File structure for ILRS products
Outline of CDDIS and EDC directories

The ILRS generates weekly, unconstrained solutions for:

- station coordinates(epoch the mid-point of each 7-day interval);
- EOPs (x-pole, y-pole and Length-Of-Day (LoD) at 1-day intervals).

These results are stored in subdirectories "pos+eop/YYMMDD", where "YYMMDD" is the **date of the end of each 7-day interval**.

Within each subdirectory are individual solutions and combination solutions.

File structure for ILRS products
details (1)

for the individual contributions to our pos+eop project:
/pub/slr/products/pos+eop/YYMMDD/deos.pos+eop.YYMMDD.v1.snx

for the official ILRS primary product on pos+eop:
/pub/slr/products/pos+eop/YYMMDD/ilrsa.pos+eop.YYMMDD.v1.snx

idem, for eop only:
/pub/slr/products/pos+eop/YYMMDD/ilrsa.eop.YYMMDD.v1.snx

for the official ILRS backup product on pos+eop:
/pub/slr/products/pos+eop/YYMMDD/ilrsb.pos+eop.YYMMDD.v1.snx

idem, for eop only:
/pub/slr/products/pos+eop/YYMMDD/ilrsb.eop.YYMMDD.v1.snx

File structure for ILRS products details (2)

for possible new combination solutions that are not official:
 /pub/slr/products/pos+eop/YYMMDD/deos.combination.pos+eop.YYMMDD.v1.snx
and
/pub/slr/products/pos+eop/YYMMDD/deos.combination.eop.YYMMDD.v1.snx

If necessary, directories
 /pub/slr/products/orbits;
/pub/slr/products/···;

or whatever, parallel to "/pub/slr/products/pos+eop

A README file will be placed in /pub/slr/products/

ILRS Pilot Project 'POS+EOP' - status

- Weekly station coordinates (epoch mid GPS week) and daily EOPs (X_{pole}, Y_{pole}, LoD), unconstrained;

- SINEX files available from 5 ACs each Tuesday;

- Combined products available from 2 combination centres each Wednesday:
  - Unconstrained station coordinates;
  - EOPs mapped to ITRF2000

ILRS Pilot Project 'POS+EOP' – status (2)

- Operational and on-going since November 2003;
- Official Primary Combination Centre – ASI;
- Official Backup Combination Centre – DGFI.
- Ongoing comparisons between the 2 combined solutions;
- (At least) one new AC wishing to join project.

ILRS Analysis Working Group

IERS Combination Pilot Project:
Status of ILRS contributions

The IERS Combination Pilot Project

・Motivation:
 ・IERS to develop a successor for the current ITRF2000;
 ・Derived from weekly inter-technique combinations;
 ・Back in time as far as possible.

・ILRS response:
 ・AC and AACs currently involved in 'pos+eop' weekly solutions:
 ・Agreed to generate weekly SINEX solutions from ~1983 or before;
 ・Combination centres to form ILRS Official and Back up solutions;
 ・End of January 2005.

Status of ILRS solutions

	ASI	DGFI	GFZ	JCET	NSGF
how far back?	1984	1981	1993	at least 1983	1992
what satellites?	L1+L2+E1+E2	L1+L2	L1+L2	L1+L2+E1+E2	L1+L2+E1+E2
current status?	1992-> now	ready	"ready"	1993-> now	L1+L2 to 1999
when finished?	end Jan 2005	now	now	end Jan 2005	end Jan 2005
any problems?	quality of EOP 1990s	6 bad weeks pre-1986 poor; site ids, DOMES for old sites	3 bad weeks	cleaning pre-1992	early

Call for submissions from IERS

- Very soon a call for submissions will be made
- Important that the ILRS combined solutions are available _ other solutions known to be ready to go
- Unfortunate if product from ILRS not included.
- Ideally ready by end January 2005.

Other ILRS Official Products?

· Consider:

    _ Weekly station coordinates mapped to ITRF2000? _ the current unconstrained product is not 'user friendly', being designed for further inter-technique combination;

    _ Orbits? _ suggest the geodetic satellites

Benchmark Project: status

- New ACs wishing to contribute to 'pos+eop' need to submit orbits and residuals for comparison with 'standard'

- Need a speedy response, not least because AC's funding may depend on acceptance of their product;

- Who will carry out analysis?

SLR Global Coverage
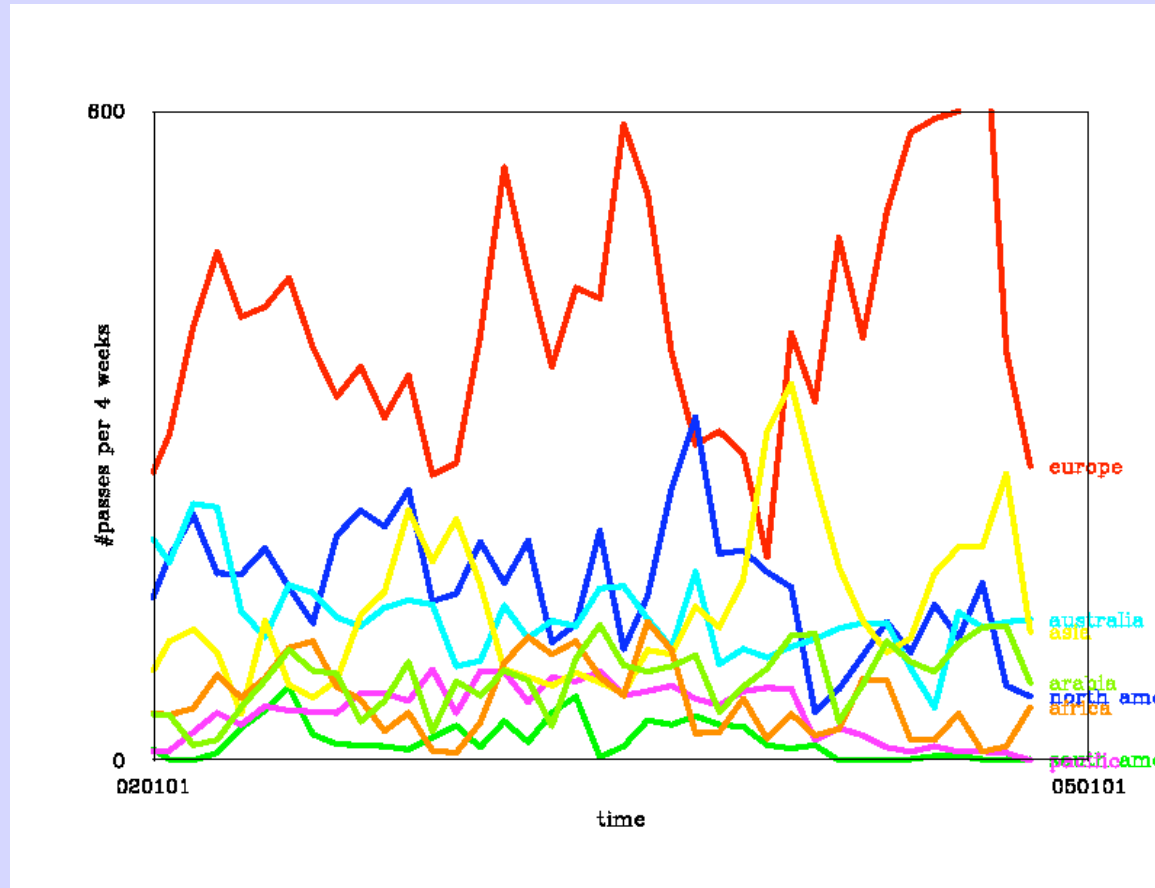
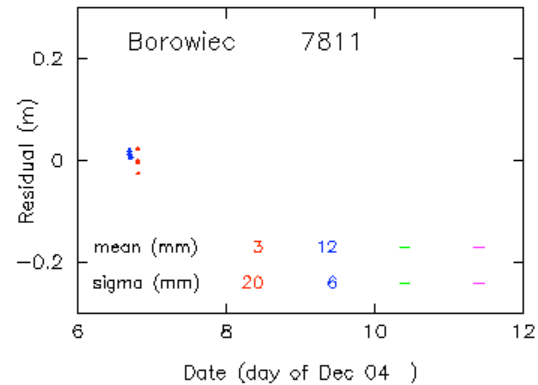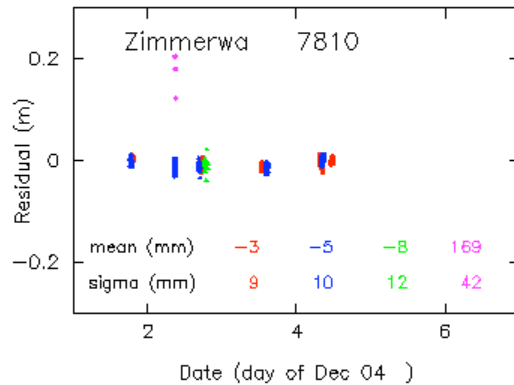Worrying is the situation in the Pacific and South America - loss of Hollas and no data from TIGO at present.
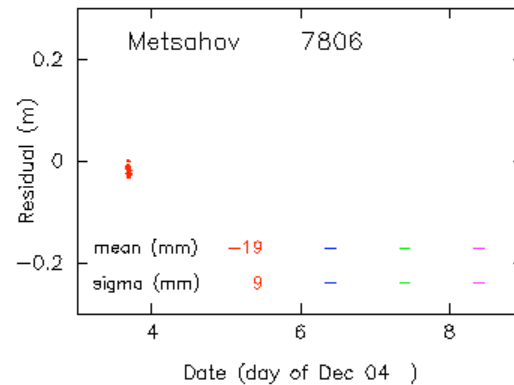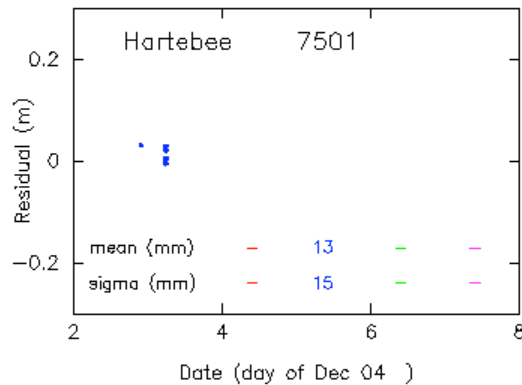
Snapshot of geodetic tracking
Six days ending Dec 6 2004
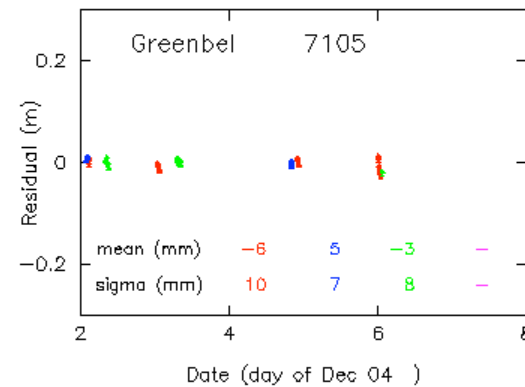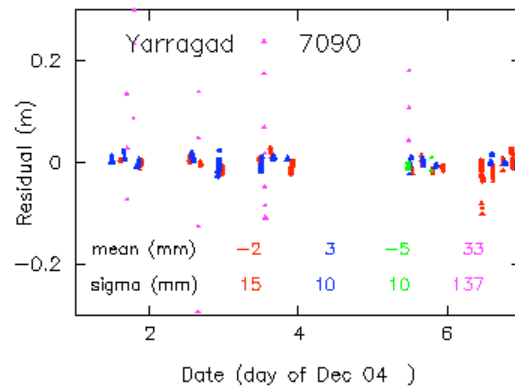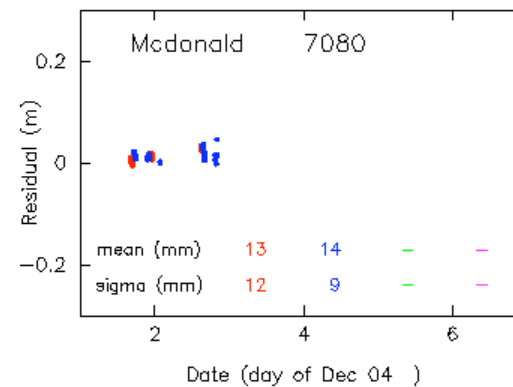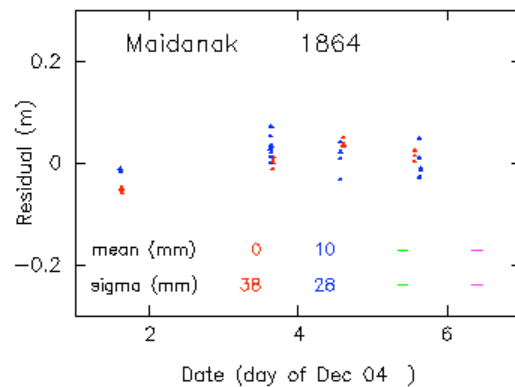
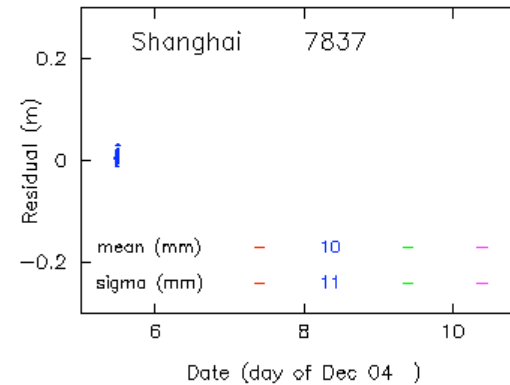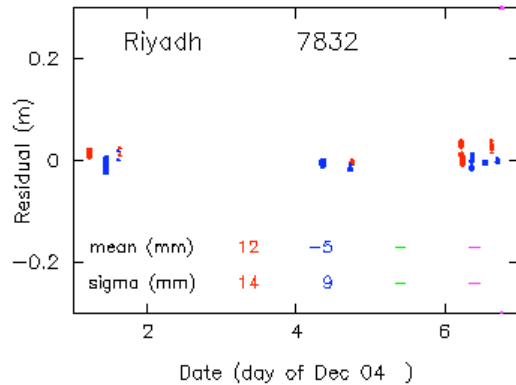# Snapshot of geodetic tracking
Six days ending Dec 6 2004
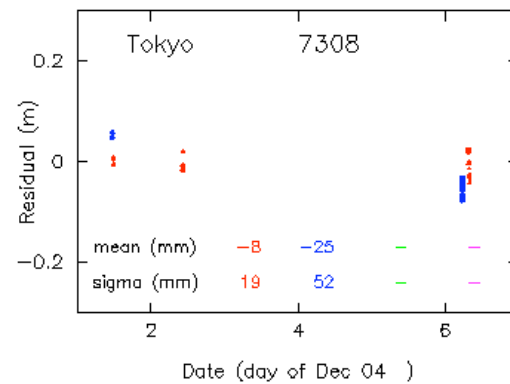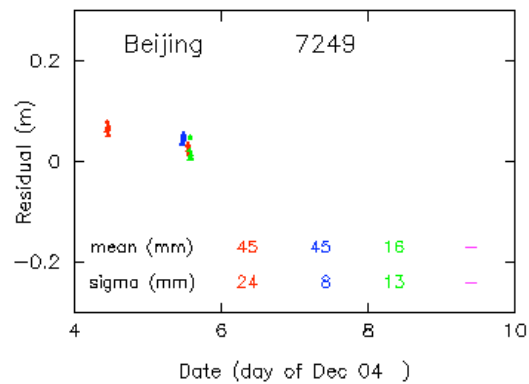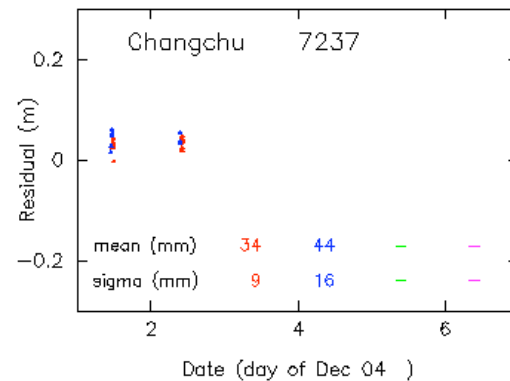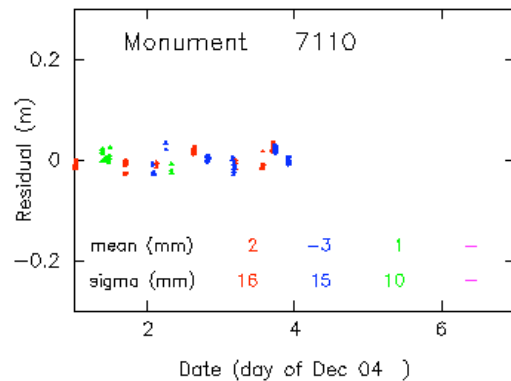
Snapshot of geodetic tracking
Six days ending Dec 6 2004
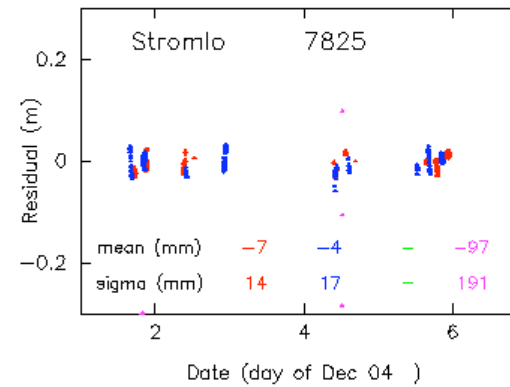
Snapshot of geodetic tracking
Six days ending Dec 6 2004

