ROB

IAG WG "Integration of Dense Velocity Fields in the ITRF" Future EUREF contribution

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with contributions of
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Acknowledgement Q. Baire

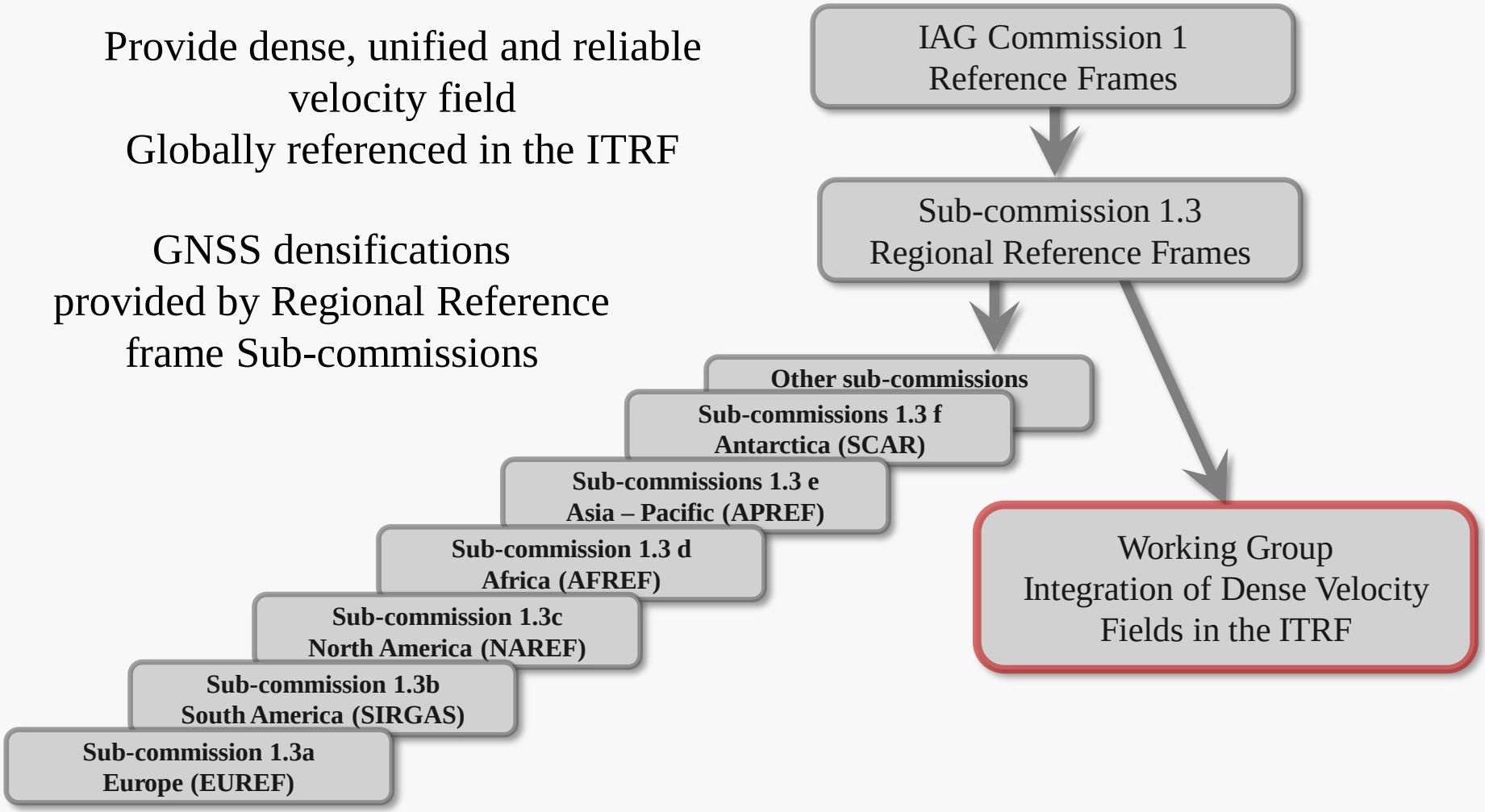
EUREF LAC WORKSHOP 2013

Session : Reports from EPN Coordination Group and EUREF TWG

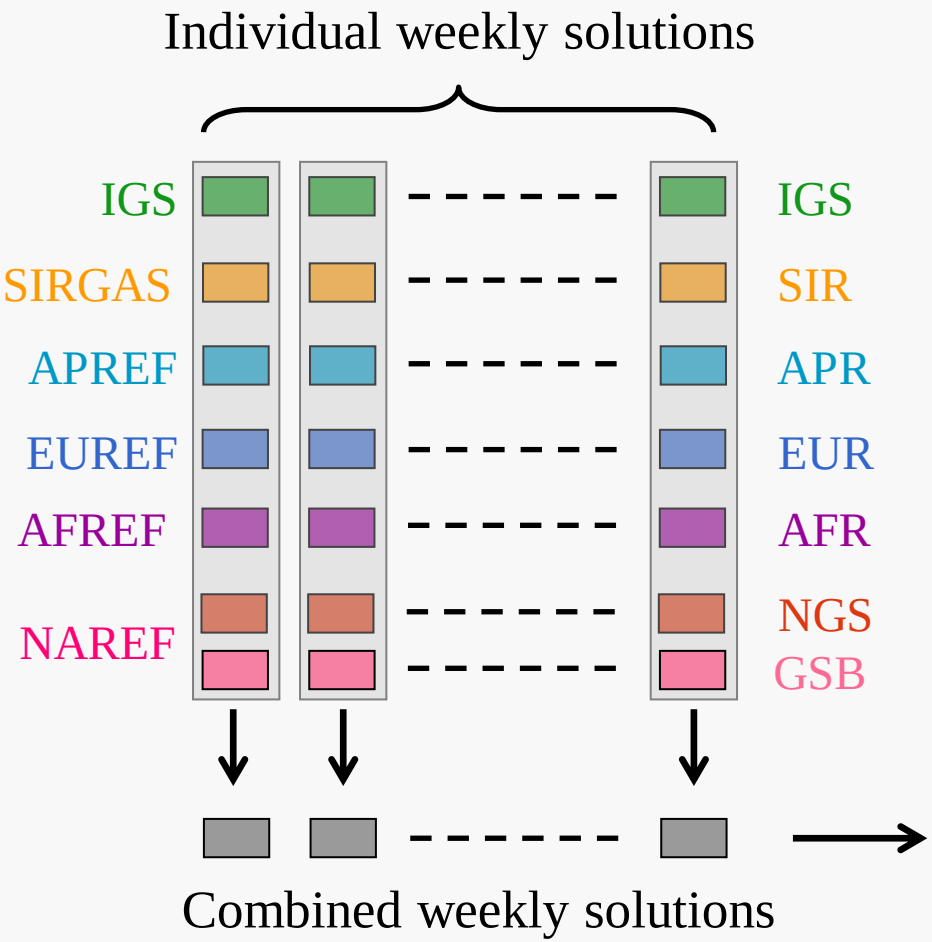
COOPERATIVE APPROACH
IAG REGIONAL REFERENCE FRAME SUB-COMMISSIONS

Provide dense, unified and reliable velocity field
Globally referenced in the ITRF

