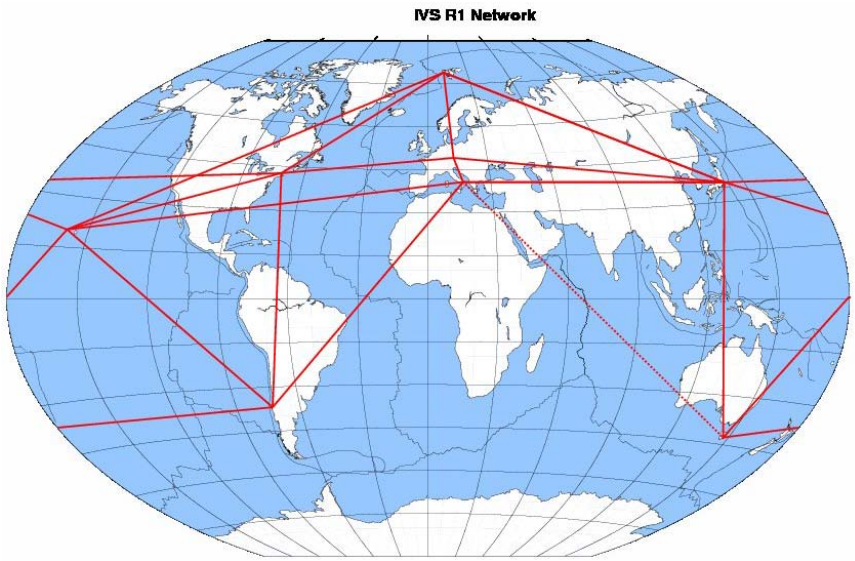
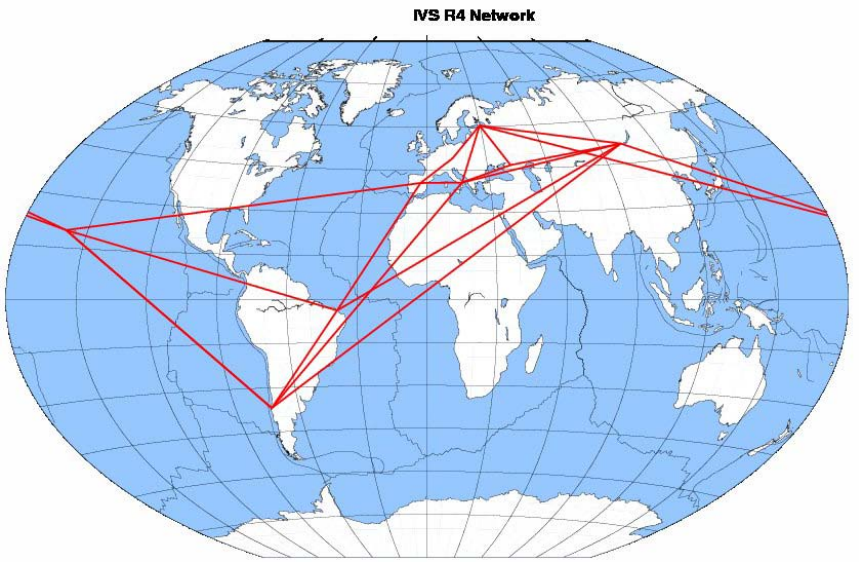
International VLBI Service for Geodesy and Astrometry
- Status of and Plans for Operations, Analysis and Combination -

Axel Nothnagel
- IVS Analysis Coordinator -
Institute of Geodesy and Geoinformation
University of Bonn

Progress in Observations

- 24h Sessions
  - Monday and Thursday rapid-turnaround (1700/1830)
  - Network of 8 – 10 telescopes (8 now standard)
  - Limited by telescope time in distinct areas





  - AuScope network coming up
  - Hartebeesthoek re-activated in middle of 2010

Progress in Observations

- UT1-UTC Intensives (1h)
  - Monday 07.00h Wettzell – Tsukuba – NyAlesund
    - rapid-turnaround, correlated at 15.00h UT, analysed at 16.00h UT
  - Monday 18.30h Wettzell – Kokee Park
    - Disks from Kokee still shipped by courier, Wettzell eTransfer
    - Imminent change of Kokee to eTransfer
  - Tuesday, Wednesday ,Thursday, Friday -dito-