Snapshot of geodetic tracking
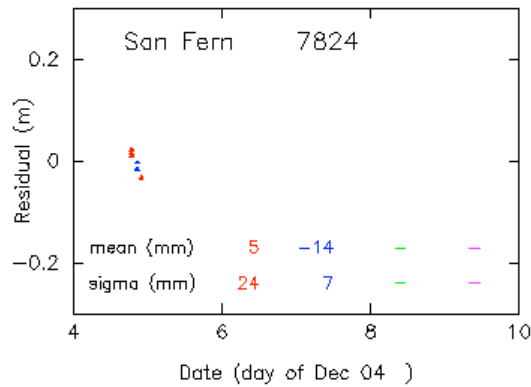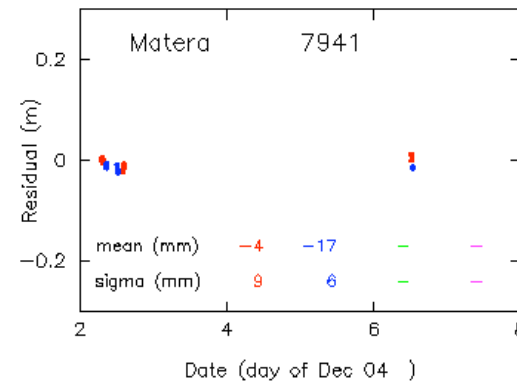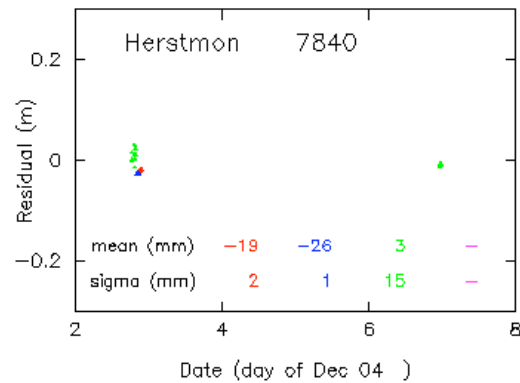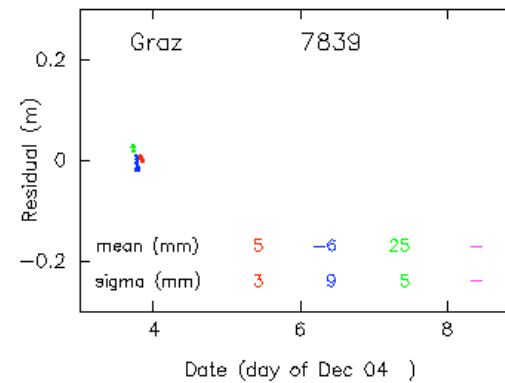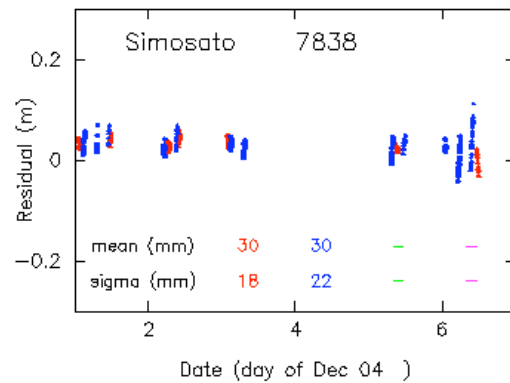# Six days ending Dec 6 2004

Analysis Centre Categorisation

- Question _ should AACs that have committed to the 'pos+eop' project

- AWG Recommendation to GB?

Quality assessment for new station

- AWG has the responsibility for this important task;
- Need to be able to recommend to GB acceptance of station within ILRS;
- Currently only ad-hoc procedures in place:
  - _ e.g. for recent Stromlo re-birth: late data, non-standard filenames, extra effort for analysts -> no formal recommendation.
- Ideas? _ recommendations to analysts and prospective stations?

Action Items

- AC/AACs involved in pos+eop – keep running solutions, making combinations

- AC/AACs involved in IERS PP – get 'back' solutions done to allow Combination Centres to submit ILRS solution **asap**

- AC/AAC work towards implementing atmospheric loading – application date?

The ASI/CGS operational combination for the ILRS Pos+EOP Pilot Project

C. Sciarretta, V. Luceri

(cecilia@asi.it; luceri@asi.it)

ILRS AWG Meeting, 13 December 2004, S. Francisco

Scope

Illustrate the ASI/CGS weekly combined solutions in terms of:

-Comparisons with IERS EOP (USNO finals.data) and with EOP from DGFI combined solution

-ITRF2000 consistency evaluation: 3D wrms on the Core Sites estimations, Tx, Ty, Tz and scale time series

Summary and remarks conclude the presentation.

Issued products

- **EOP only SINEX file (ITRF2000 constrained solution)**
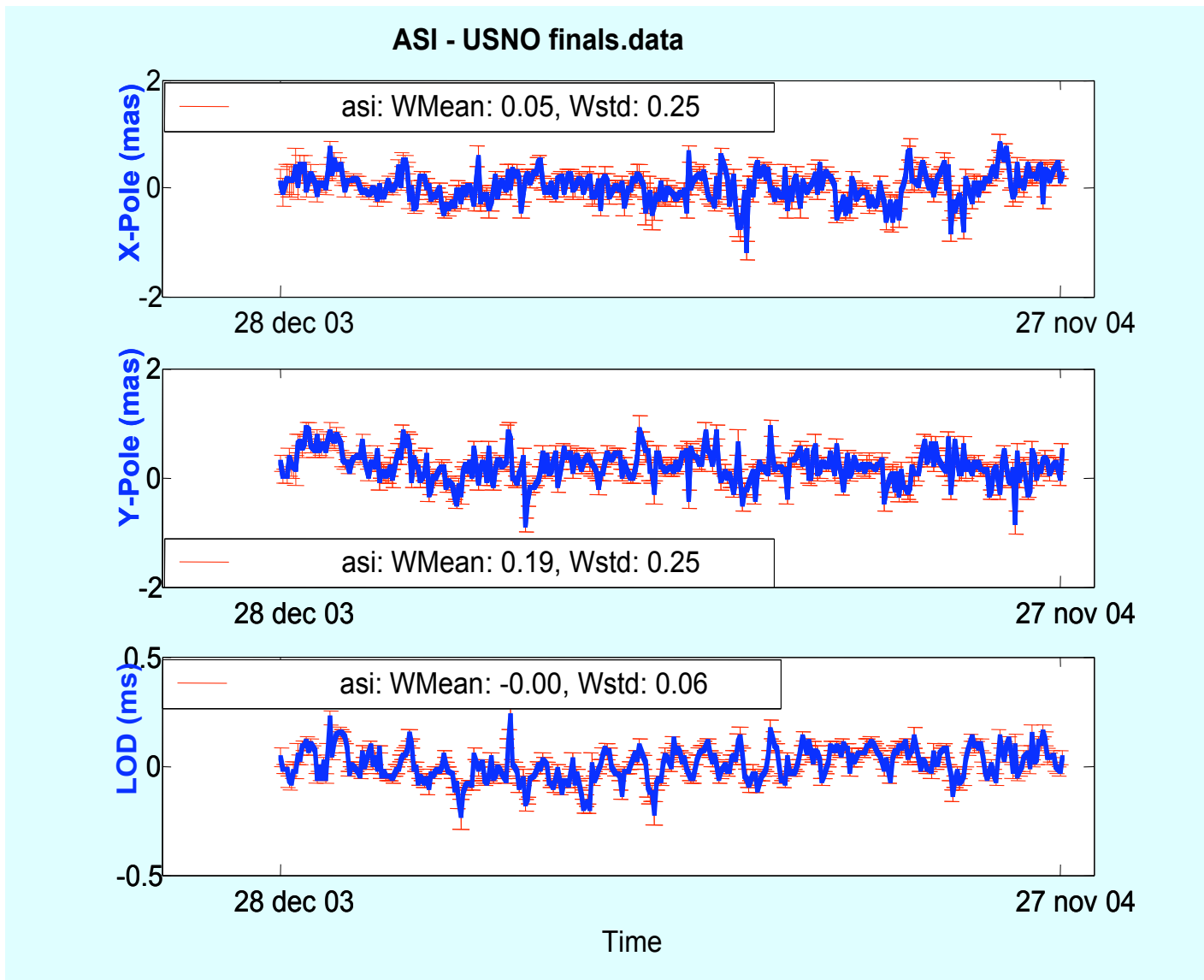
     Header, File/Reference, Input/History, Solution/Statistics, Solution/Estimate, Solution/Matrix_Estimate L Cova