GNSS densifications provided by Regional Reference frame Sub-commissions



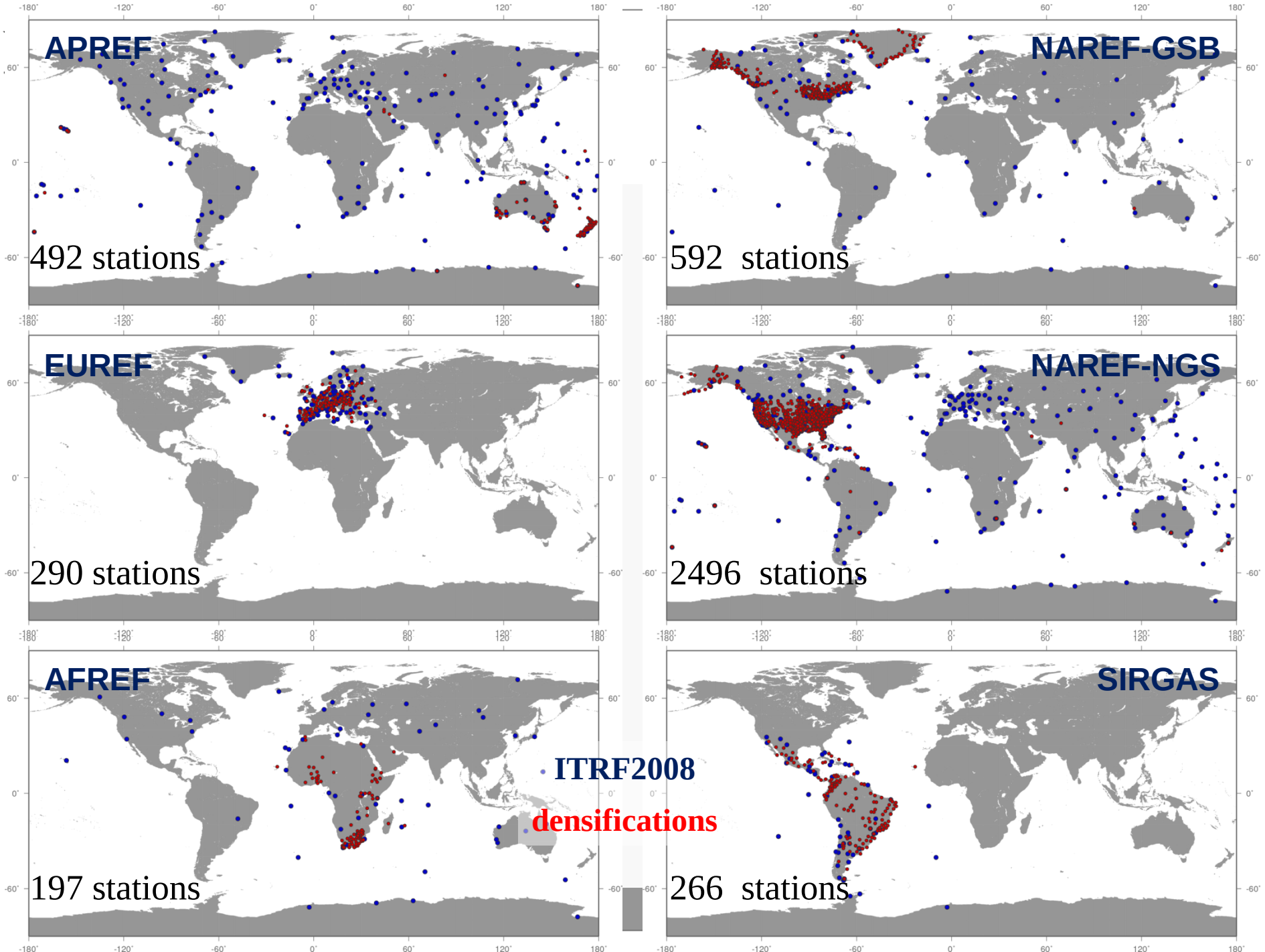
