EPN TIME SERIES ANALYSIS: BEFORE AND AFTER GPSWK1400

AMBRUS KENYERES

EPN TIME SERIES ANALYSIS SPECIAL PROJECT

EUREF2007 SYMPOSIUM, 6-9 JUNE 2007 LONDON

OUTLINE

- TIME SERIES WEB PAGES REVITALIZED
  (AS ANNOUNCED IN EUREFMAIL_3328)

  STATE-OF-THE-ART RESULTS AND PRODUCTS

  - NOISE AND HARMONIC ANALYSIS
  - COORDINATE AND VELOCITY ESTIMATES

- THE (MIXED) WORLD AFTER GPSWK1400

  - ITRF2000 → ITRF2005
  - REL → ABS PCV TRANSITION (IGS05)

  PROBLEMS (?) AT COMBINATION AND IN THE CUMULATIVE SOLUTION

- RE-ANALYSIS

NEW TIME SERIES WEB PAGES

LONG AWAITED MODERNISATION

NEW CONTENT, NEW DESIGN

- EPN_TSA CUMULATIVE SOLUTION (CATREF)

  DESCRIPTION, RELATED QUALITY MEASURES
- NOISE ANALYSIS (CATS_MLE)

  COLORED NOISE → HIGHER VELOCITY UNCERTAINITIES
- HARMONIC ANALYSIS

  ESTIMATION OF THE SEASONAL VARIATION

  ONGOING COMPARISON WITH ENVIRONMENTAL MODELS

  (RE-ANALYSIS!)

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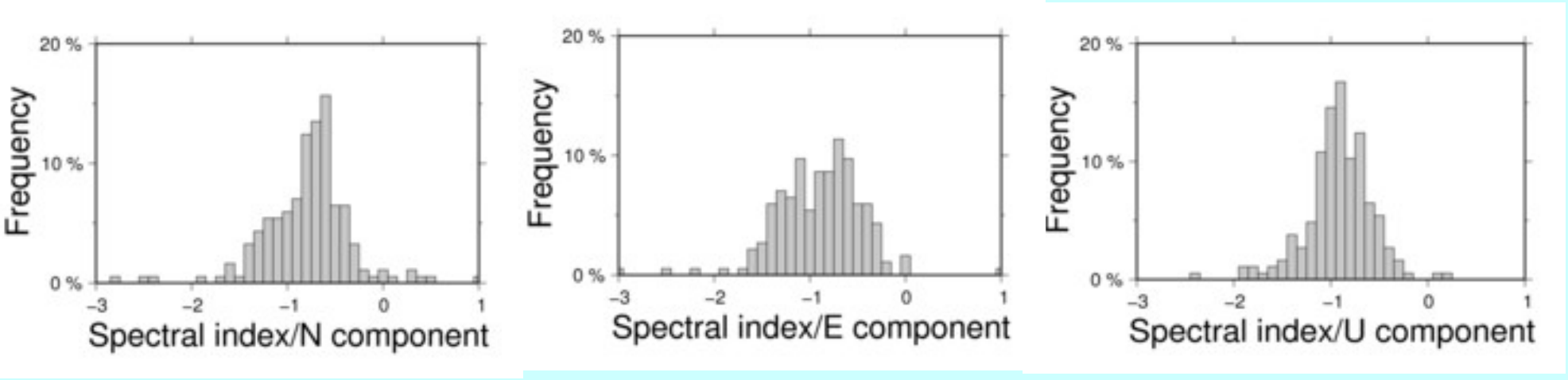
NOISE ANALYSIS - CATS_MLE



HISTOGRAMS OF THE SPECTRAL INDEX DISTRIBUTION

PRESENCE OF COLORED NOISE (K=-1 ==== FLICKER NOISE)

IMPACT ON VELOCITY UNCERTAINITY ESTIMATION:

LARGER (MORE REALISTIC) UNCERTAINITIES
COMPARED TO THE WHITE-ONLY NOISE MODEL

EXAMPLE:

HERS	N	E	U
V [MM/Y]	16.4	16.6	0.24
σV (WHITE)	0.00	0.04	0.19
σV (COLORED)	0.09	0.12	0.28

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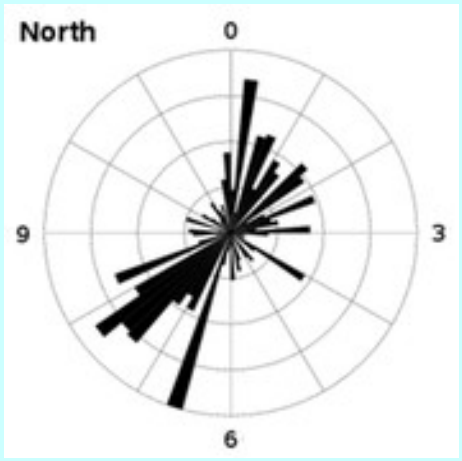
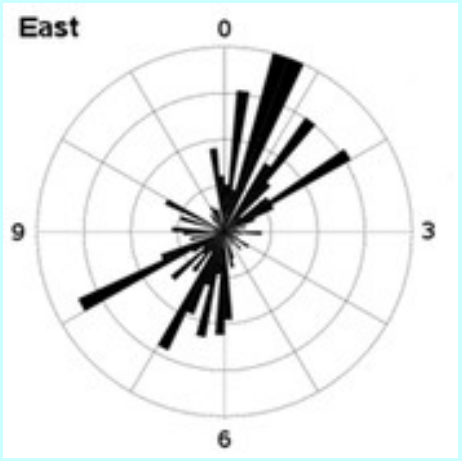
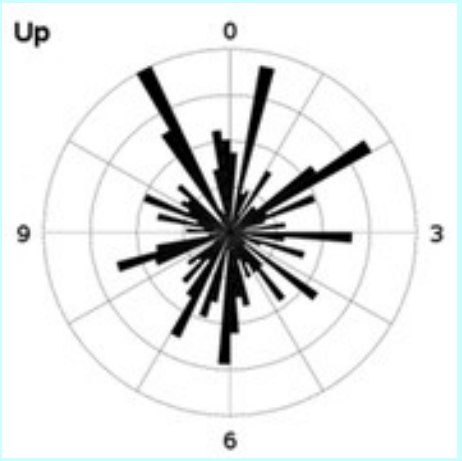
EPN HARMONIC ANALYSIS:
TS SEASONAL VARIATION