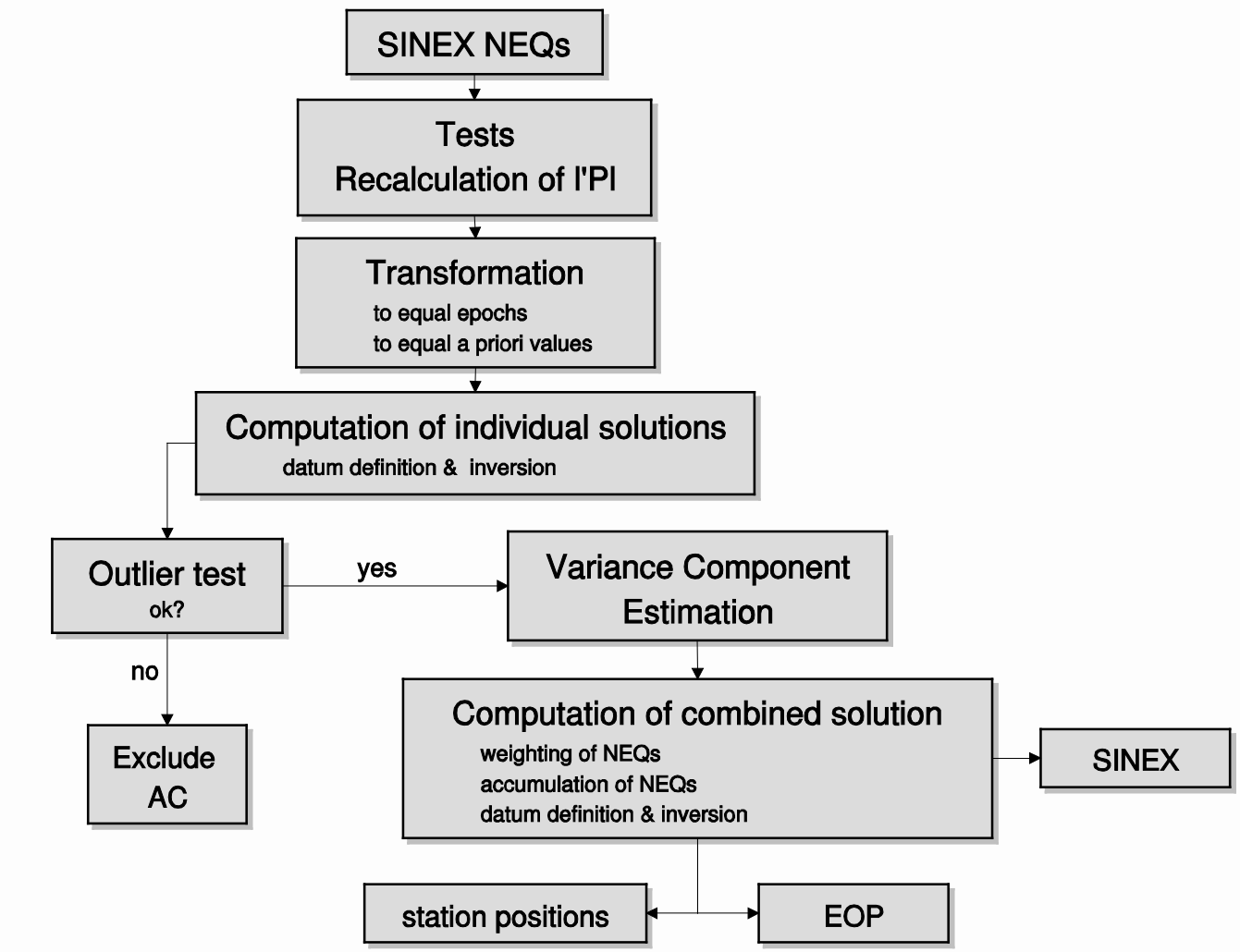
  - Saturday 07.30h Wettzell – Tsukuba
  - Sunday 07.30h Wettzell – Tsukuba
    - eTransfer, but correlation completed only on Monday ~ 10.00 UT