WEEKLY COMBINATIONS

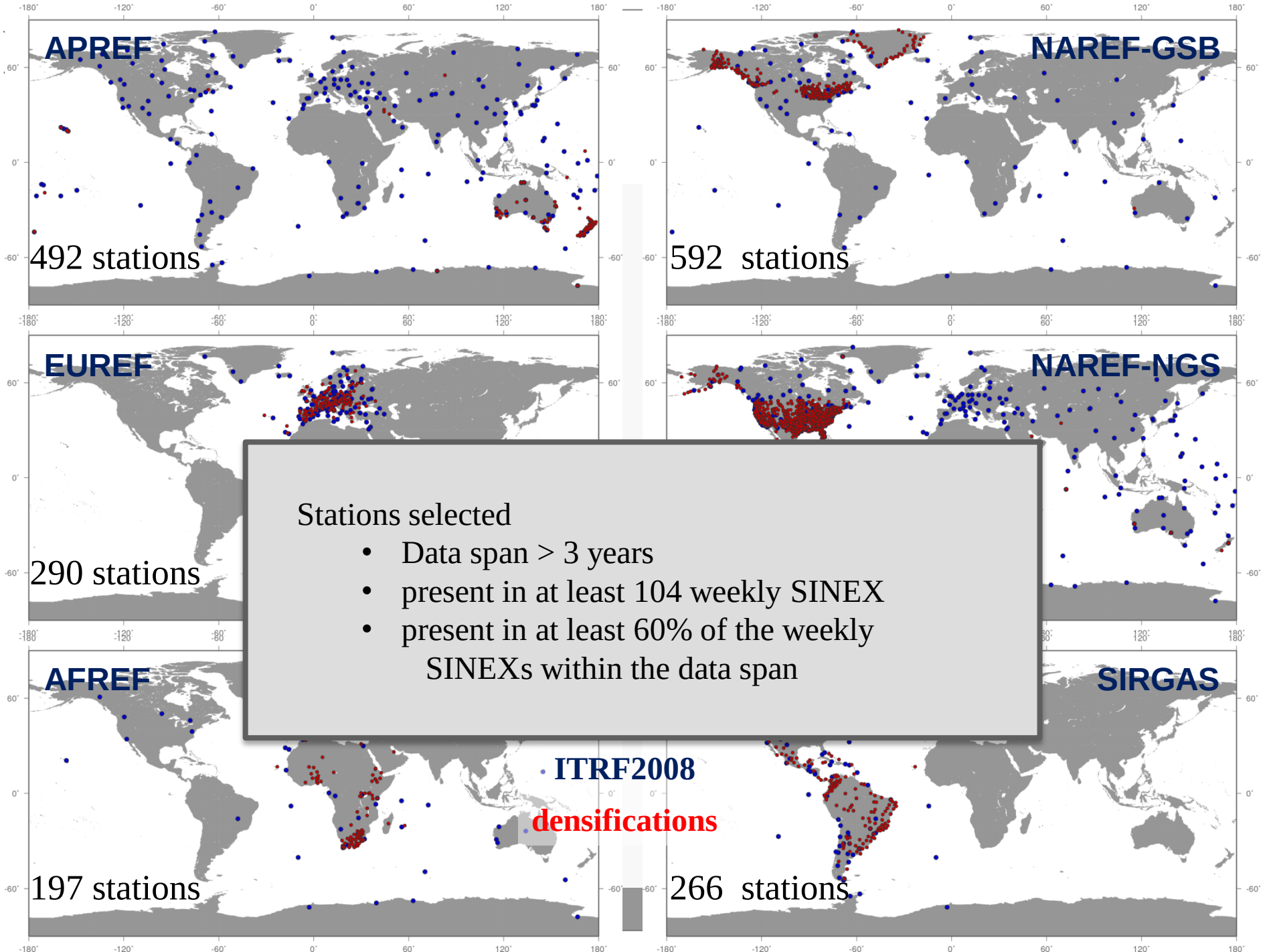


Individual ACs submit:

- cleaned weekly SINEXs
- cumulative solution and time series
- discontinuities
- station site logs (if available)

Cumulative solution aligned to ITRF (Stacking of weekly combined SINEX)

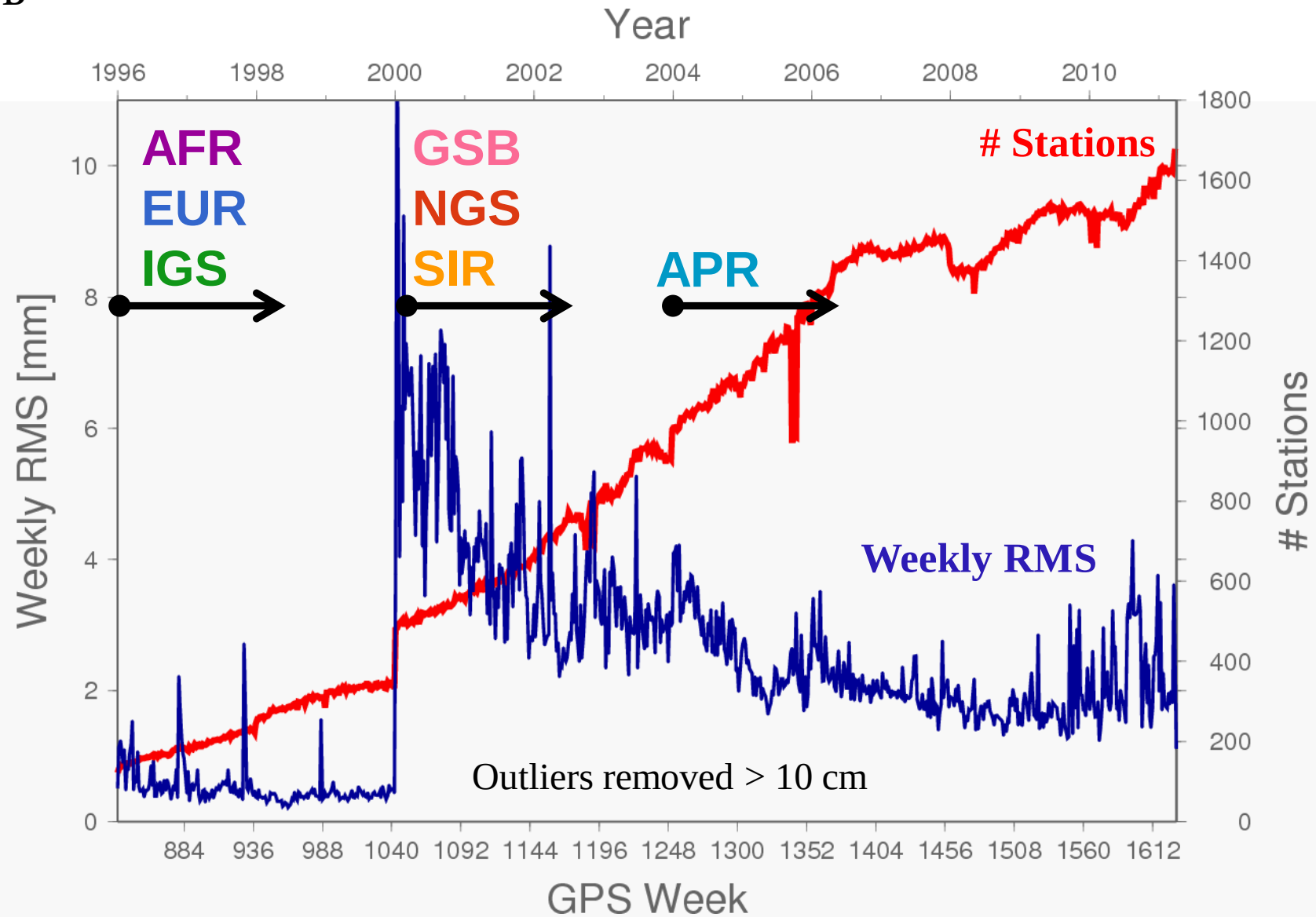

APREF
492 stations
NAREF-GSB
592 stations
EUREF
290 stations
NAREF-NGS
2496 stations
AFREF
197 stations
SIRGAS
266 stations
ITRF2008
densifications



Stations selected

- Data span > 3 years
- present in at least 104 weekly SINEX
- present in at least 60% of the weekly SINEXs within the data span

Weekly Combination RMS



INCONSISTENCIES

- Disagreement at one station

  ➡ Rejection of the “incorrect” solution

- Check the reason of the inconsistencies

- Main reasons of inconsistencies
  - Inconsistent antenna modeling
  - Incorrect meta data (antenna/radome type, eccentricities)