WINDROSE DIAGRAMS OF THE ESTIMATED PHASE LAG AND AMPLITUDE

N,E - WELL DEFINED PHASE LAG
U - MORE HOMOGENOUS LAG DISTRIBUTION

LIMITED LIFETIME – THE REPROCESSING WILL OVERWRITE ALL PRIOR DEDUCTIONS!

NEW TIME SERIES WEB PAGES

EPN_TSA PRODUCTS

- DATABASE OF
  - OFFSETS AND OUTLIERS
  - *NOISE SPECTRAL INDICES*
  - SEASONAL COORDINATE VARIATION (AMPLITUDE AND PHASE LAG)
  - VELOCITIES AND UNCERTAINTIES
- 'OFFICIAL' EPN COORDINATE AND VELOCITY SOLUTION BETWEEN THE RELEASES OF THE ITRF SOLUTIONS

"GPSWK 1400" SYNDROME

COMPLICATIONS CAUSED BY THE REL/ABS PCV TRANSITION (ITRF2005/IGS05)

- ADDITIONALLY: SOFTWARE UPGRADE AT THE EPN LACS

DESPITE OF THE CAREFUL PREPARATIONS

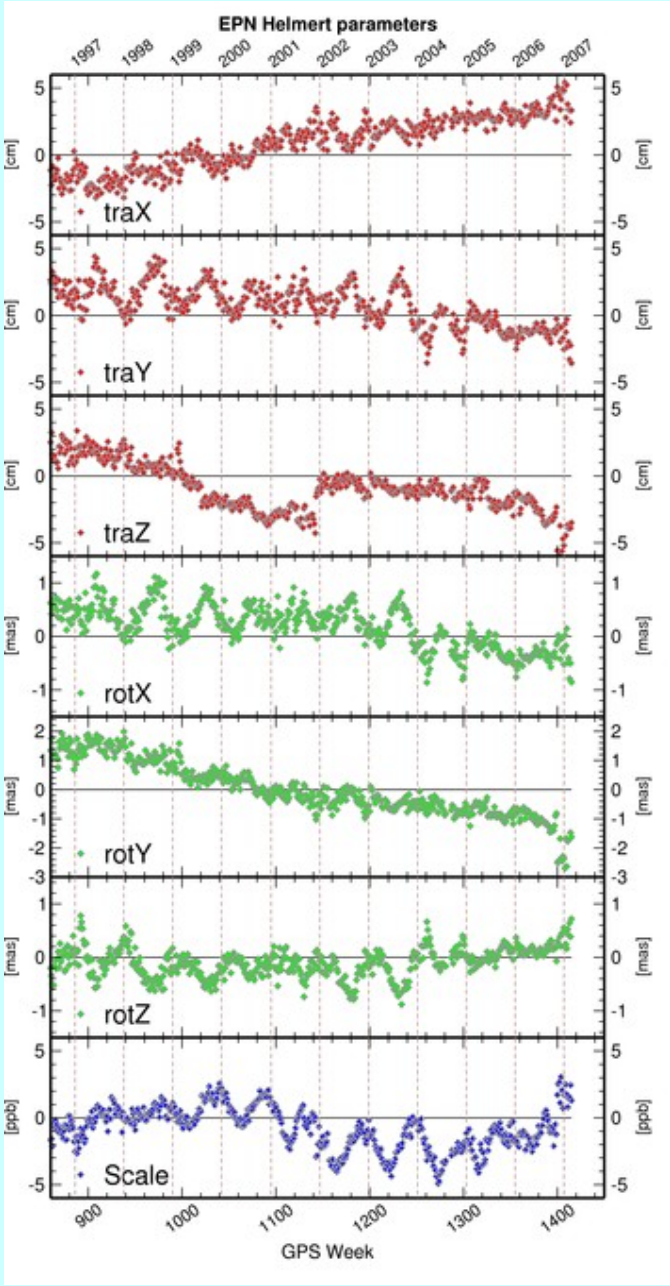
COORDINATE JUMPS COULD NOT BE AVOIDED!