IVS Analysis Conventions

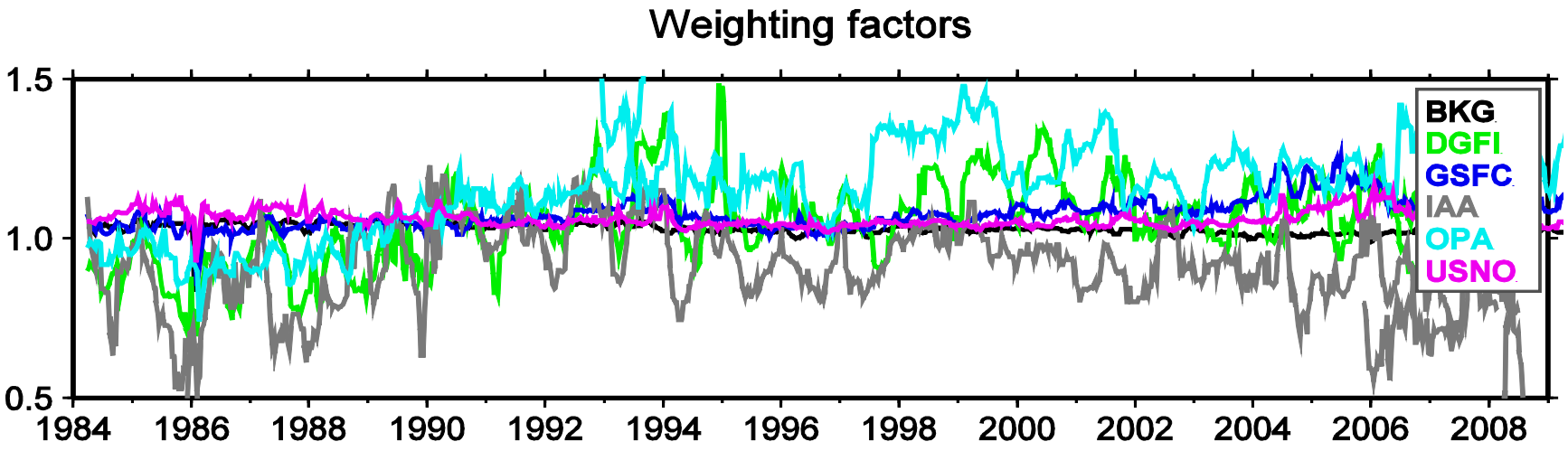
- Analysis checklist for models and constants
  - IERS Conventions
  - ICRF2
  - VMF1
  - Thermal expansion model
  - Atmospheric loading
- Exchange of datum-free normal equations in SINEX format (24h sessions)
  - X_i, Y_i, Z_i,
  - RA_i, DEC_i,
  - X_p, Y_p, UT1–TAI, dX_p/dt, Y_p/dt, LOD,
  - $d\varepsilon$,$d\psi$ (X, Y planned)

Combination of 24h sessions

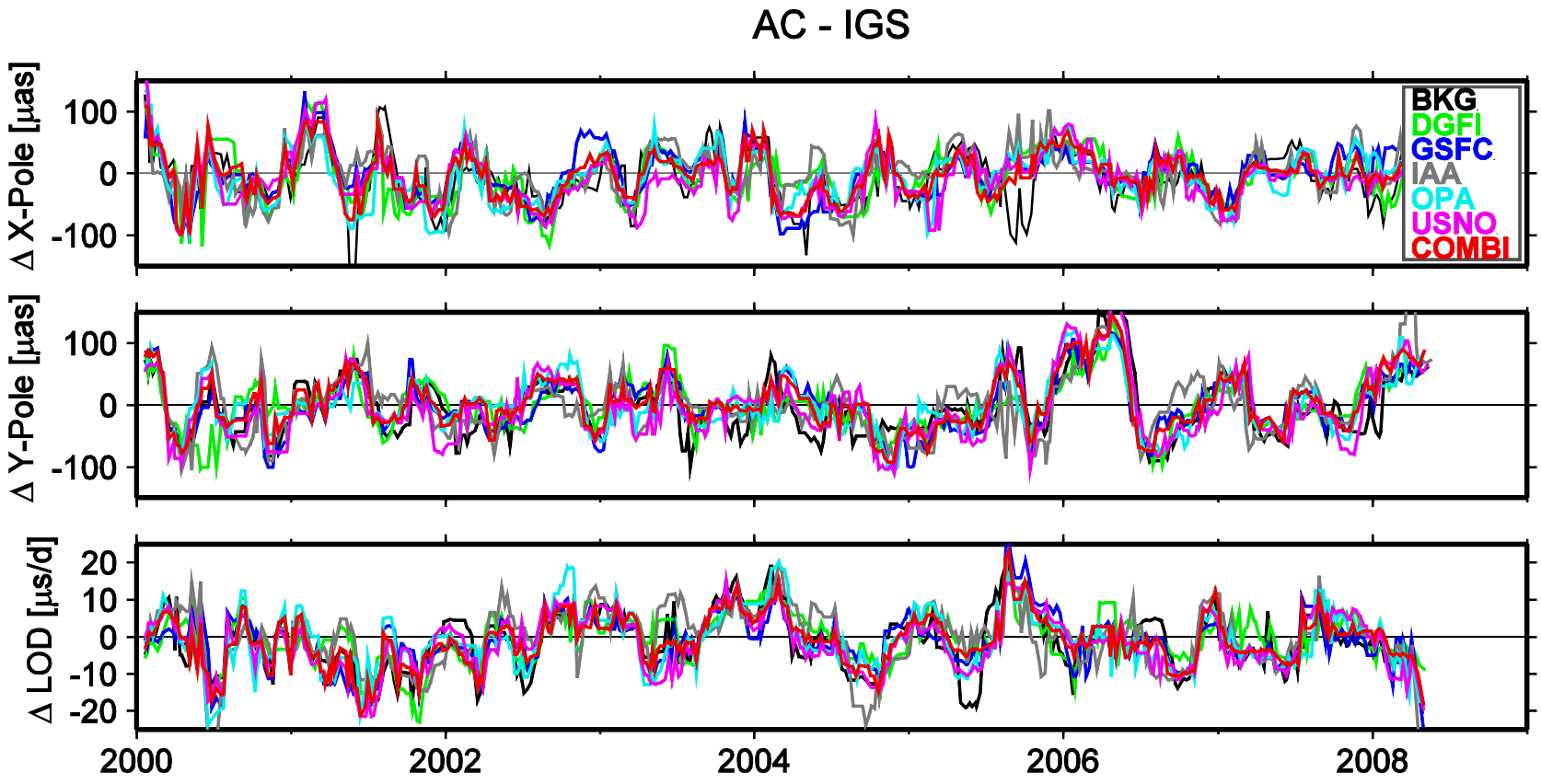
- Combination of SINEX files for EOP determinations