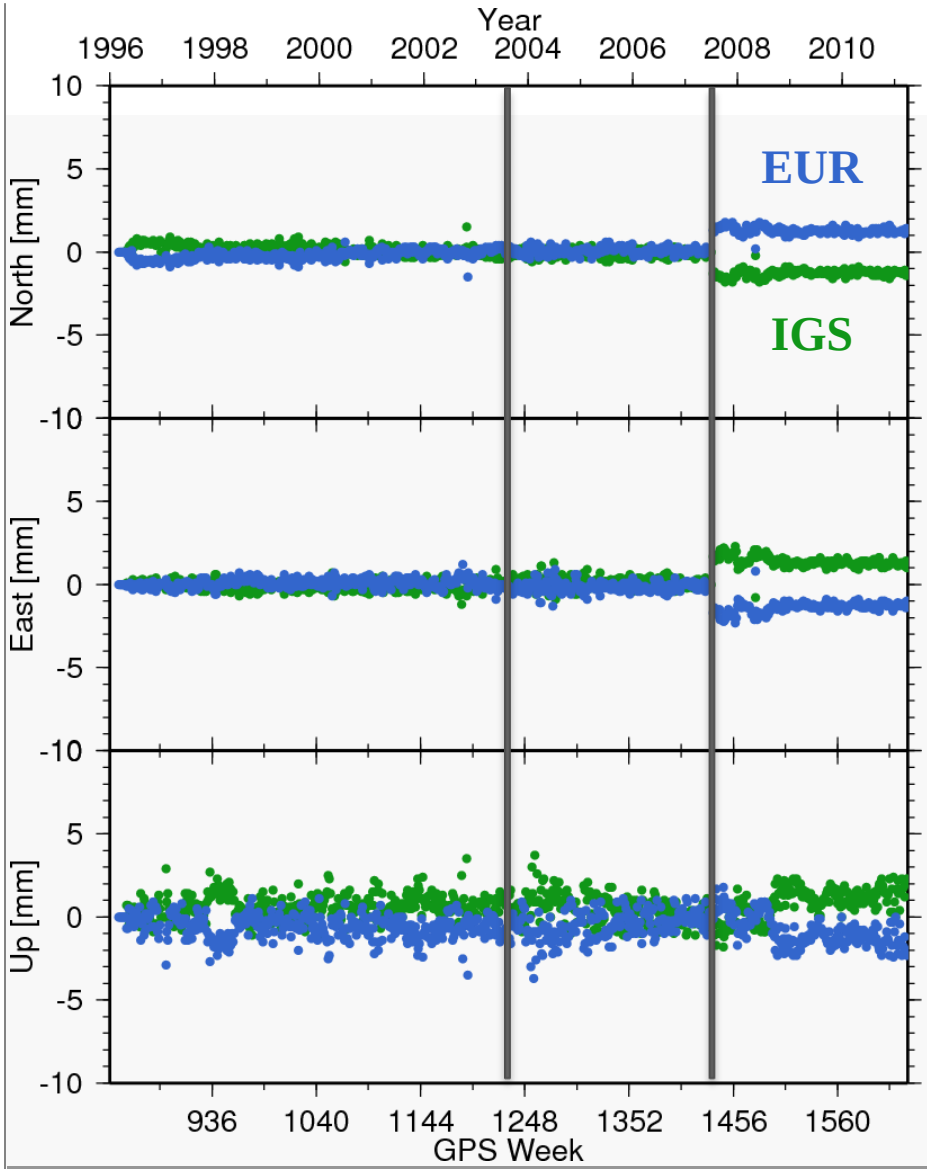
ANTENNA MODELING

	Data span (year)	Antenna calibrations	Antenna calibrations from 2011.3
IGS	1996.0-2011.3	igs05.atx	igs08.atx
AFREF	from 1996.0	igs08.atx	
APREF	from 2004.0	igs08.atx	
EUREF	1996.0-2011.3	igs05.atx + indiv	igs08.atx + indiv
NAREF	2000.0-2011.3	igs05.atx	igs08.atx
	2000.0-2011.3	igs05.atx	igs08.atx
SIRGAS	2000.0-2011.3	igs05.atx	igs08.atx

Antenna Modeling: mitigation

- Do nothing or reject station/solution pair
- Apply position offsets coming from PPP estimations:
  - igs05.atx vs igs08.atx
    - Estimated offsets from Rebischung et al. (2011) (only some IGS stations)
    - Model Rebischung et al. (2011) (antenna/radome type in igs08.atx)
    - Estimated offsets from Baire et al. (2011, in preparation) (only EPN)
  - Individual calibrations vs igs05.atx/igs08.atx
    - Estimated offsets from Baire et al. (2011, in preparation) (only EPN)