- **Pos+EOP SINEX file (loose solution)**

     Header, File/Reference, Input/History, Solution/Statistics, Solution/Epochs, Site/Id, Site/Eccentricity, Solution/Estimate, Solution/Matrix_Estimate L Cova
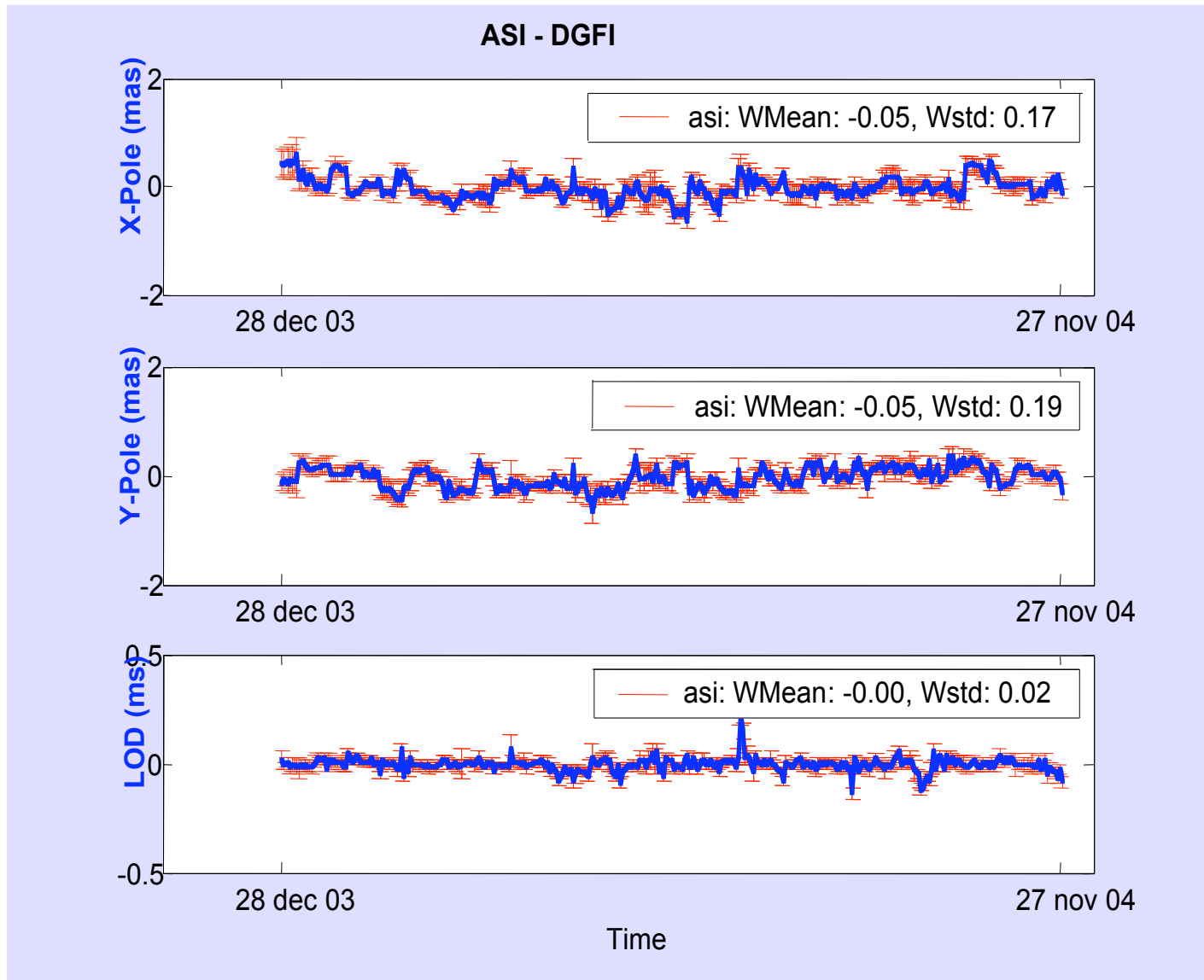

- **Summary Report**

ASI combined solution vs IERS EOP

ASI - USNO finals.data

asi: WMean: 0.05, Wstd: 0.25

asi: WMean: 0.19, Wstd: 0.25

asi: WMean: -0.00, Wstd: 0.06

- Daily ASI combined values from "eop" sinex file have been differentiated with USNO "finals.data" values (interpolated at the corresponding points; declared accuracy for USNO values x,y: 0.1 mas, lod: 0.02 ms)

- Data span: December 28th, 2003 – November 27th, 2004

- Wmean, wstd are bias and standard deviation of the differences weighted by the ASI estimation uncertainties

- Typical SLR y-"bias" is evident (0.2 mas in the analysed period) ; no bias in x-pole and LOD; scatter (x, y, LOD) of 0.25 mas (x,y) and 0.06 ms (LOD)
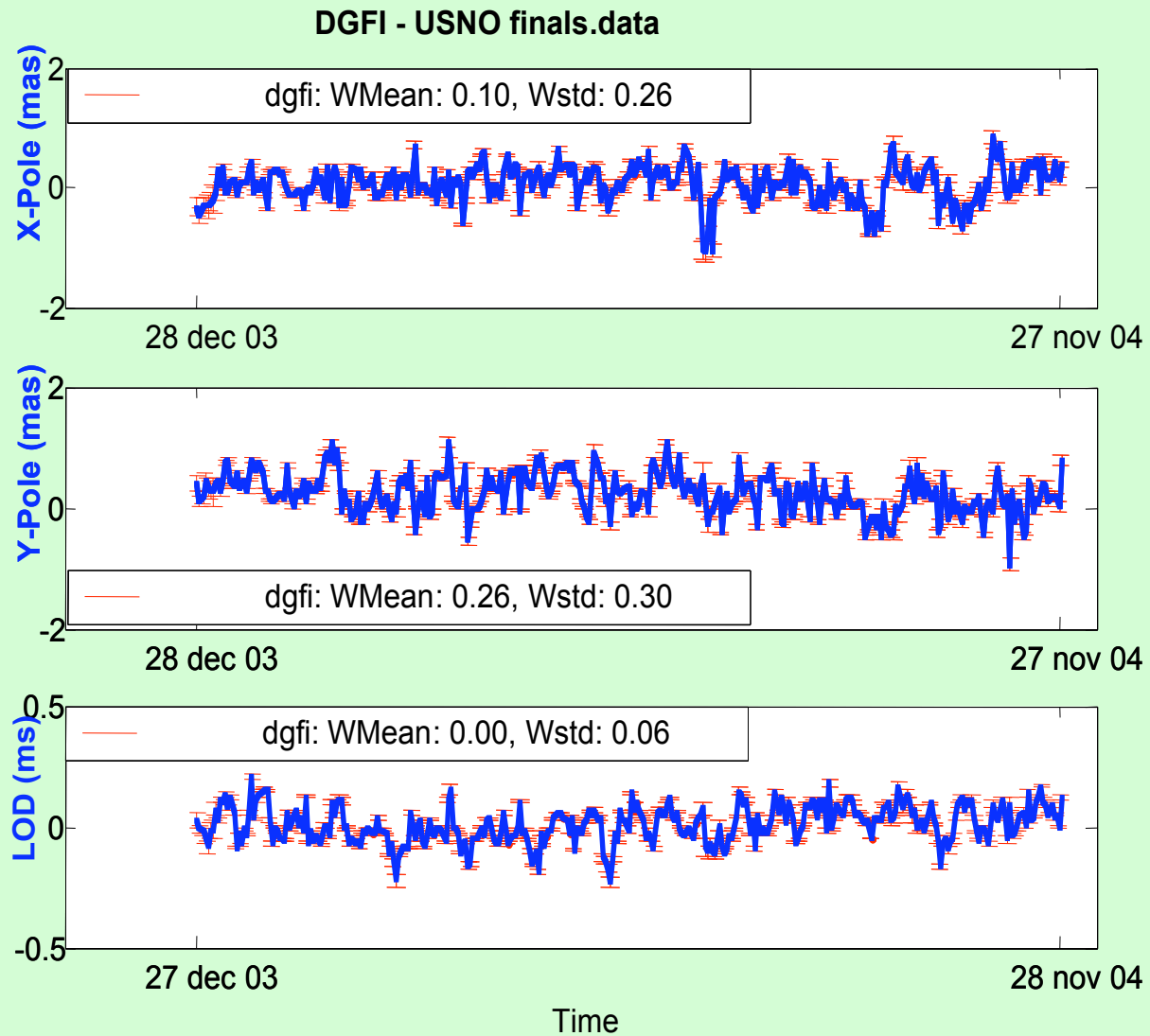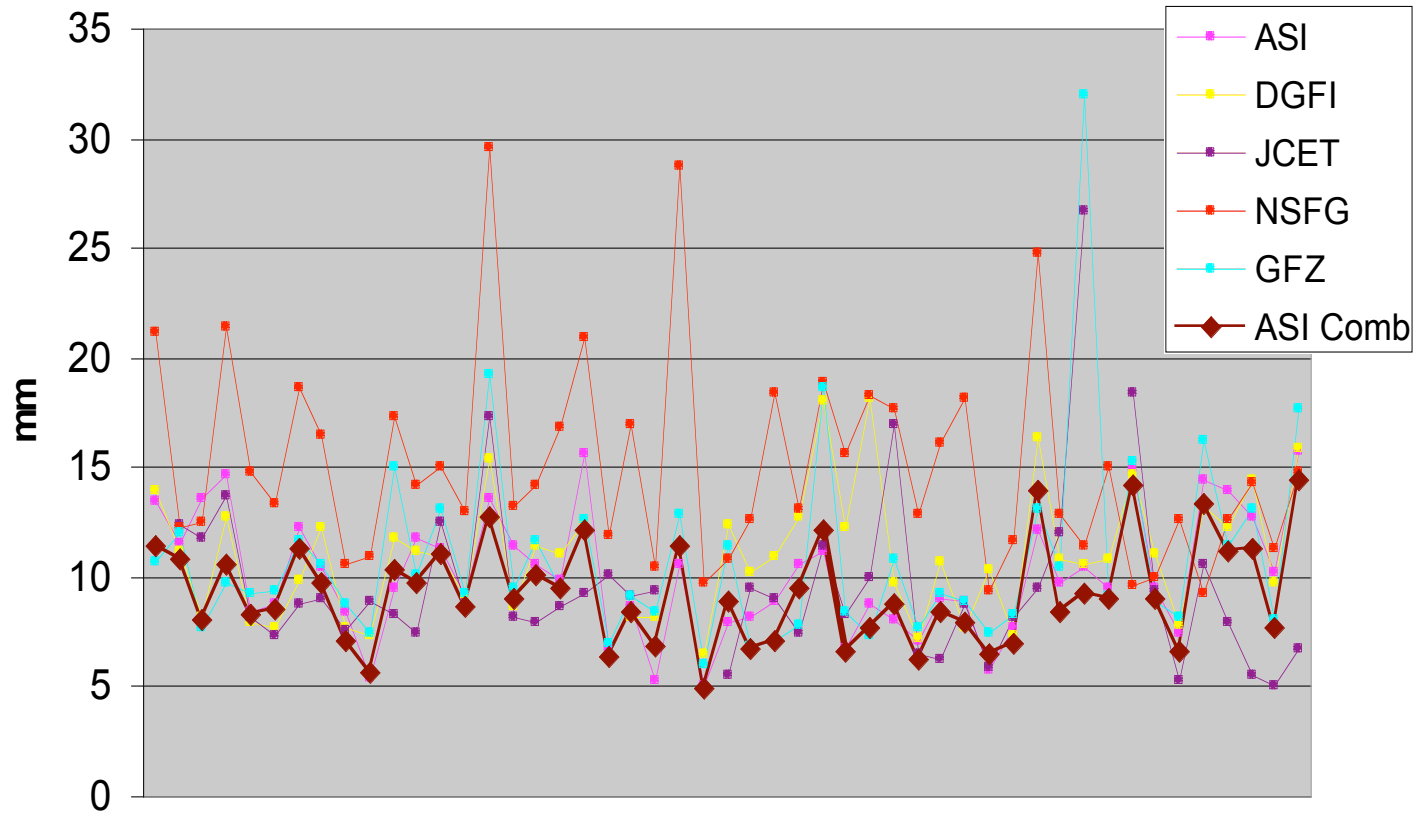
ASI combined solution vs DGFI combined solution