- THE STACKING ELIMINATES THE REFERENCE FRAME RELATED OFFSETS

  → HELMERT TRANSFORMATION PARAMETERS

- THE REST IS DUE TO REL/ABS PCV INCONSISTENCIES

HELMERT TRANSFORMATION PARAMETERS



BYPRODUCT OF THE CUMULATIVE SOLUTION

NO STRICT PHYSICAL MEANING,
BUT GOOD INDICATION OF INCONSISTENCIES:

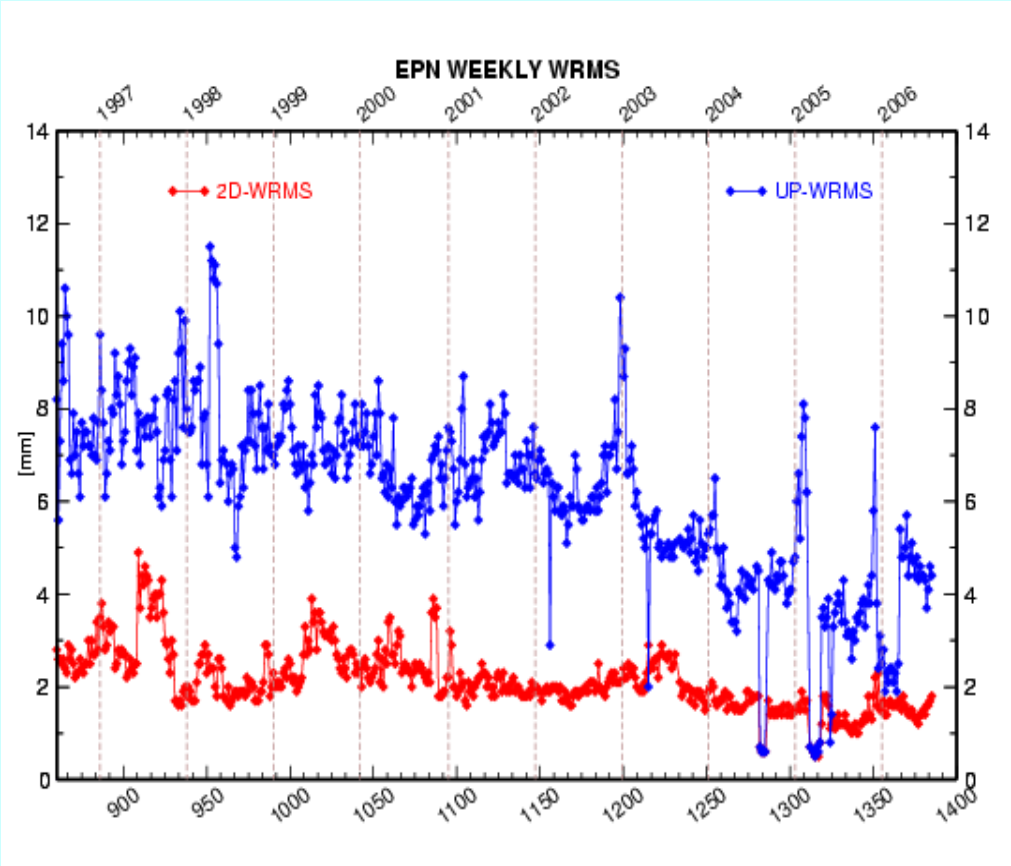
- REFERENCE FRAME CHANGES
- ANALYSIS MODEL ERRORS (TIDAL BUG)
- INCONSISTENCIES, NOT YET HANDLED BY THE COMBINATION

EPN WEIGHTED RMS SERIES

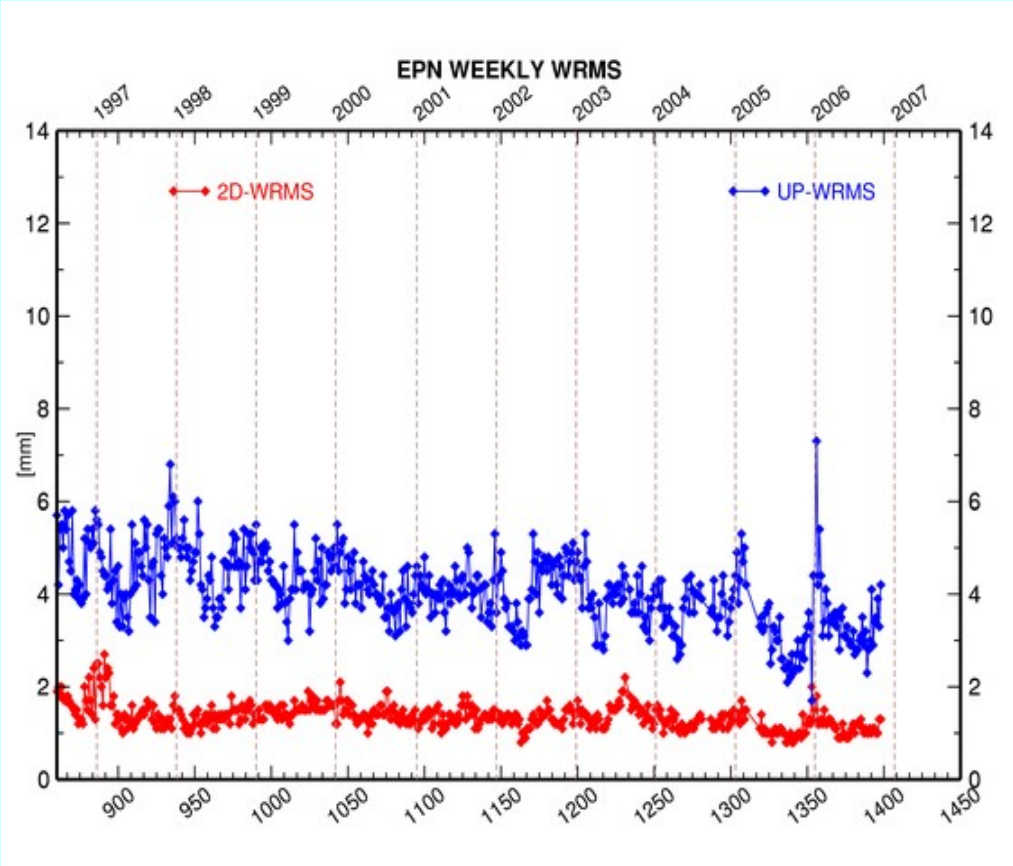
QUALITY INDICATOR OF THE WEEKLY COMBINED SOLUTIONS