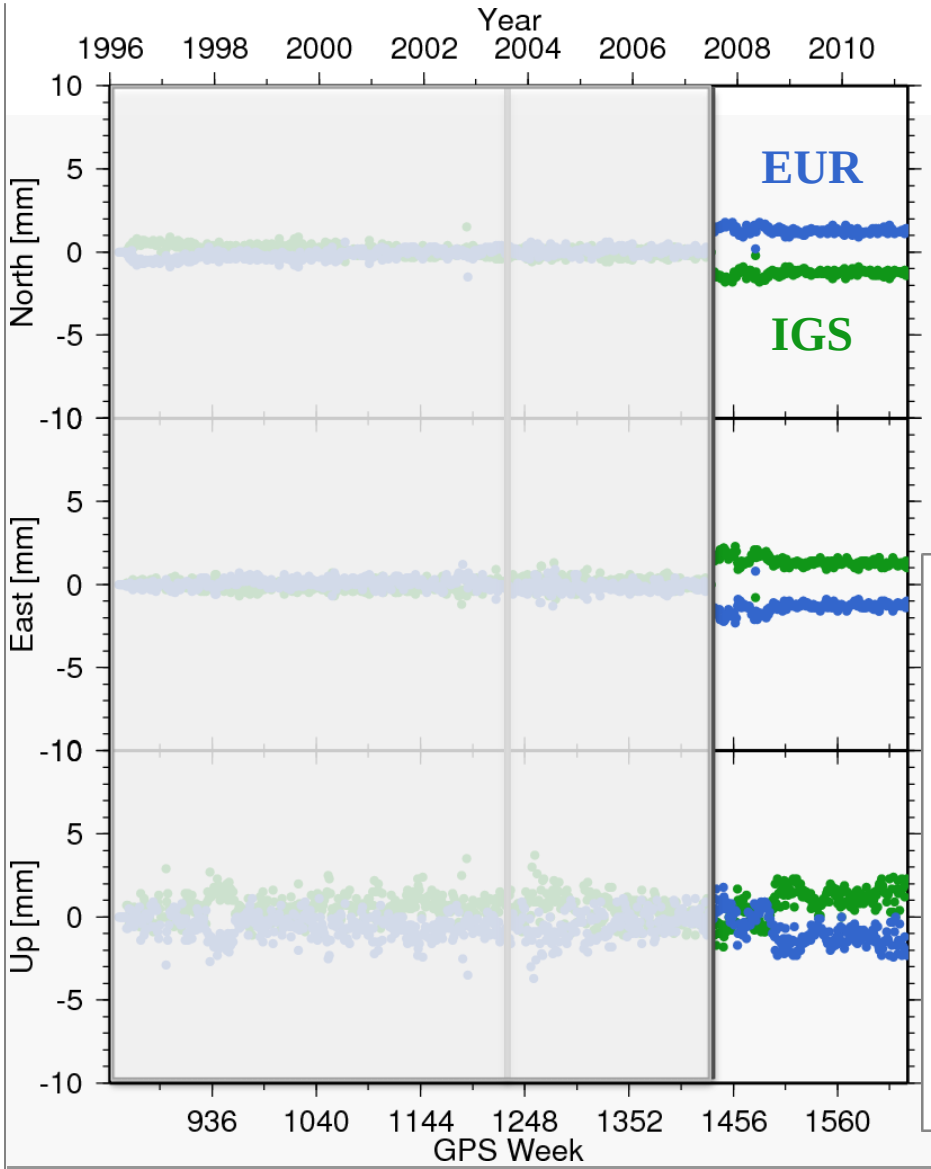
INDIVIDUAL CALIBRATIONS IN EPN



PENC

(Penc, Hungary)

INDIVIDUAL CALIBRATIONS IN EPN



PENC

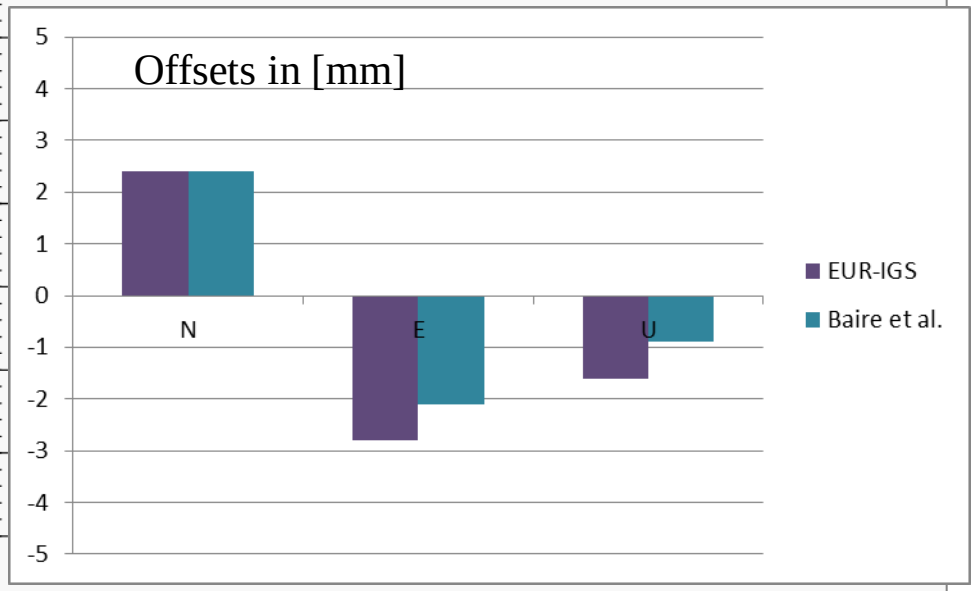
(Penc, Hungary)