- Daily ASI combined values from "eop" sinex file have been differentiated with daily DGFI combined values from "eop" sinex file

- Data span: December 28th, 2003 – November 27th, 2004

- Wmean, wstd are bias and standard deviation of the differences weighted by the ASI estimation uncertainties

- no bias in x-pole, y-pole and LOD; scatter (x, y, LOD) below the 0.20 mas (x,y) and 0.02 ms (LOD)

DGFI combined solution vs IERS EOP

DGFI - USNO finals.data

# Core sites: 3-D wrms of differences w.r.t. ITRF2000

28 dec 03 - 04 dec 04

ITRF2000 consistency

- Core Sites: 3D weighted RMS of differences w.r.t. ITRF2000 of the ASI Combined solution, over the period 28 dec 03 – 04 dec 04, is 9.3 +/- 2.3 mm

- The same values for the individual solutions are:
 ASI   10.1 +/- 2.8; DGFI 11.1 +/- 2.9; GFZ 11.0+/- 4.4;
 JCET 9.7 +/- 3.9; NSFG 15.1 +/- 4.6

- Plots of Tx, Ty, Tz, Scale w.r.t. ITRF2000 follow

ITRF2000 consistency
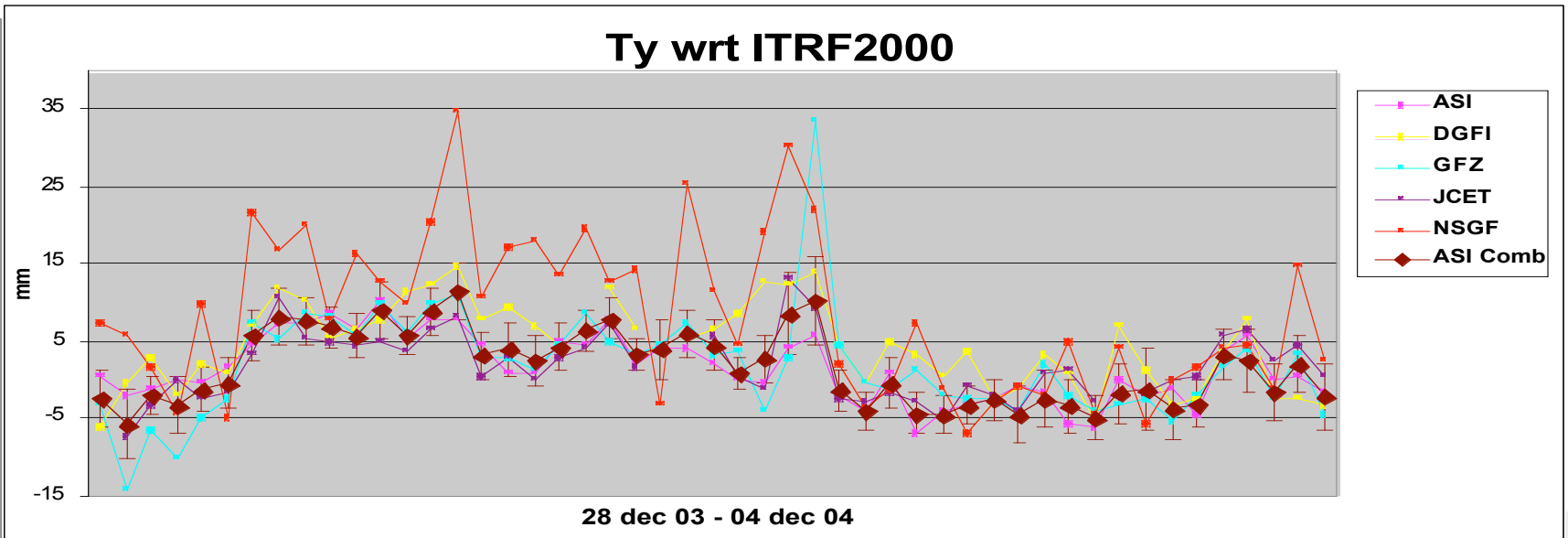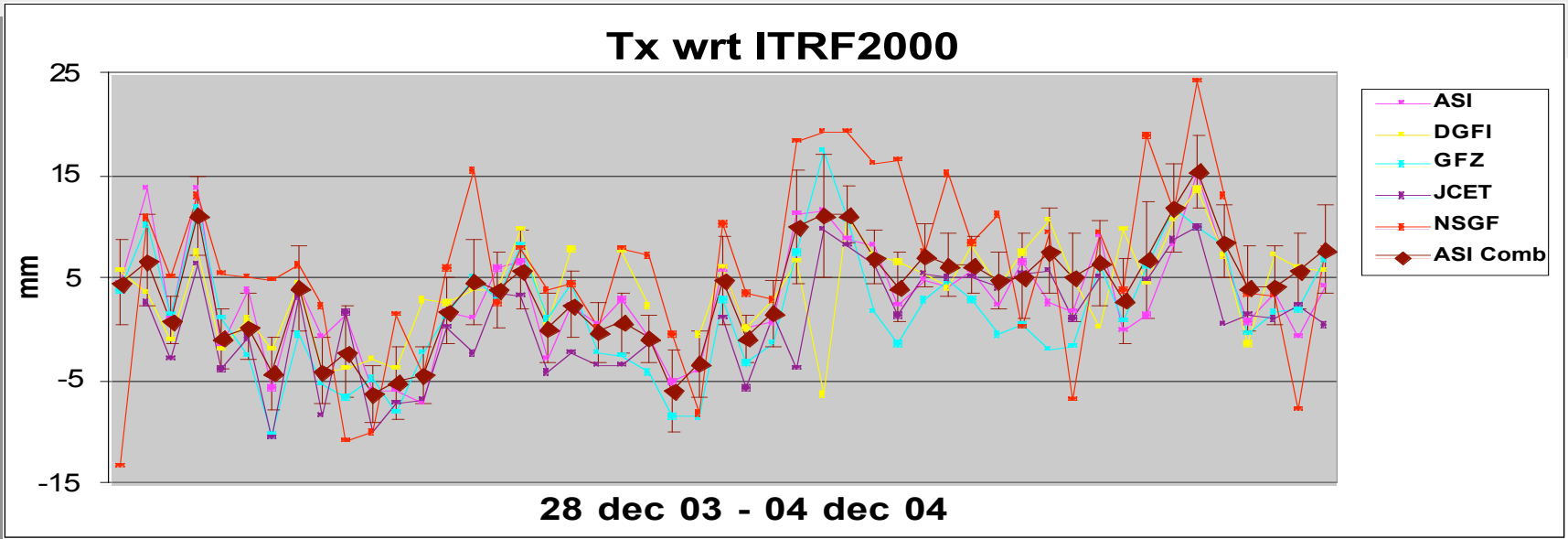
ITRF2000 consistency
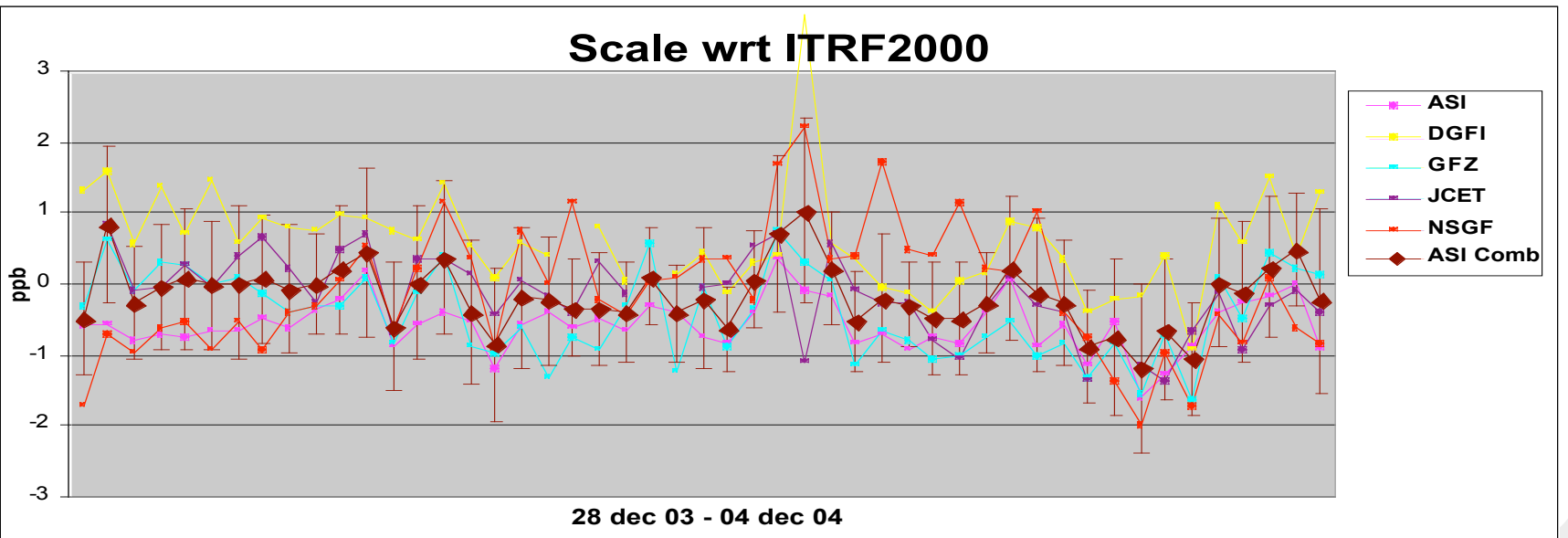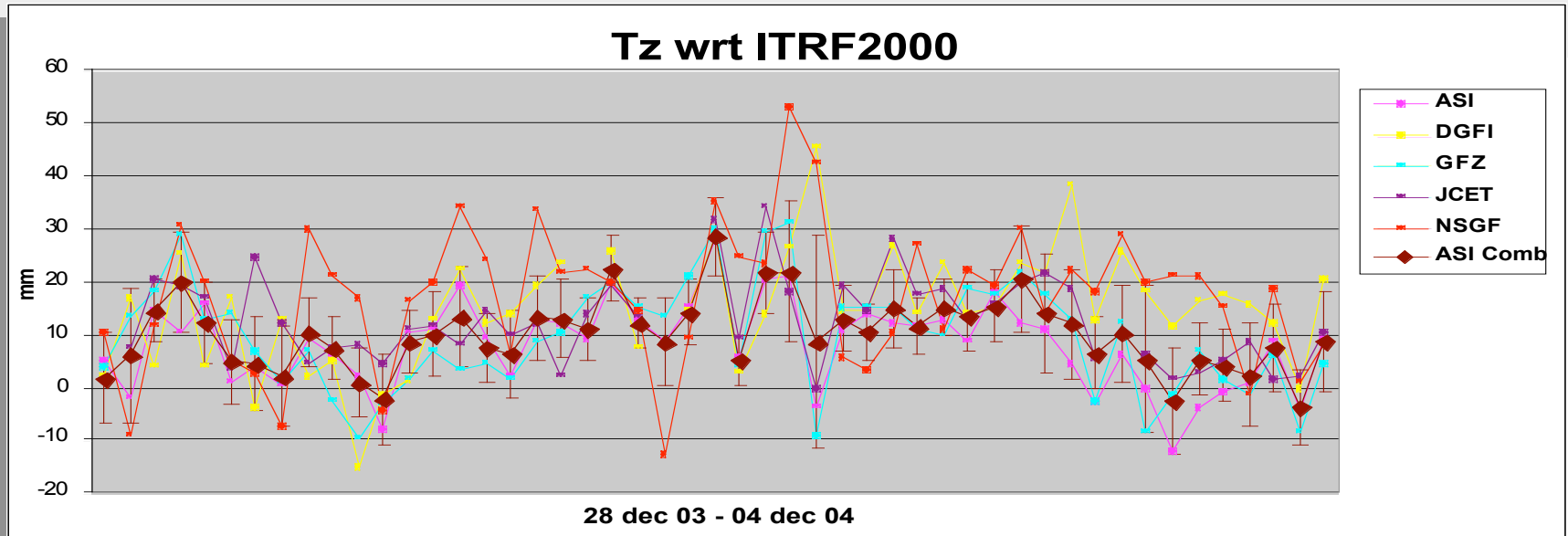
Summary

- The comparison of the EOP time series w.r.t. the USNO values shows:
  - typical SLR y-"bias": 0.2 mas in the analysed period ;
  - no bias in x-pole and LOD;
  - scatter (x, y, LOD) of 0.25 mas (x,y) and 0.06 ms (LOD)

- The comparison of the EOP time series w.r.t. the DGFI values shows:
  - no bias in x-pole, y-pole and LOD;
  - scatter (x, y, LOD) below the 0.20 mas (x,y) and 0.02 ms (LOD)

- ASI combined solutions show a 10mm consistency with the ITRF2000 in terms of 3D core sites WRMS

Remarks

- ASI combined solutions, consistent with ITRF2000 at 10 mm level, are capable to provide a quick EOP SLR product for the IERS operational aims

- ASI combined solutions are regularly uploaded as ILRS contribution to the IERS Combination Pilot Project

- ASI and DGFI, at the moment primary and back-up ILRS combination centers, are cooperating to compare results and procedures; tests and compared analyses cases have been carried out: a dedicated report, under revision, will be enclosed as appendix to the minute of the present meeting.