BEFORE WK 1400

RAW



CLEAN

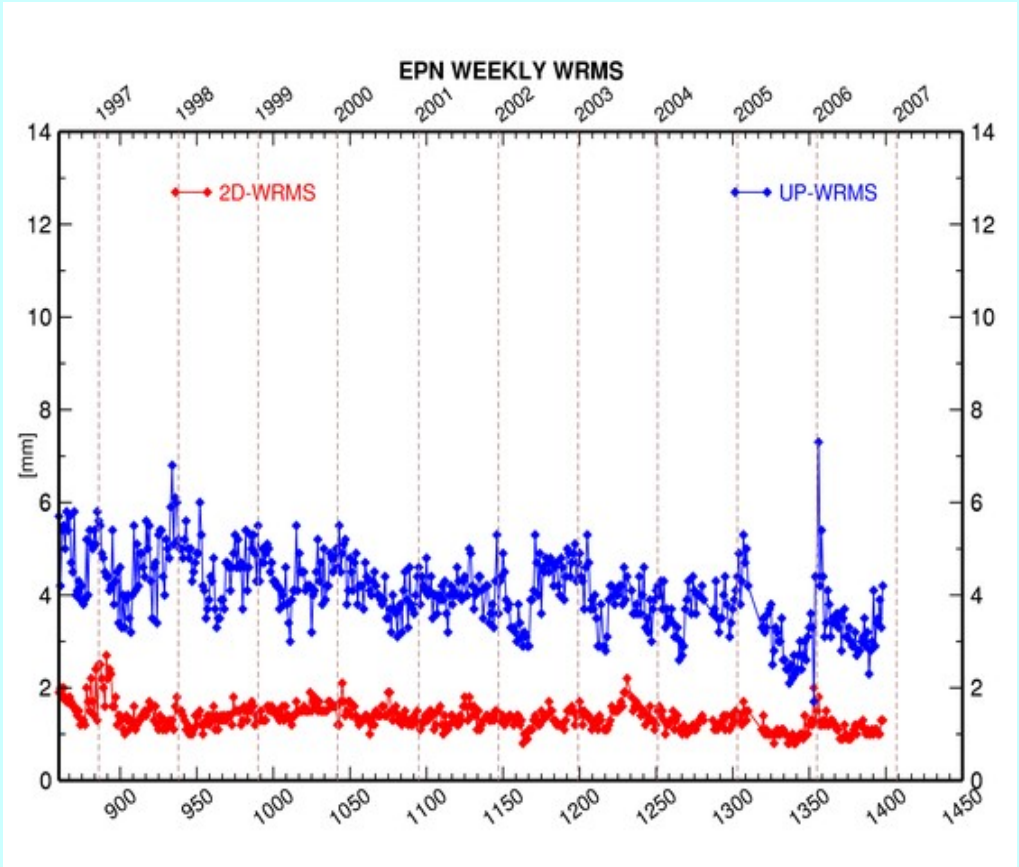


EPN WEIGHTED RMS SERIES

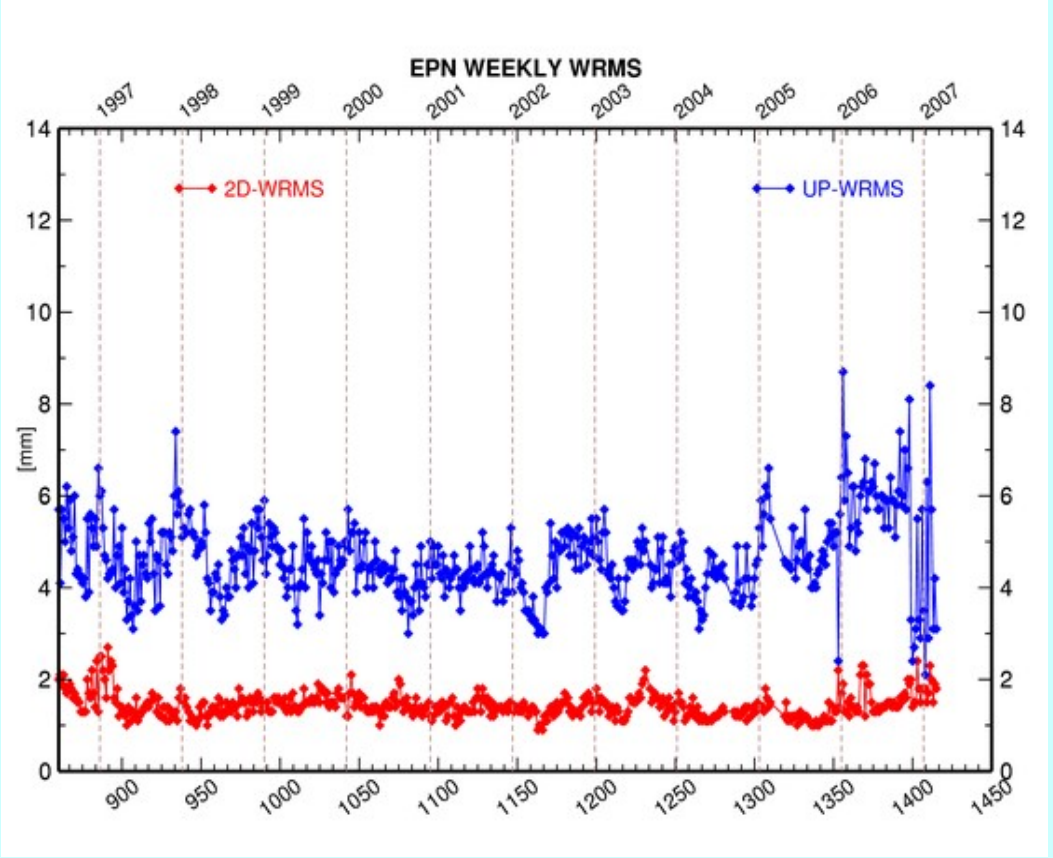
QUALITY INDICATOR OF THE WEEKLY COMBINED SOLUTIONS