after 2007/194

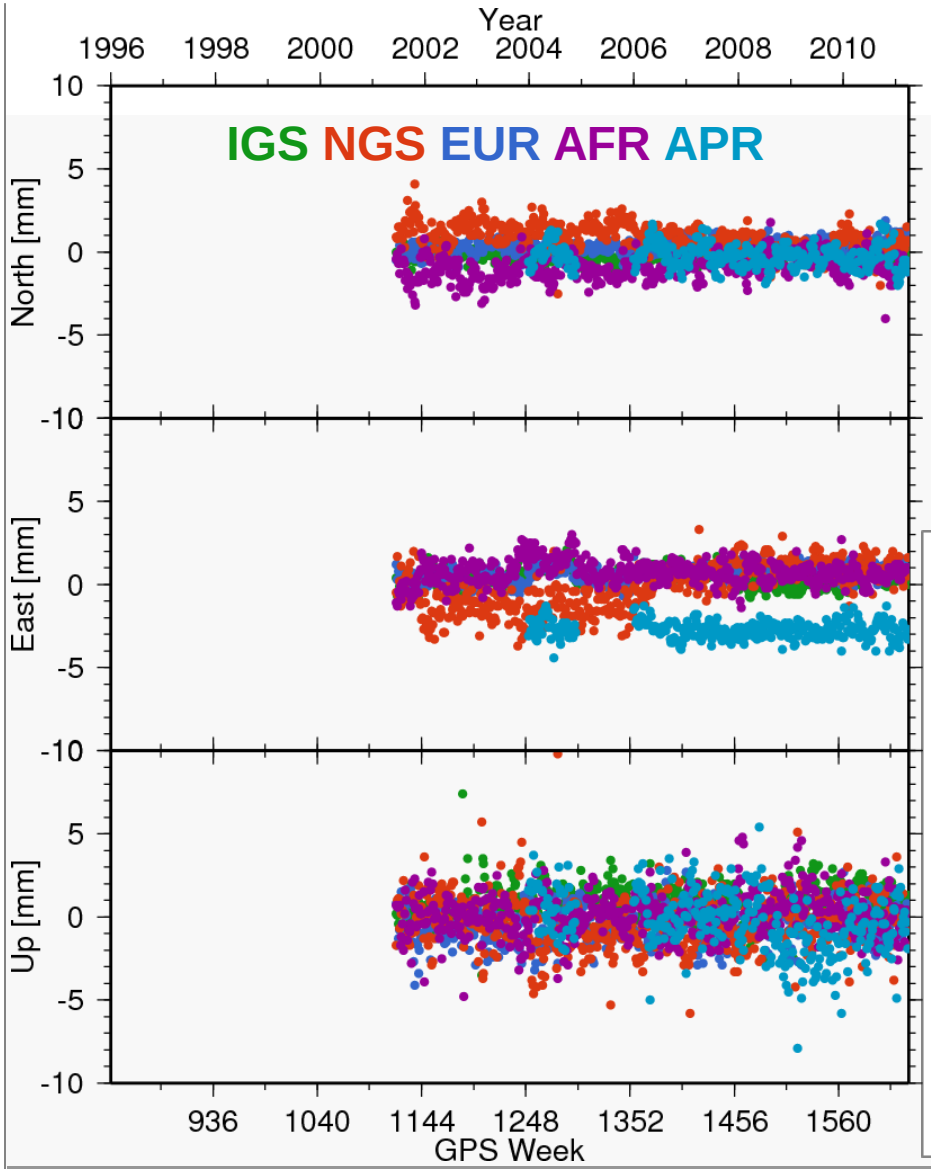
LEIAT504GG LEIS

EUR indiv

IGS igs05.atx



IGS05.ATX VS IGS08.ATX CALIBRATIONS



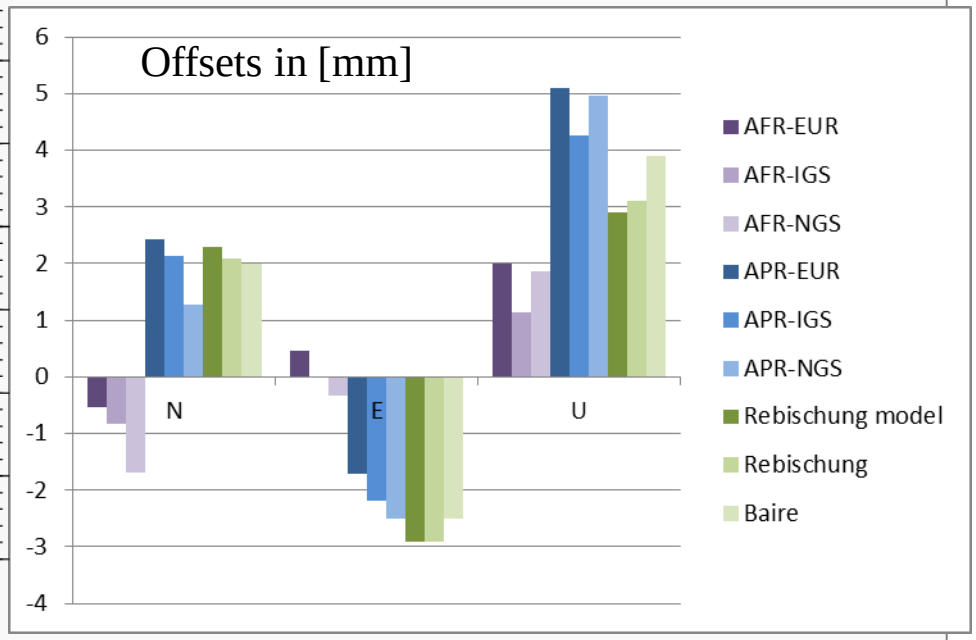