First Experiences with the Official ILRS Combination Solutions

Rainer Kelm
Deutsches Geodätisches Forschungsinstitut

presented by

Detlef Angermann
Deutsches Geodätisches Forschungsinstitut

ILRS AWG meeting, San Francisco, USA,, December 13, 2004

Status of official products (1)

pos+eop.snx file:

* ASI: loose constraints solution, no apriori information

* DGFI: minimal constraints solution, full apriori information, normal equation system

eop.snx file:

* ASI: Helmert transformation of loose contraints parameters (pos+eop) w.r.t. ITRF2000 with full minimal constraints covariance matrix

* DGFI: eop part of pos+eop.snx, because minimal constraints parameters are already aligned to ITRF2000

Status of official products (2)

pos+eop.sum file:

* ASI: solution statistics of individual solutions
Helmert transformation of individual and combined solutions w.r.t.
ITRF2000 with stationwise coordinate residuals
EOP residuals w.r.t. „finals.daily"
relative scale factors
pos+eop residuals w.r.t. combined solution
Helmert transformation of individual coordinates w.r.t. combined solution
with stationwise coordinate residuals

* DGFI: solution statistics of individual solutions
smallest eigenvalues of deconstrained normal equations
Rank type analysis for individual and combined solutions:

$$\text{diag}(\ E^T\ N_{deconstrained}\ E) = 0\ ?\ \text{and}\ \text{sqrt}(\text{diag}[(E^T\ (C_{loose}^{-1})\ E)^{-1})] >> 0$$

?

Helmert transformation of individual and combined coordinates w.r.t.
ITRF2000 and stationwise coordinate residuals
EOP residuals w.r.t. „finals.daily"
EOP jumps between last and actual week

Operational quality control (1)

* starting with **plot control** as basis for the development of analytical criteria

* **weekly**: here for last **week 041204**

> **first smallest eigenvalues** of individual deconstrained normal matrices

> **comparison of pos+eop:**

DGFI
> > **loose:** direct comparison of given ASI loose constraints solution and minimal constraints solution
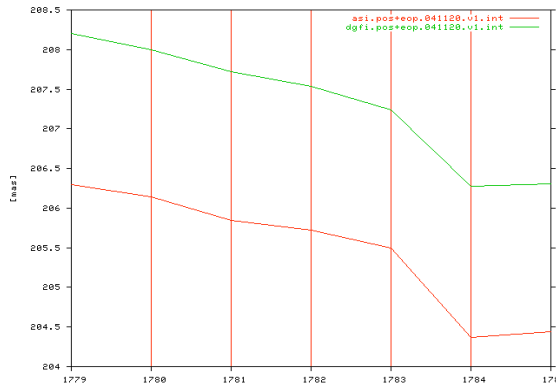
> > **minimal:** minimal constraints solution af ASI with the same set of core stations and comparison of both minimal constraints solutions

First smallest eigenvalues week 041204
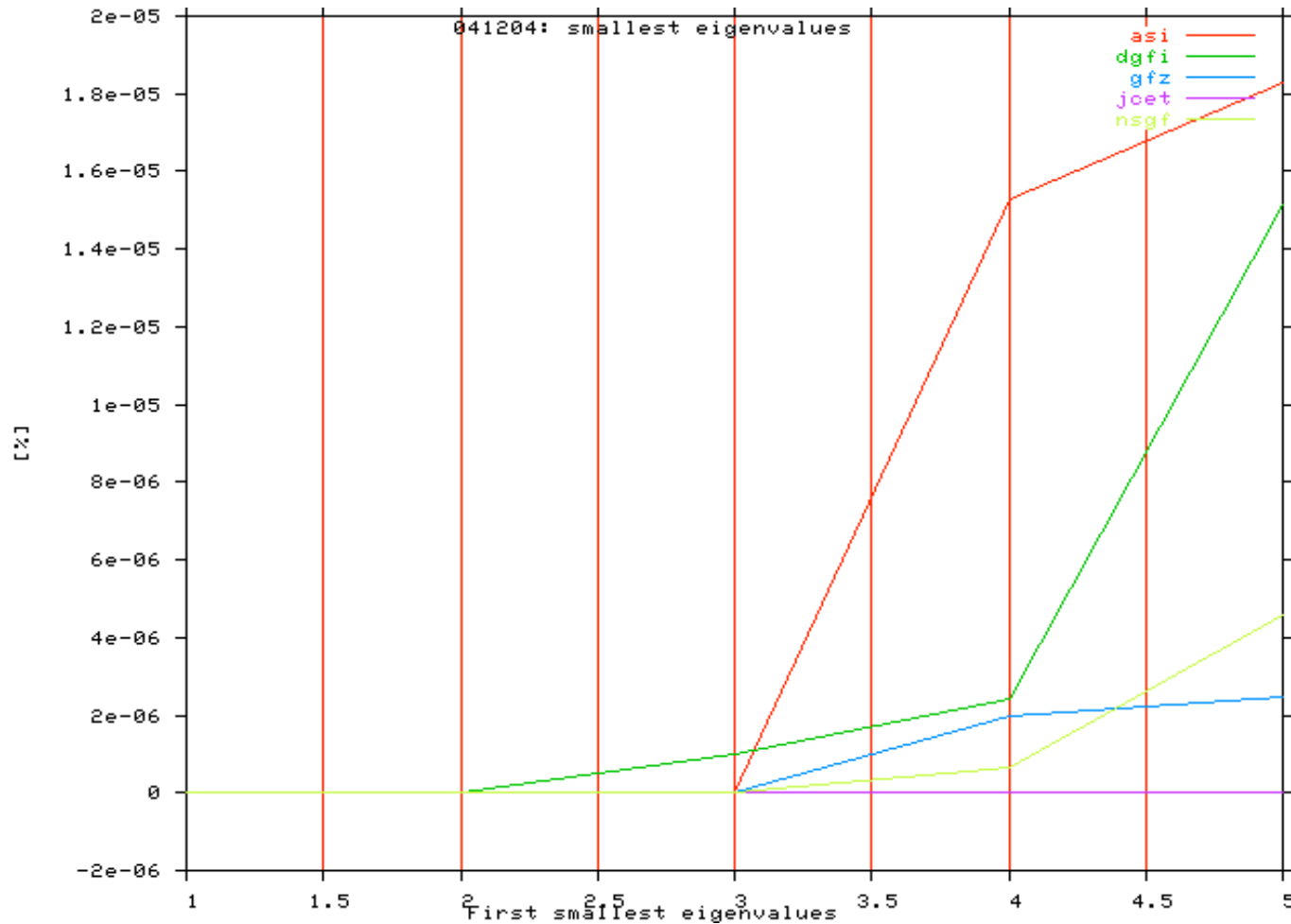
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EOP week 041204

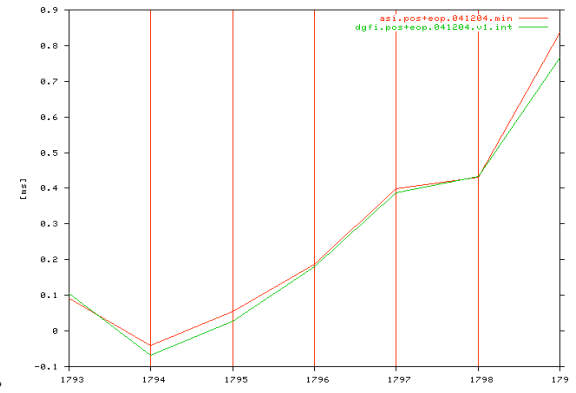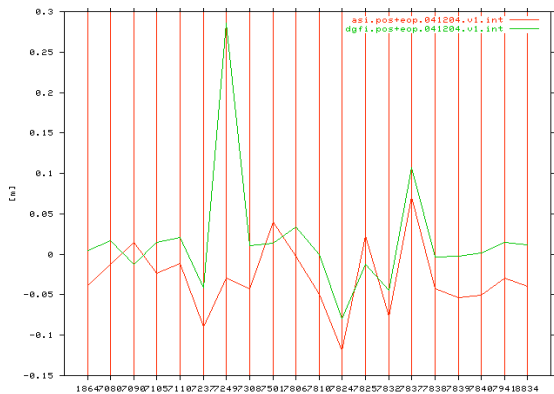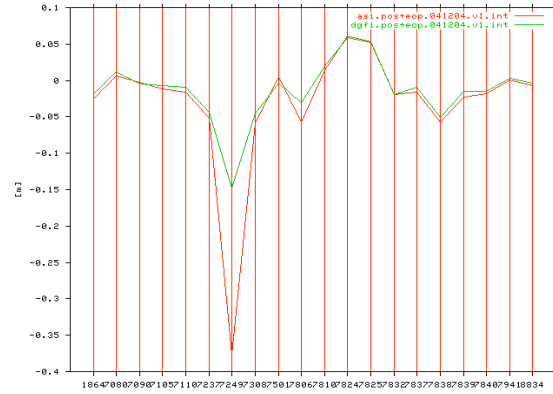

X pole loose
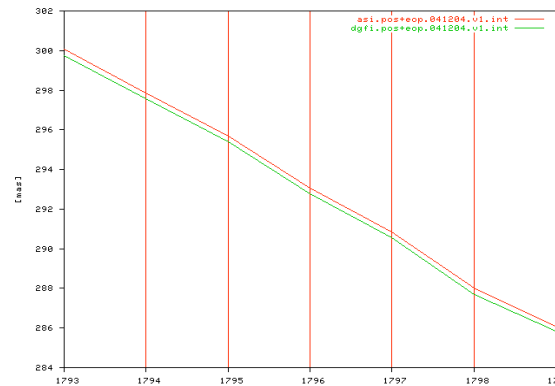
Y pole loose
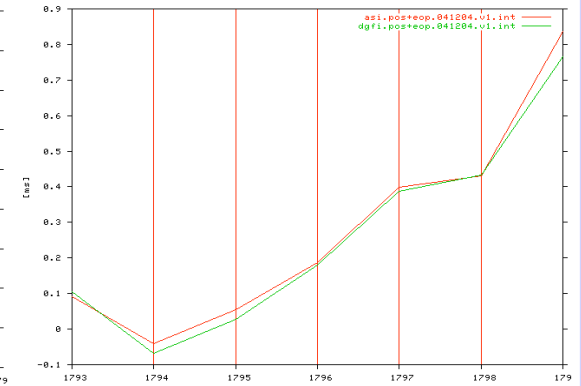
LOD loose
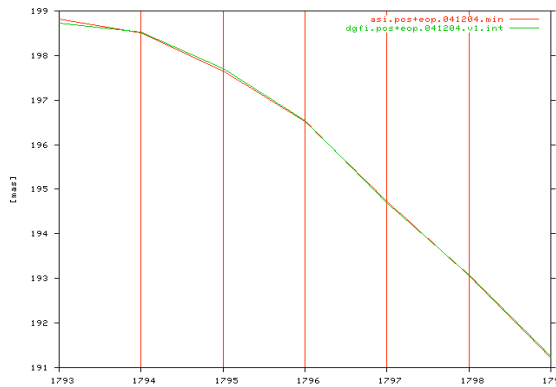
X pole minimal
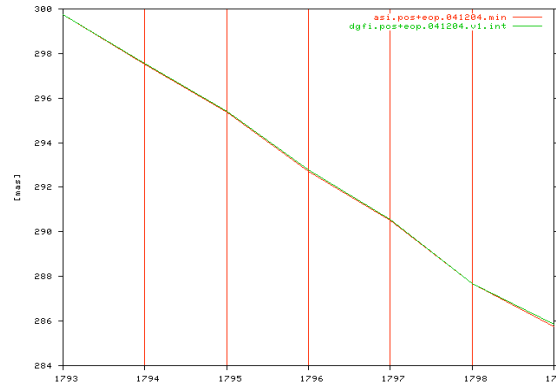
Y pole minimal