Relative Weighting



Remaining systematics



IVS Analysis Coordinator

International VLBI Service for Geodesy and Astrom

Contact
Products
Activities
Analysis Service
Text infos

EOP Products

- IVS **Primary** Combined EOP results
  on the basis of SINEX normal equations
  Quarterly Solution
  - all available sessions from 1984 - now
  - updated every three months
  - Epoch: middle of session

  Rapid Solution
  - all R1- and R4-sessions from 2005 - now
  - updated twice a week
  - Epoch: middle of session

- Comparisons of EOP results
  - by Observatoire de Paris
  - by US Naval Observatory

Other Products

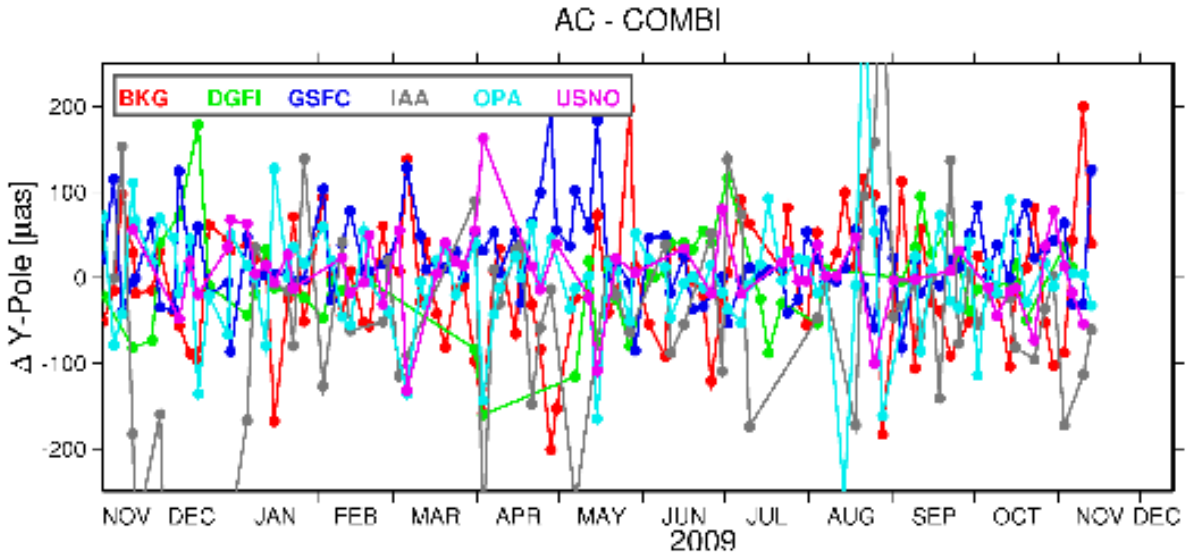
- IVS VLBI baseline lengths
- **VTRF2005** A Conventional Combined VLBI Terrestrial Reference Frame

Post fit residuals

Y-Pole residuals

Statistics (last 365 days)

	BKG	DGFI	GSFC	IAA	OPA	USNO
Offset [µas]	-17.5 ± 6.0	-7.5 ± 6.2	21.4 ± 4.3	-82.1 ± 22.6	6.4 ± 5.0	12.6 ± 4.7
WRMS [µas]	58.7	44.6	42.7	180.8	47.4	35.6