CLEANED COMBINATION UP TO

WK1400



WK1415



REL ABS PCV TRANSITION: OFFSETS IN THE TIME SERIES

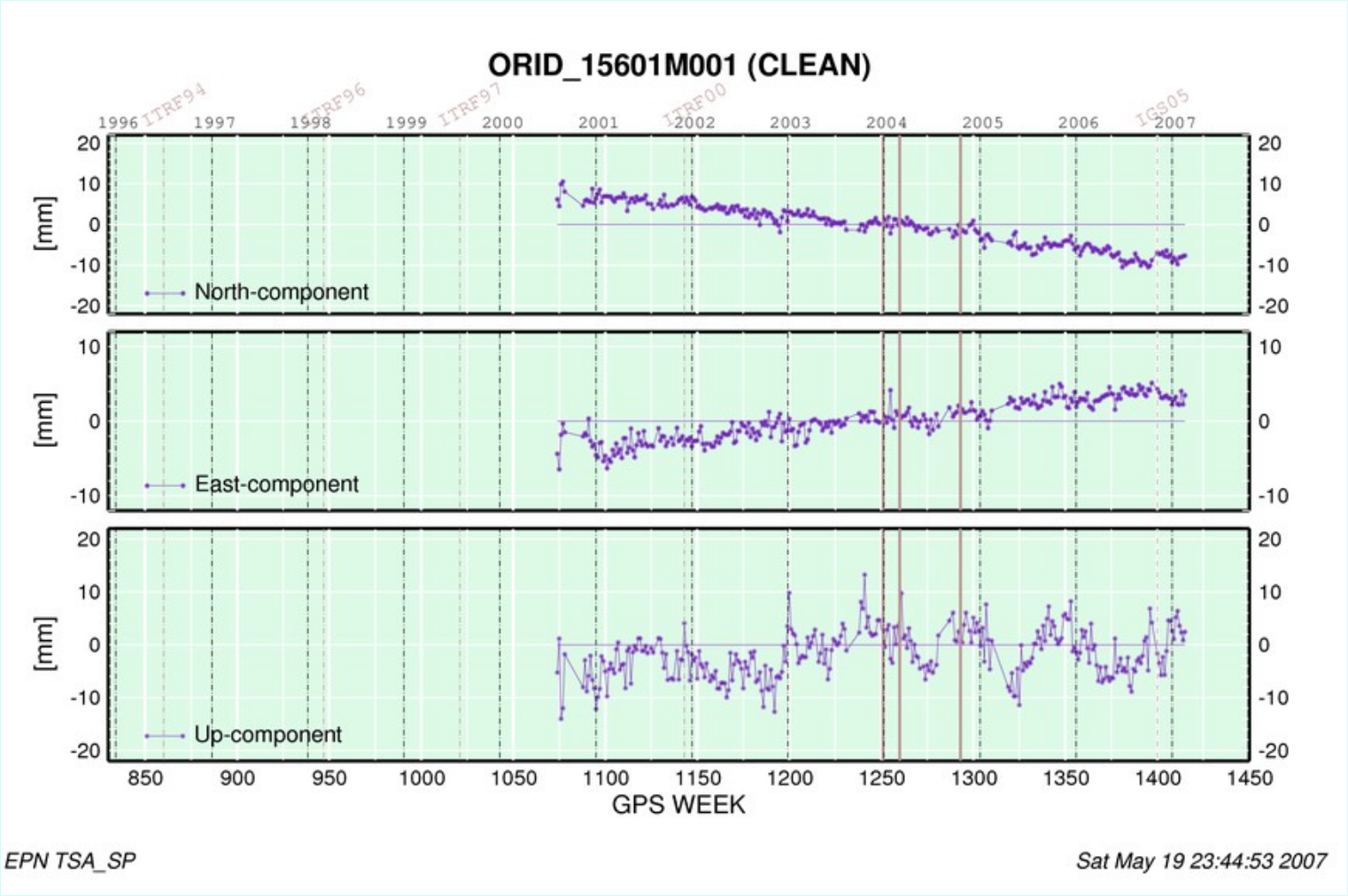
ONLY ROUGH ANALYSIS POSSIBLE DUE TO THE SHORT SERIES AVAILABLE

OFFSET STATISTICS SORTED BY ANTENNA/RADOME TYPES:

ANTENNA TYPE	RADOME TYPE	ALL/FITTING SITES	N	E	U
			mean offset at GPSwk 1400		
AOAD/M_T	ANY	25/22	✓	✓	✓
ASH700936A_M	ANY	5/4	✓	✓	✓
ASH700936D_M	ANY	7/6	~	-	>+10 mm
ASH700936[BC]_M	NONE	11/10	✓	✓	✓
ASH700936C_M	SNOW	5/5	~	~ 3 mm	>+10 mm
ASH700936E_M	SCIS	5/5	~	~ 3 mm	>+10 mm
JPSREGANT_DD_E	NONE	2/2	3	-3	> +10 mm
ASH701946.2	SNOW	3/3	✓	✓	✓
LEIAT504	LEIS	12/?	~	-	12/4 – 5 mm
TPSCR3_GGD	CONE	5/4	✓	✓	✓
TRM29659.00	NONE	41/29	✓	✓	✓
TRM29659.00	UNAV	5/5	-5 mm	> -5 mm	10 mm
TRM29659.00	TCWD	6/4	~	-5 mm	10 mm
TRM41249.00	NONE	5/5	5 mm	-	✓

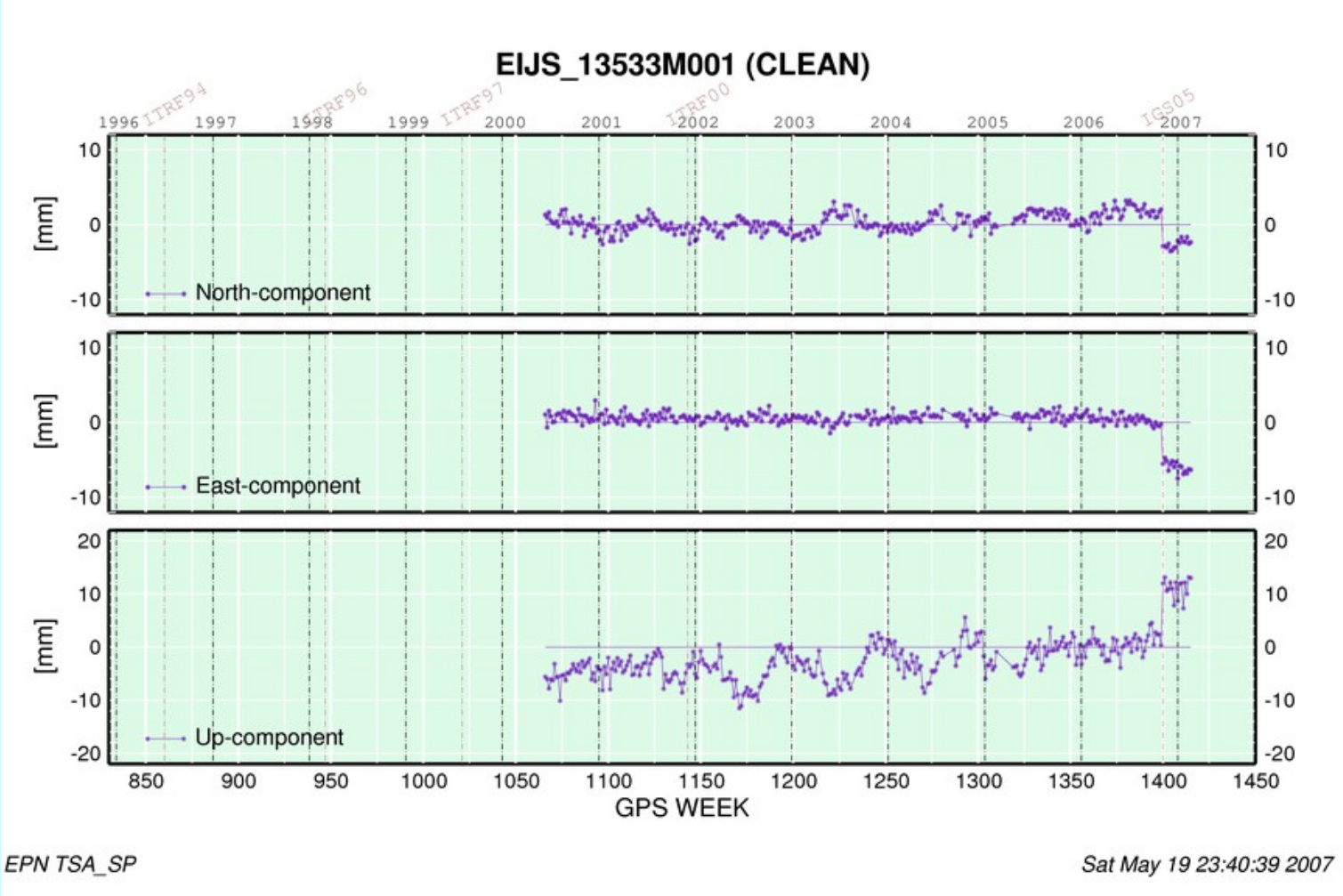
AOAD/M_T

25/22 ARE OK – EXCEPTIONS DUE TO LOCAL PROBLEMS?



