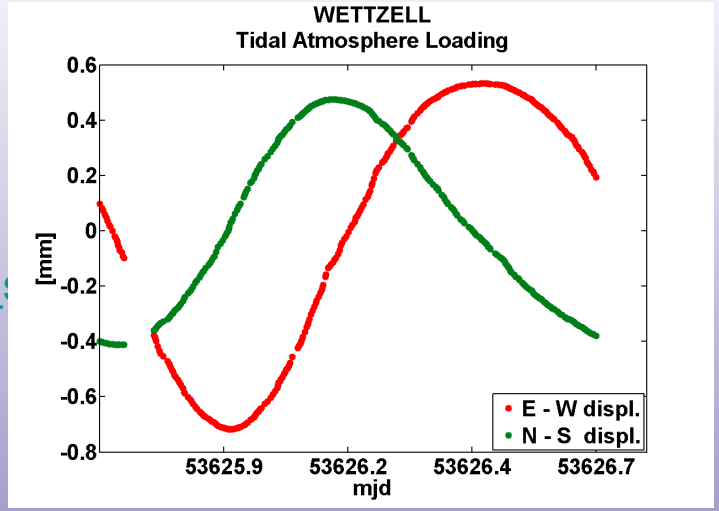


Tidal Atmosphere Loading

VieVS/ATIDE/

- caused by **diurnal heating of the atmosphere** (→surface pressure oscillations)
- the displacement is modelled with two tidal waves, S1 and S2
- external file with cosine and sine components for the Up, North, East deformation computed on the basis of the Ponte and Ray (2002) model
- 2 models in VieVS
  - from L. Petrov (http://gemini.gsfc.nasa.gov/aplo/aplo_s1_s)
  - from T. van Dam

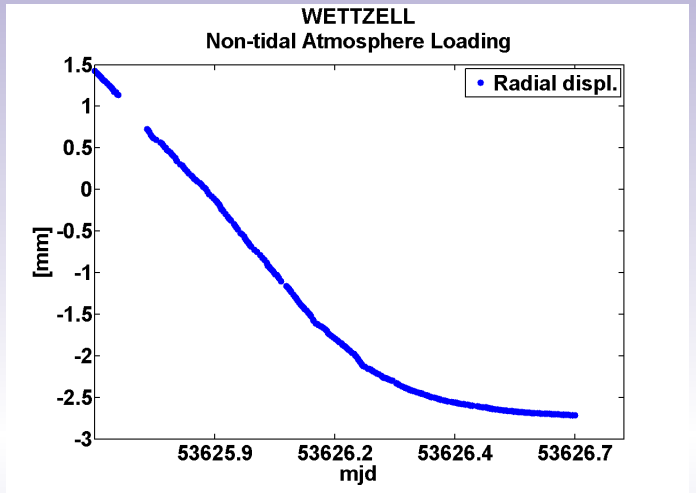


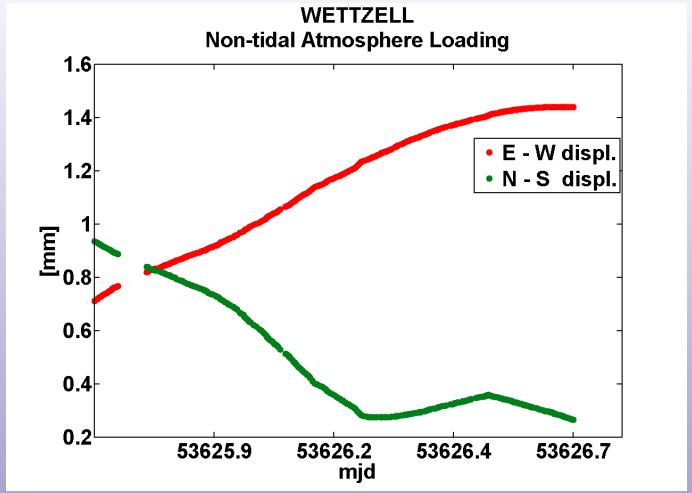


Non-tidal atmosphere loading

VieVS/ATM/

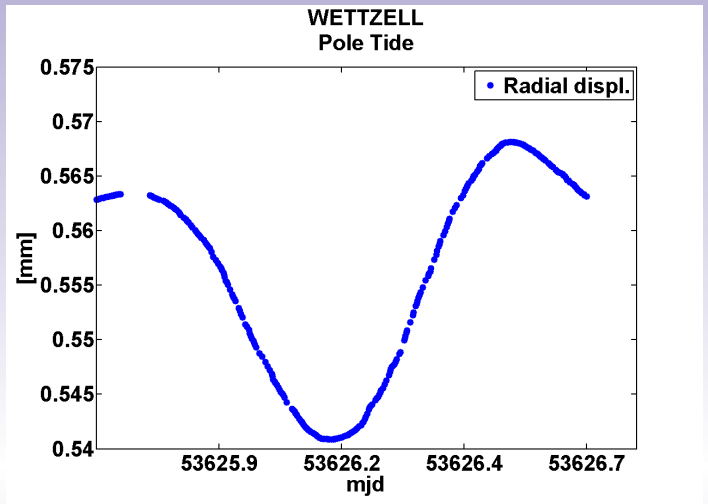
- caused by preassure changes due to **air mass movements**
- at mid-latitude stations are possible vertical crustal displacements of up to **25 mm**
- we use atmosphere pressure loading time series with a 6 hour resolution provided by Goddard VLBI group which are available on the Web at http://gemini.gsfc.nasa.gov/aplo (Petrov & Boy, 2004)
- external file contains: station, time, deformation in REN system

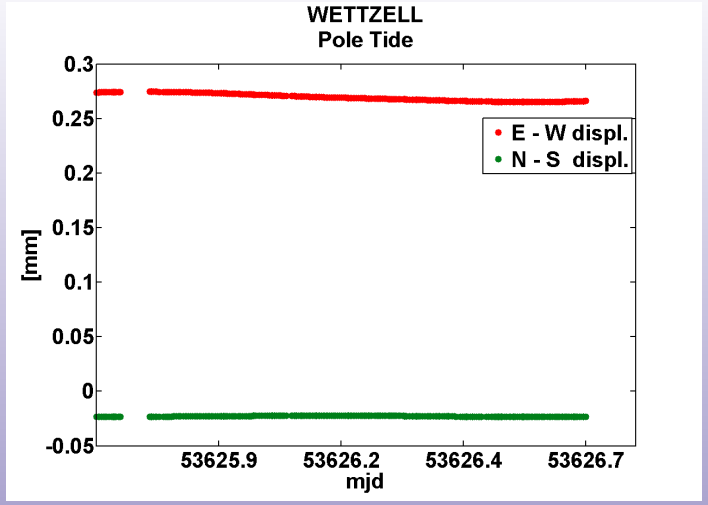




Pole tide

- caused by variations in the geocentric position of the Earth‘s rotational axis → **variation in the centrifugal potential**
- the variation of station coordinates can amount to a couple of **centimeters over a year**
- the pole path is approximated by a linear trend. The displacement vector is obtained using Love numbers appropriate to the frequency of the pole tide (h=0.6027, l=0.0836)





Thank you for your attention!