LOD minimal

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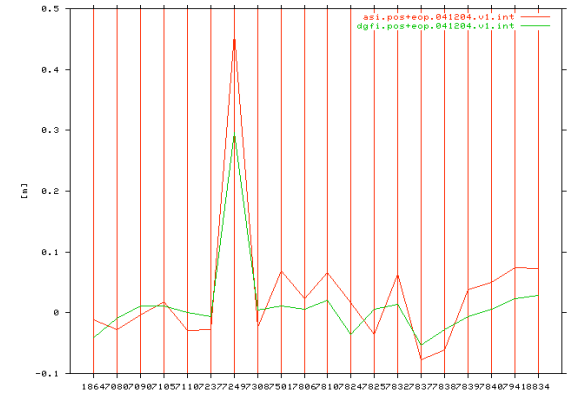
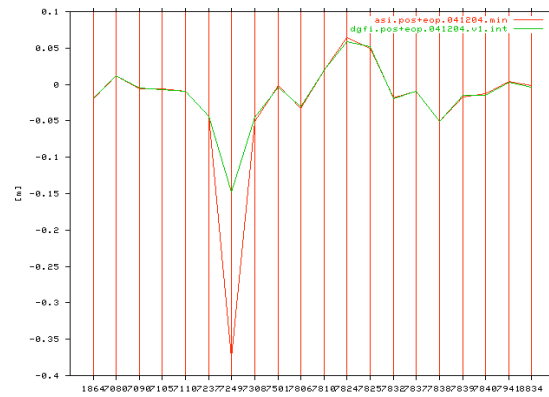# Station coordinates week 041204


X loose

Y loose

Z loose

X minimal

Y minimal

Z minimal

ILRS AWG Meeting, San Francisco, USA,, December 13, 2004
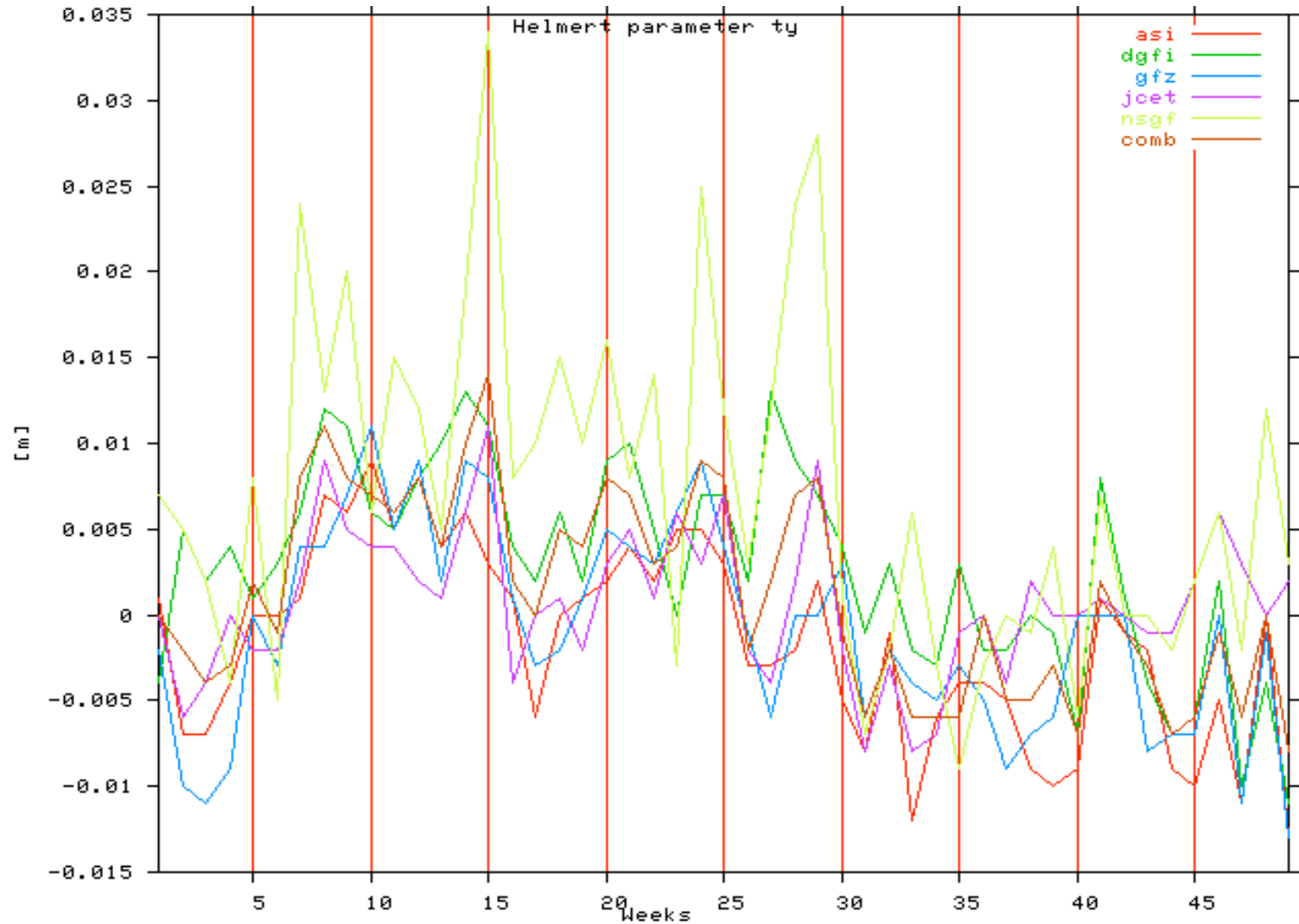
Operational quality control (2)

*** time series of Helmert parameters starting 040103 up to actual week:
individual and DGFI combined solutions**

*** time series of Helmert parameters starting 040103 up to actual week:
ASI and DGFI combined solutions**

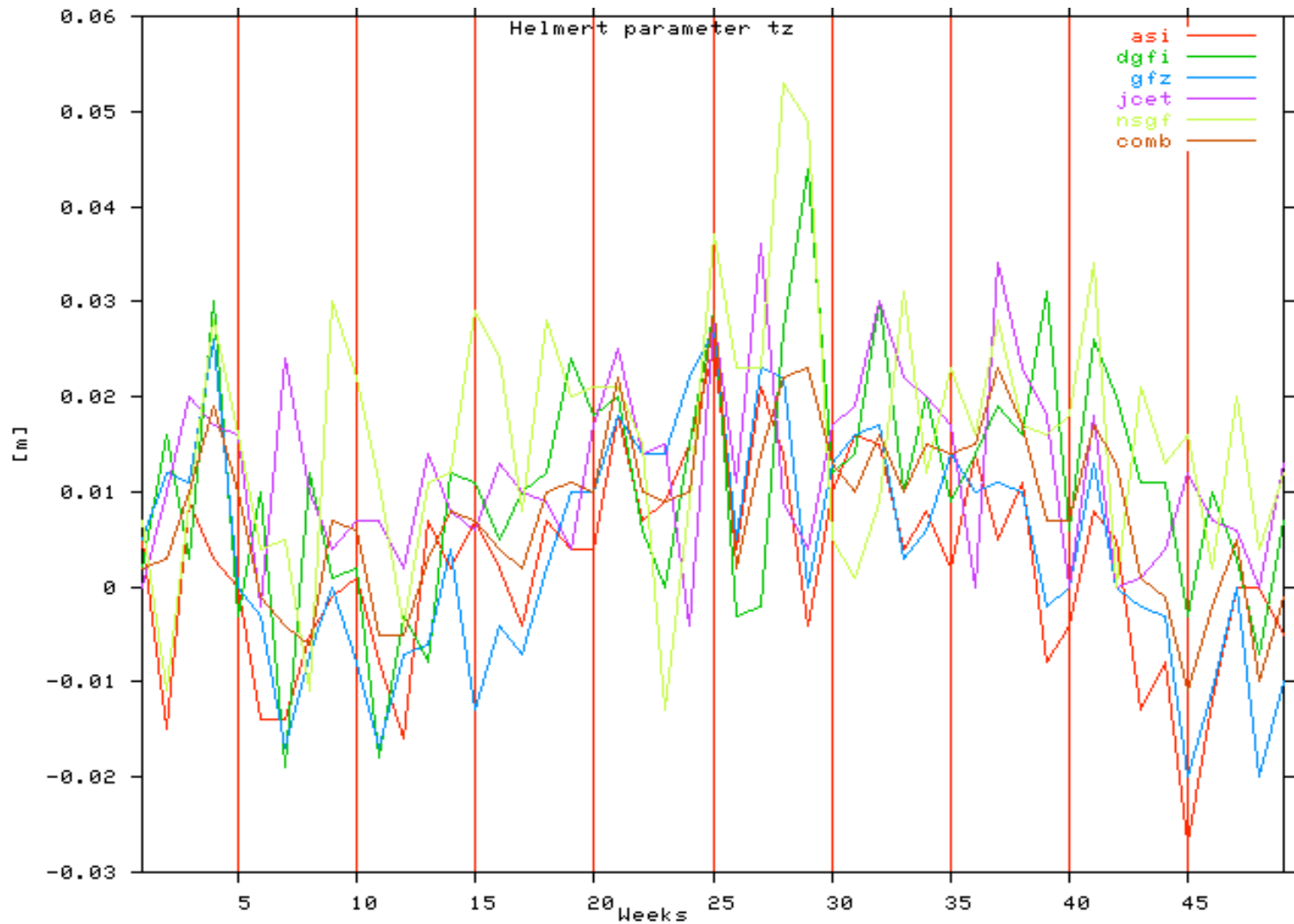# Individual and DGFI combined solutions: X translation
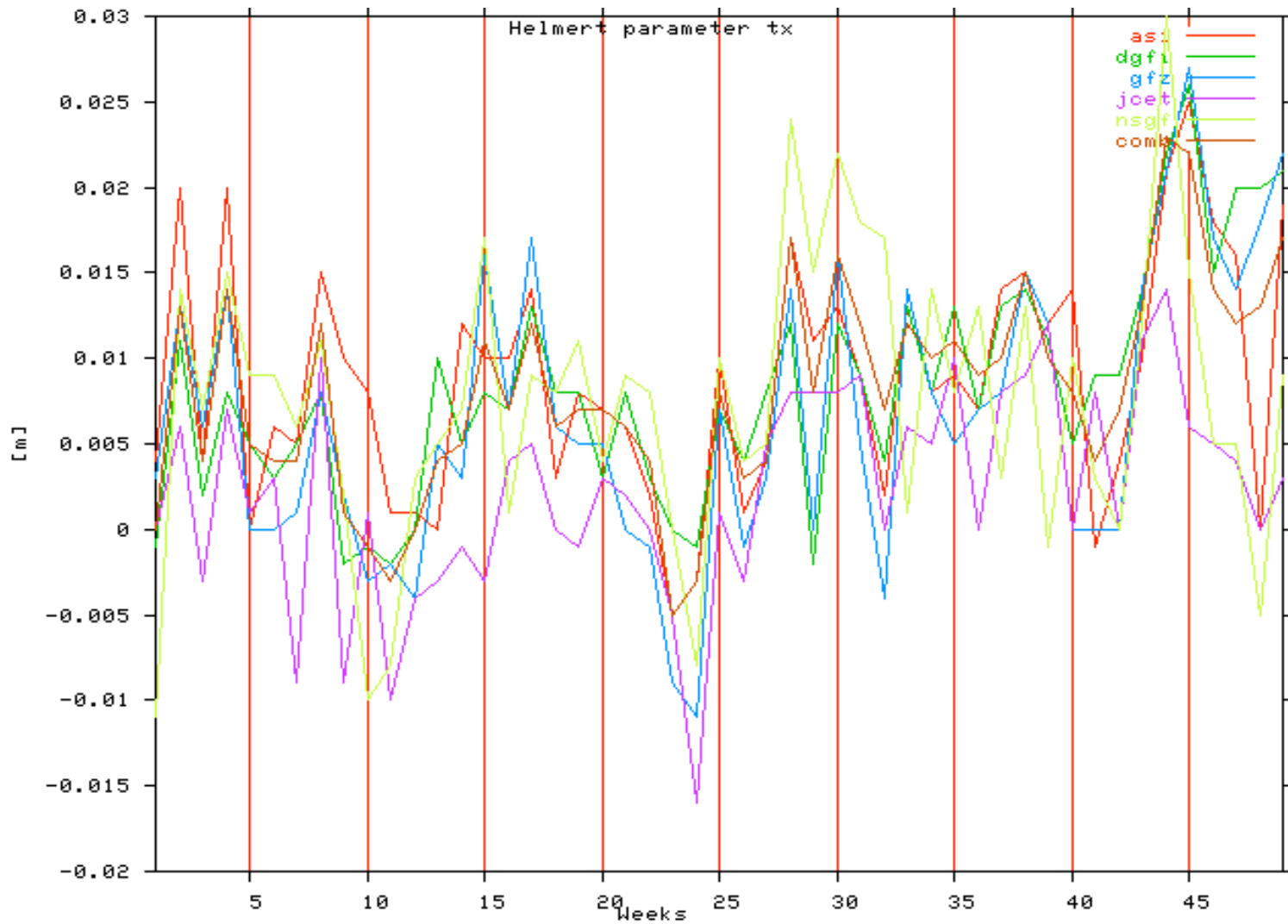
ILRS AWG Meeting, San Francisco, USA,, December 13, 2004