TRM29659.00_UNAV

5/5 (DELF,TERS, EIJS, LINZ, TUBI)



RE-PROCESSING

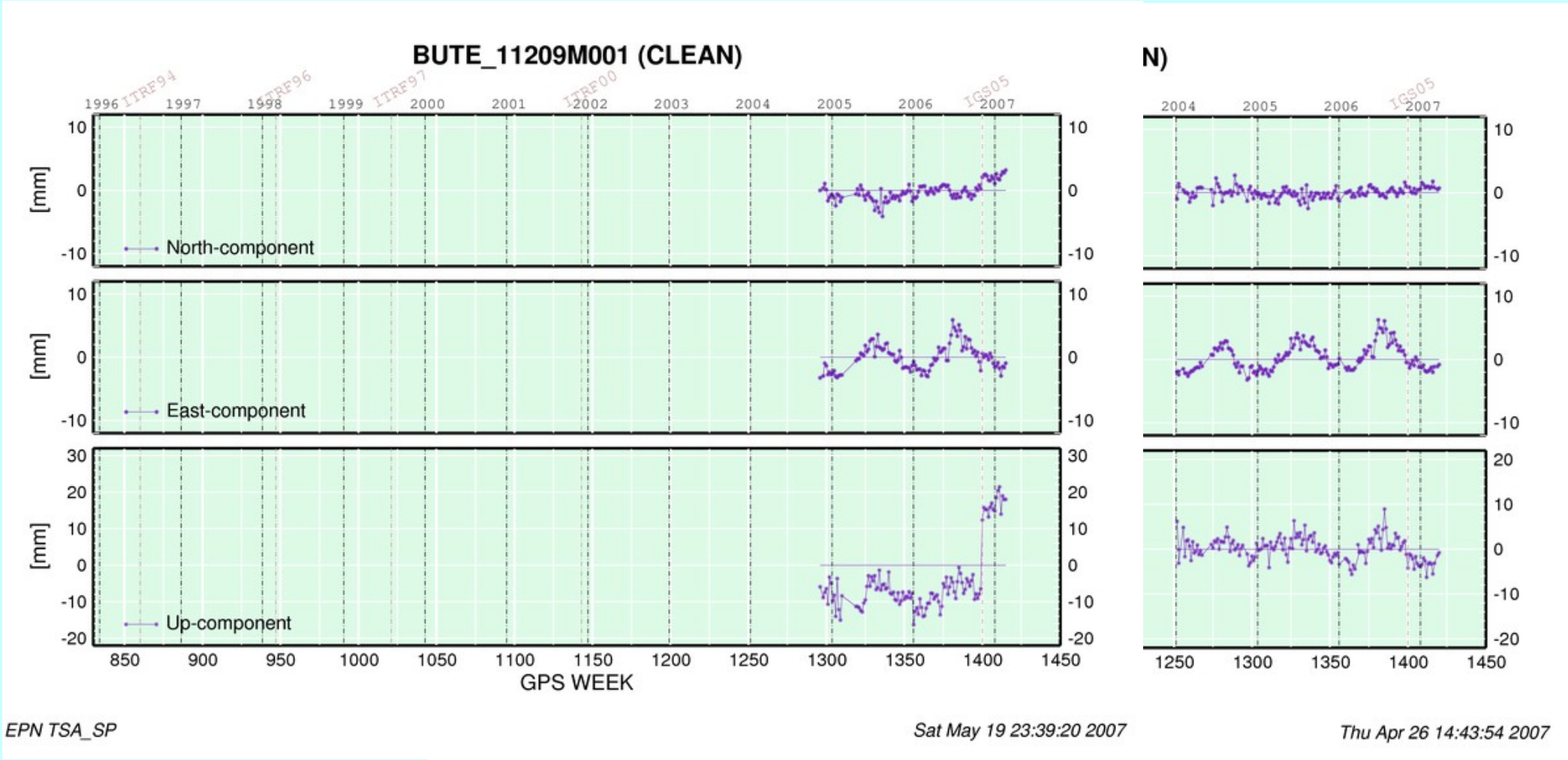
EXPECTATIONS

MORE CONSISTENT TIME SERIES

- CONSISTENT ORBIT, PCV
- LESS AND SMALLER OFFSETS
- SMALLER RMS SCATTER
- DECREASED SEASONAL VARIATION

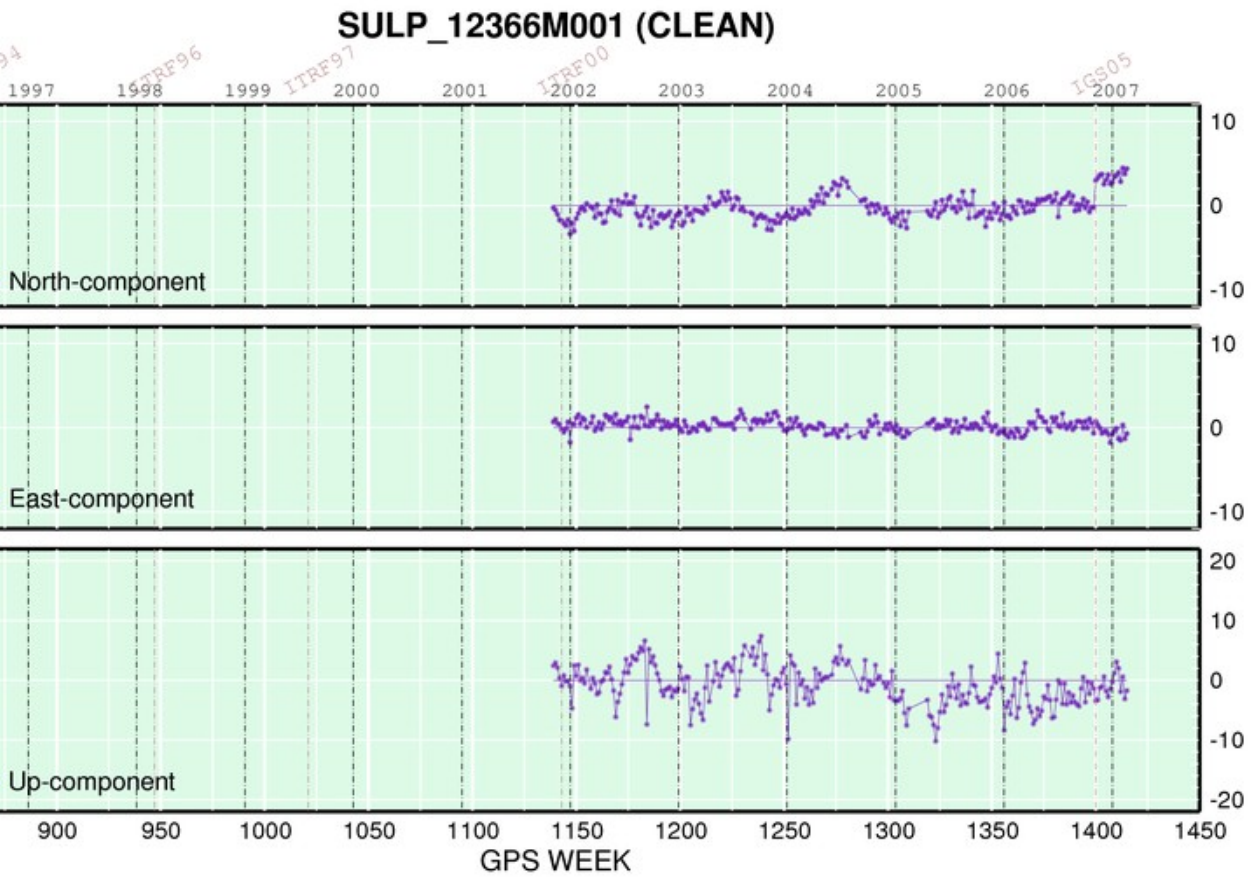
RE-PROCESSING EXAMPLES

BUTE (TRM33429.20 TCWD)



RE-PROCESSING EXAMPLES

SULP (TRM33429.20 NONE