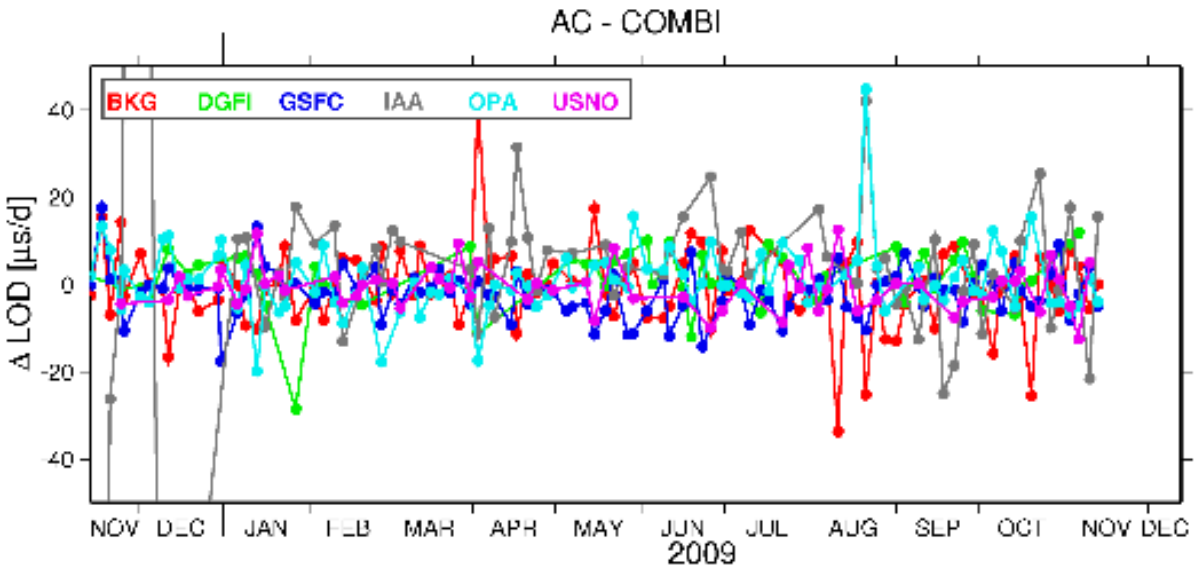


Post-fit residuals

LOD residuals

Statistics (last 365 days)

	BKG	DGFI	GSFC	IAA	OPA	USNO
Offset [µs/d]	-0.2 ± 0.6	2.9 ± 0.7	-2.0 ± 0.5	-0.8 ± 4.3	0.0 ± 0.6	-0.5 ± 0.6
WRMS [µs/d]	6.4	5.2	4.7	34.1	5.4	4.3



Documentation

Böckmann S., Artz T., Nothnagel A., (2009) *VLBI terrestrial reference frame contributions to ITRF2008*,
J. of Geodesy, DOI 10.1007/s00190-009-0357-7

Böckmann S., Artz T., Nothnagel A., Tesmer V. (2009) *International VLBI Service for Geodesy and Astrometry: EOP combination methodology and quality of the combined products*,
J. of Geophysical Research, accepted, 2009JB006465

Future Plans 1/2

Combination of Intensive UT1 sessions on SINEX basis

- SINEX files (datum-free normal equations) of Intensives contain

  X_1, Y_1, Z_1, X_2, Y_2, Z_2, UT1 – TAI, LOD, X_p, Y_p

- Purpose
  - IVS combination with identical datum
  - Combination with IGS products

Future Plans 2/2

Extended SINEX files

- NEQs with Parameters
  (coefficients in datum free NEQ):
  - Station coordinates
  - Xp, Xp-rate, Yp, Yp-rate, UT1-UTC [TAI], LOD
    (middle of session, i.e. at ~ 6.00 UT)
  - dpsi, deps (IAU2000A) -> X, Y (IAU2000A)
  - source positions
  - wet zenith delays (1 hourly),
    continuous piece-wise linear
  - NS + EW gradients and their rates (at start and stop epochs of 24 hr sessions)

0 – 24h observing

– Monday 0h UT – Tuesday 0h UT

Session start time

- Australia: Monday 10.00h local
- Hawaii: Sunday 14.00h local
- East Coast: Sunday 19.00h local

⇒Shift to Tuesday

⇒2nd session on Friday

– Friday 0h UT – Saturday 0h UT

Session stop time

- Australia: Saturday 10.00h local
- Hawaii: Friday 14.00h local
- East Coast: Friday 19.00h local