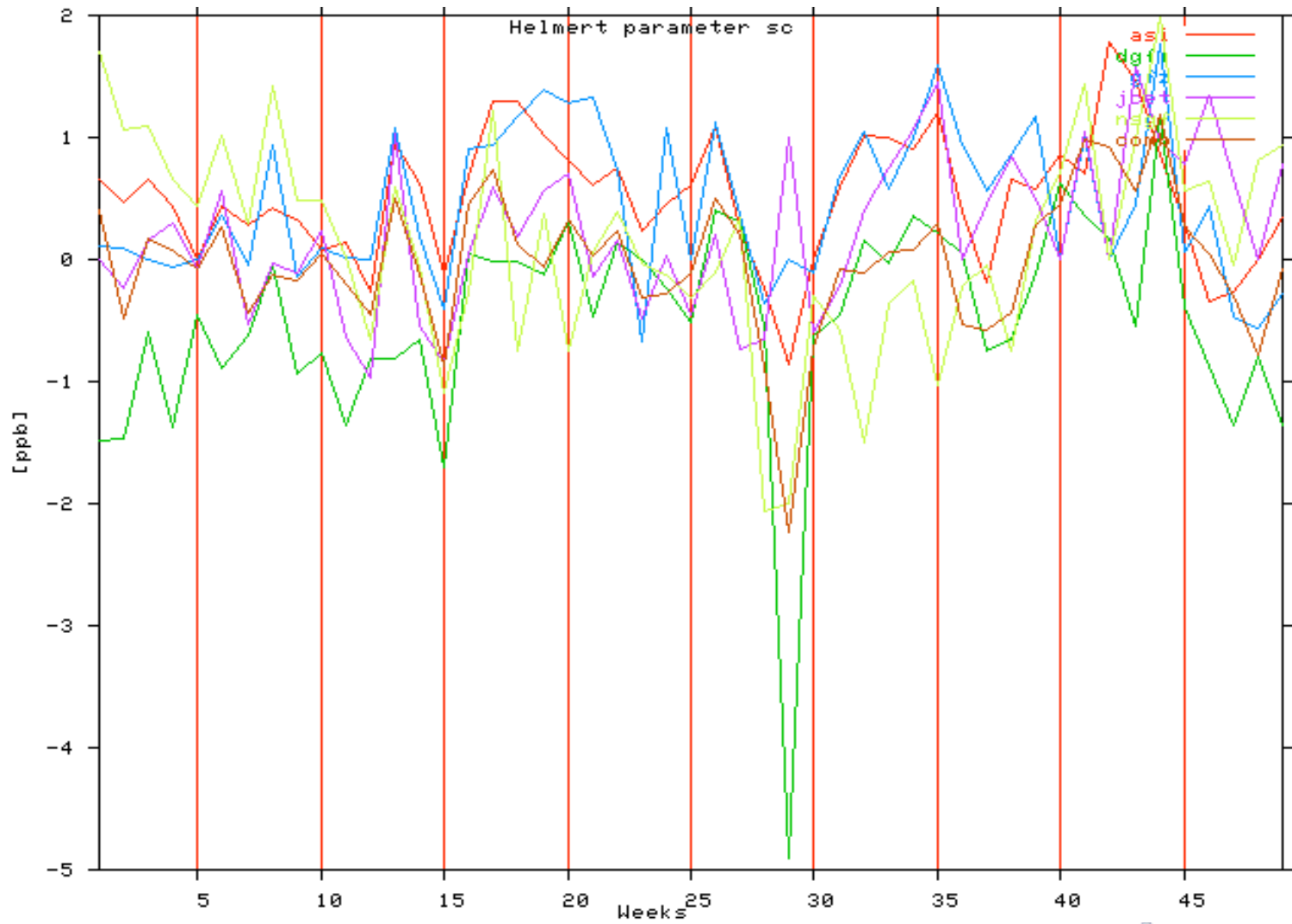# Individual and DGFI combined solutions: Y translation

Helmert parameter ty

Legend:
- asi (red)
- dgfi (green)
- gfz (blue)
- jcet (magenta)
- nsgf (light green)
- comb (brown)