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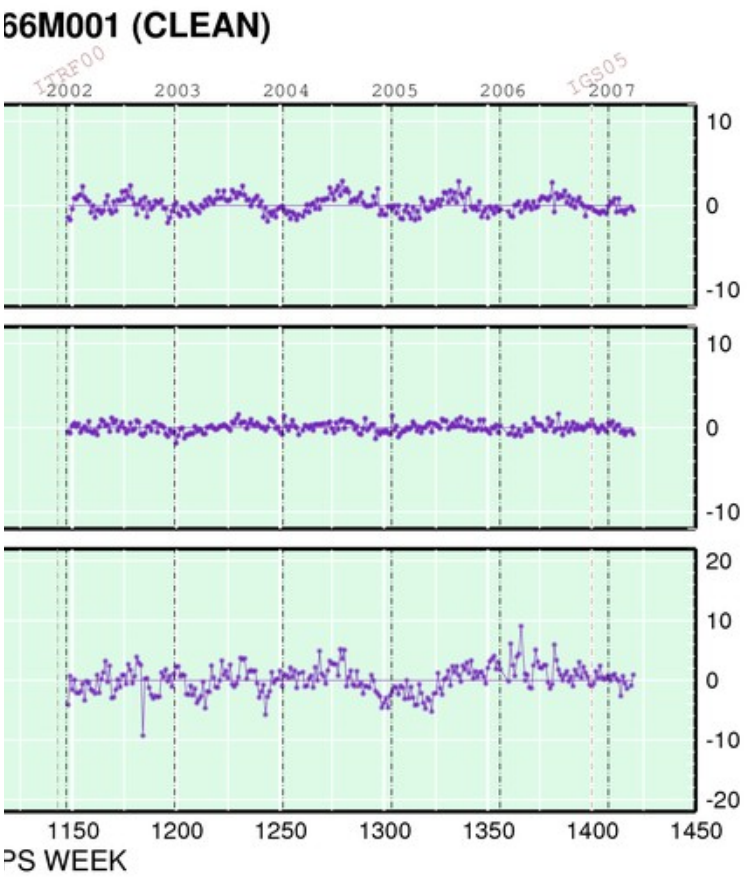

Thu Apr 26 14:45:25 2007

SUMMARY

- NEW EPN_TSA WEB PAGES
  - UP-TO-DATE RESULTS, NOISE AND HARMONIC ANALYSIS
  - OFFICIAL COORDINATE AND VELOCITY SOLUTION
- CUMULATIVE SOLUTION QUALITY MEASURES
- ANALYSIS OF THE REL-ABS PCV CHANGE
  - ANTENNA/RADOME DEPENDENT OFFSETS
- RE-ANALYSIS: LIMITED VALIDITY RESULTS
  - SMOOTHER TIME SERIES (ESP. UP COMPONENT)
  - SEASONAL TERM REMAINS IN N,E COMP.