Y-axis: [m]
X-axis: Weeks

ILRS AWG Meeting, San Francisco, USA,, December 13, 2004

Individual and DGFI combined solutions: Z translation

ILRS AWG Meeting, San Francisco, USA,, December 13, 2004

Individual and DGFI combined solutions: scale

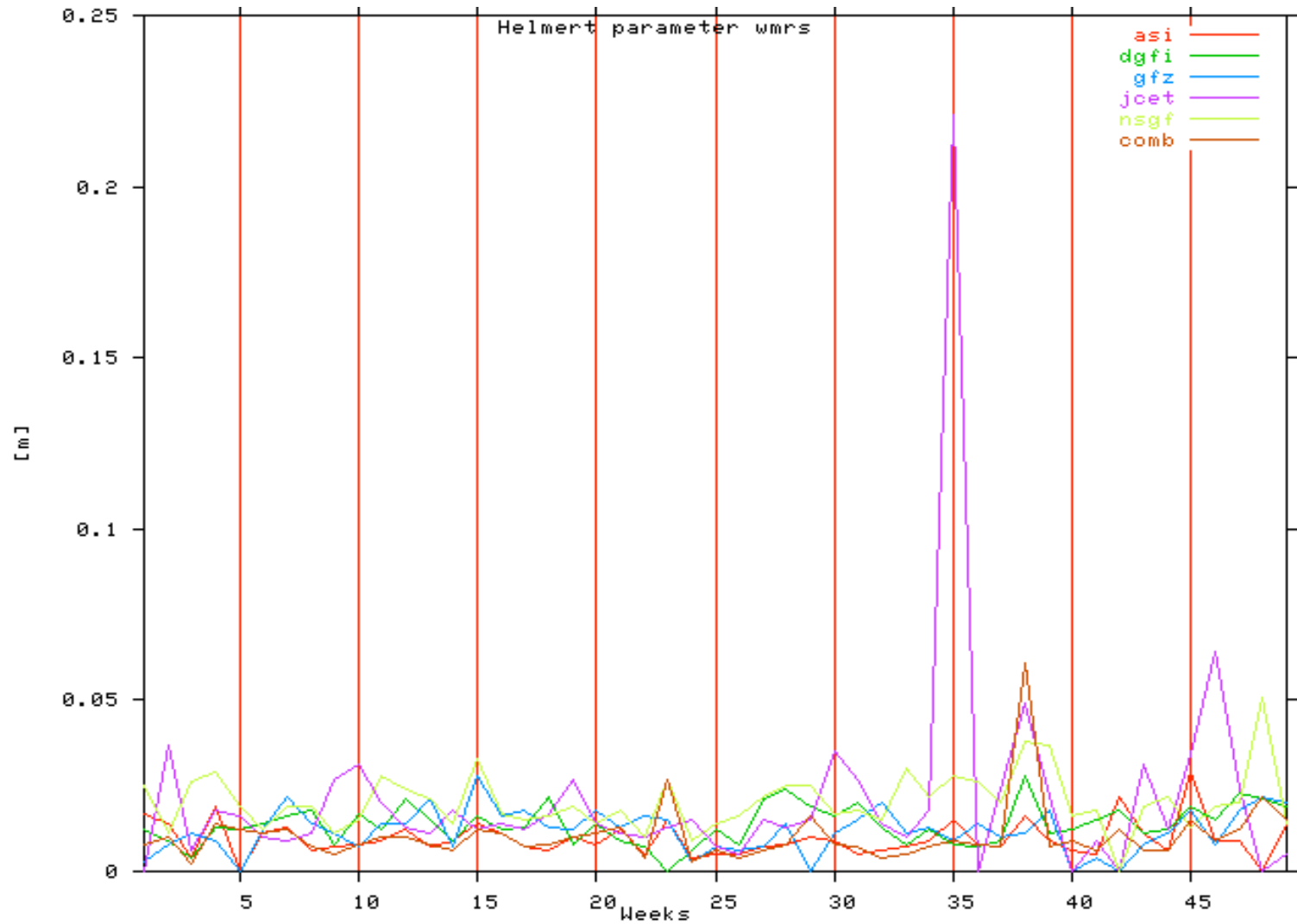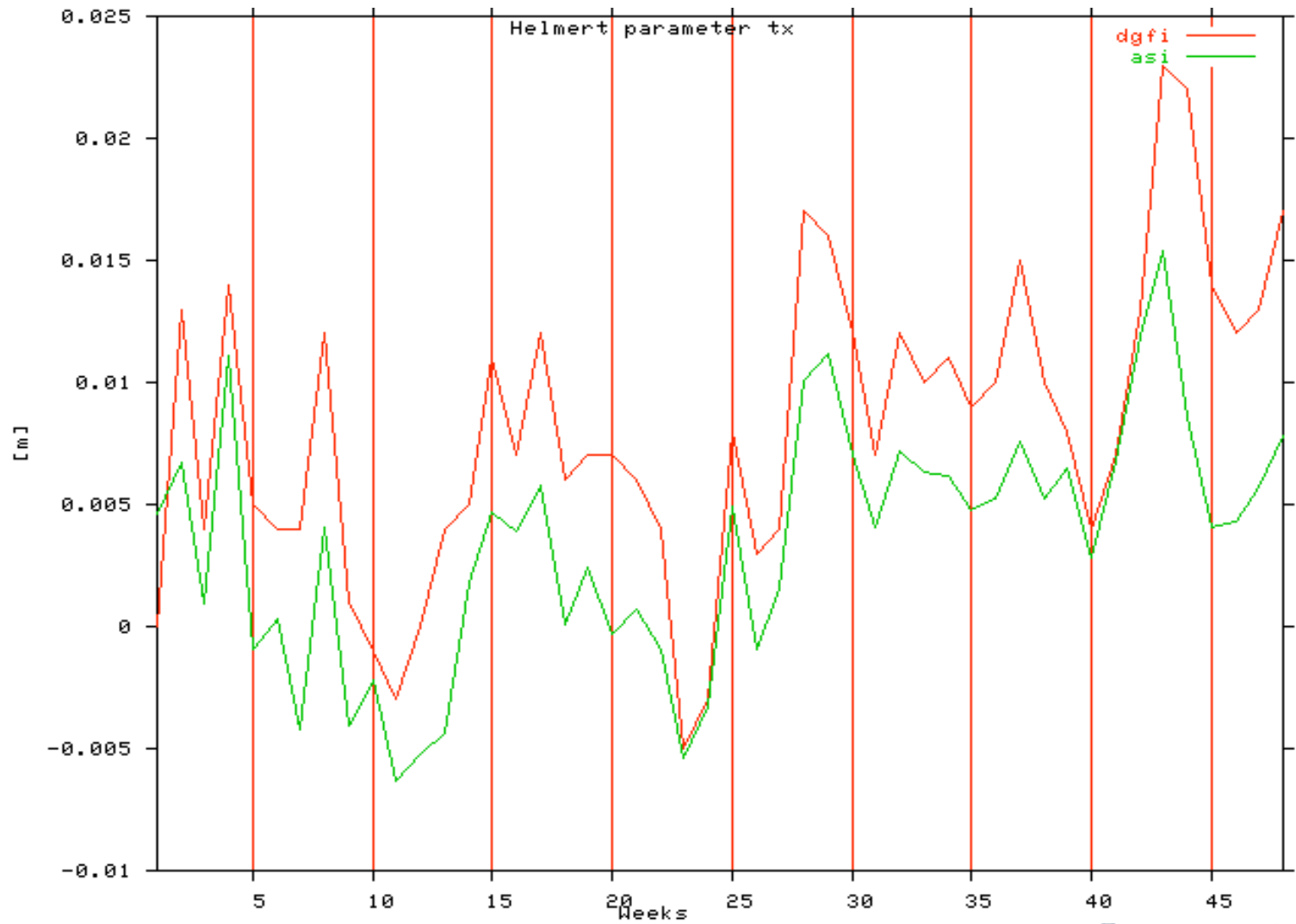

Helmert parameter sc

ILRS AWG Meeting, San Francisco, USA,, December 13, 2004

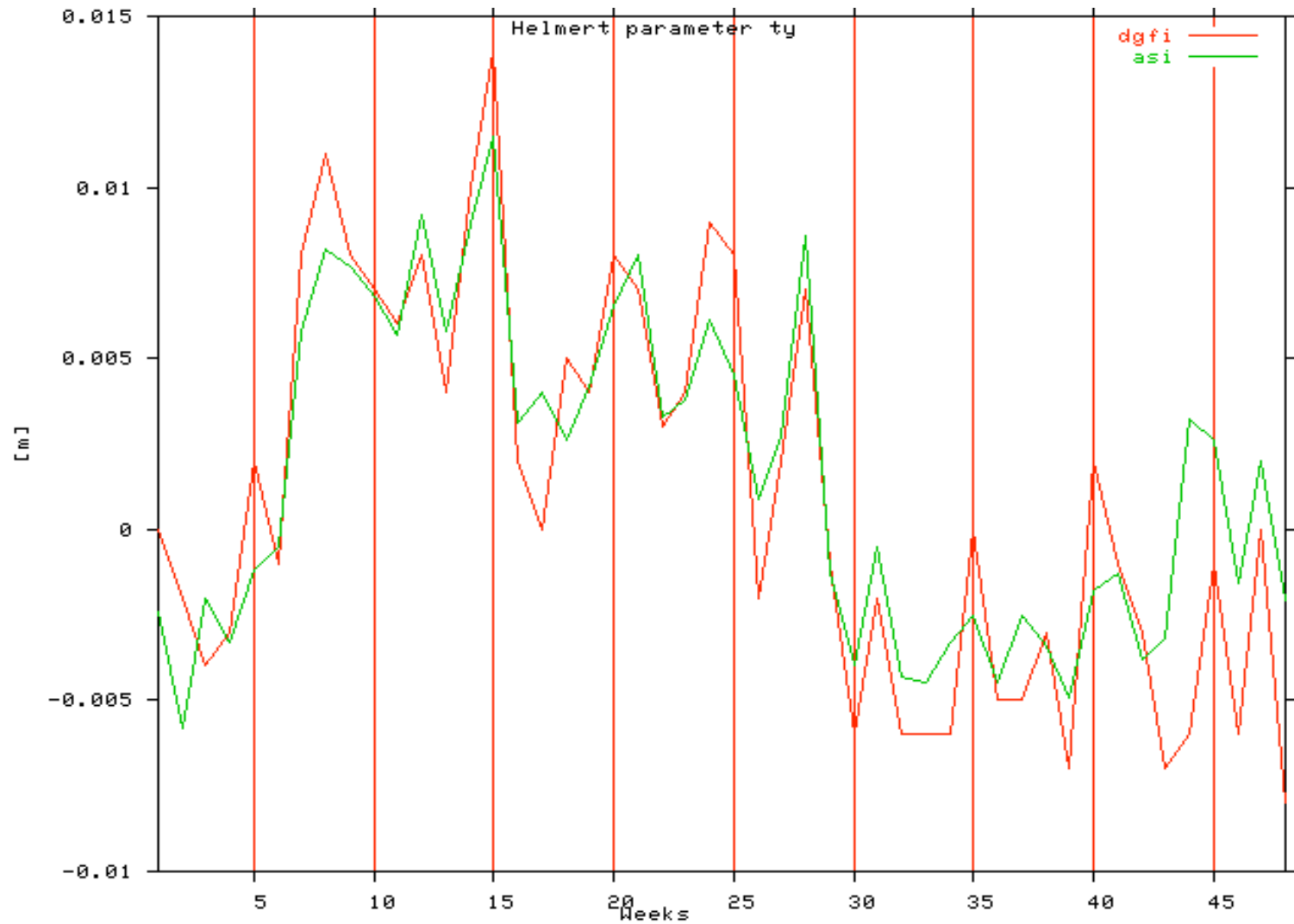# Individual and DGFI combined solutions: wrms

ILRS AWG Meeting, San Francisco, USA,, December 13, 2004

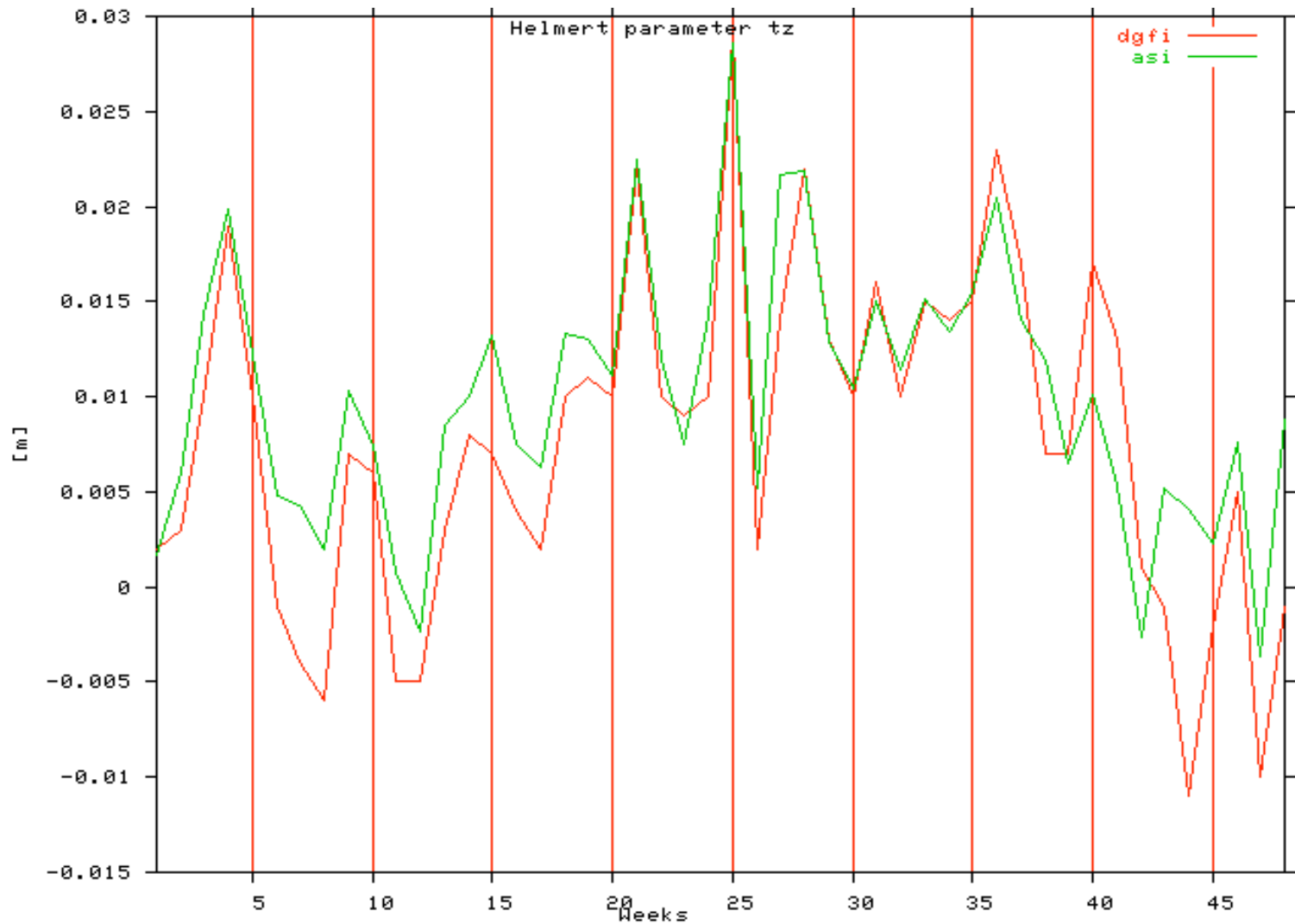# ASI and DGFI combined solutions: X tranlation

ILRS AWG Meeting, San Francisco, USA,, December 13, 2004

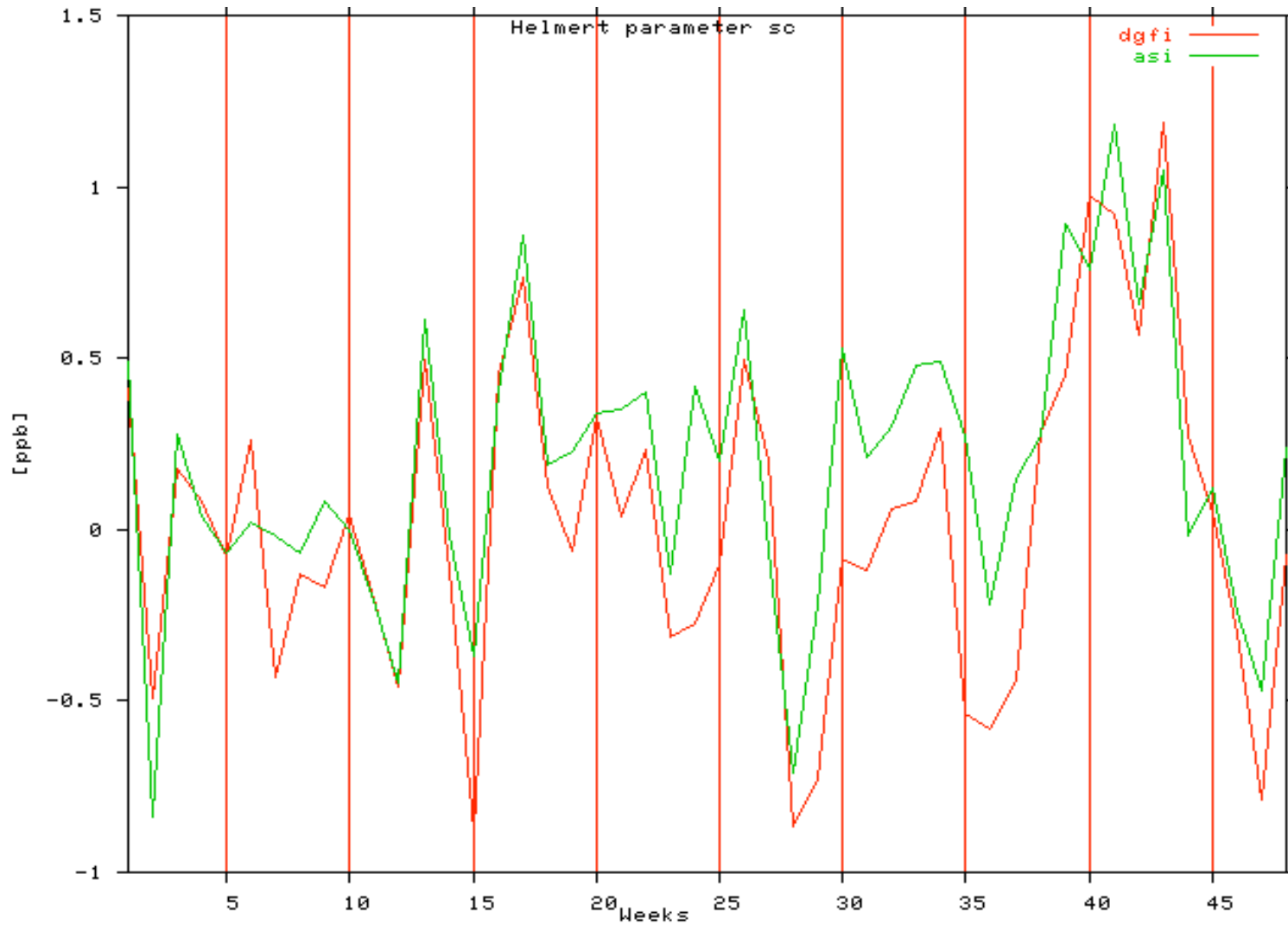# ASI and DGFI combined solutions: Y tranlation

ILRS AWG Meeting, San Francisco, USA,, December 13, 2004

ASI and DGFI combined solutions: Z tranlation

ASI and DGFI combined solutions: scale

Discussion items

* pos+eop.snx:
>   normal equations and minimal constraints solution or loose constraints solution:
>>   What is more suited for further combination projects?

* pos+eop.sum:
>   Which kind of information should be equal in both summary files?
>   **Note:** No change of format, because the analysis tools are developed w.r.t.that
>>   format

* operational quality control:
>   Which analytical quality control criteria are preferred?
>   Other quality control plots? Station time series plots are in preperation.

* communication:
>   How to handle significant differences in combined solutions?
>   How to improve communication between individual and combined solution centers?
>>   On email basis or more automated?