POLV

(Poltava, Ukraine)

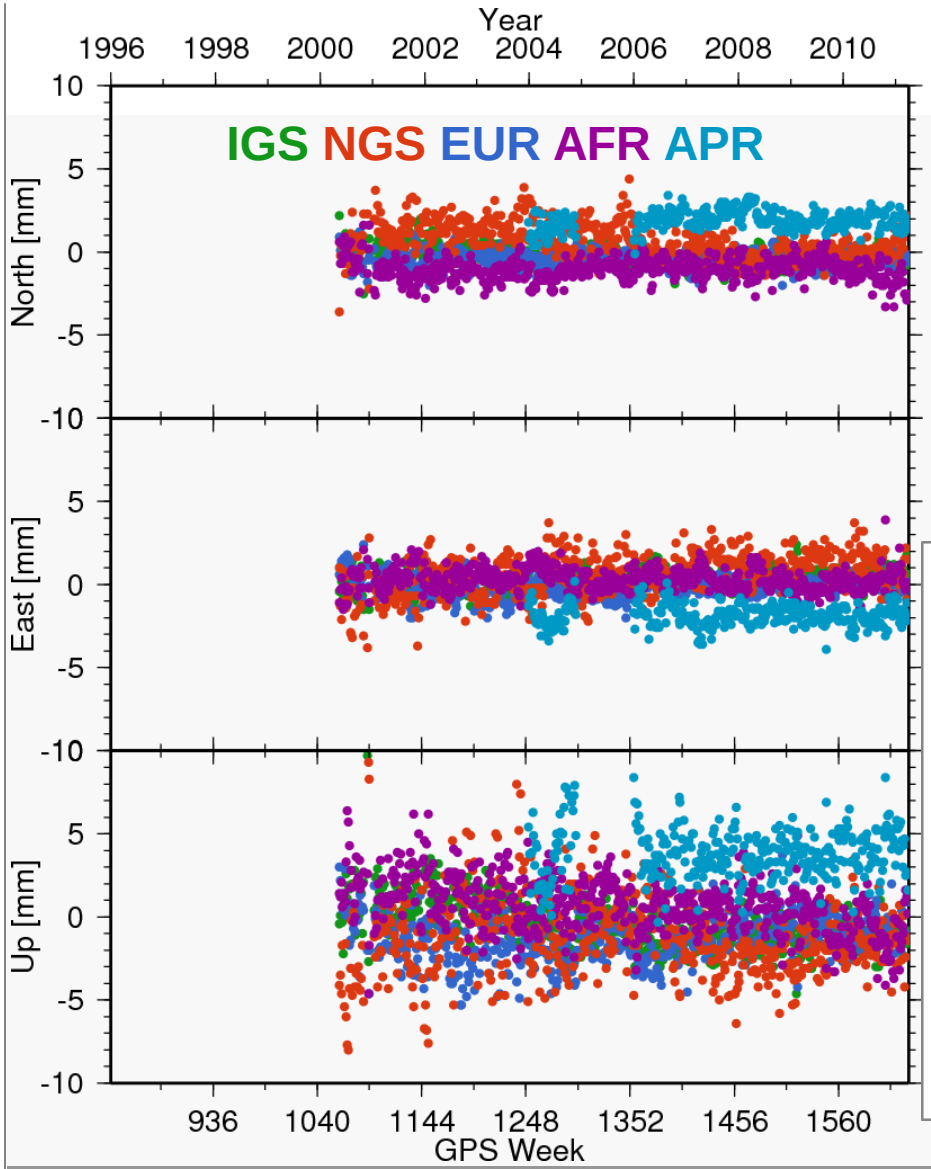
TRM29659.00 NONE

IGS NGS EUR igs05.atx

AFR APR igs08.atx



IGS05.ATX VS IGS08.ATX CALIBRATIONS



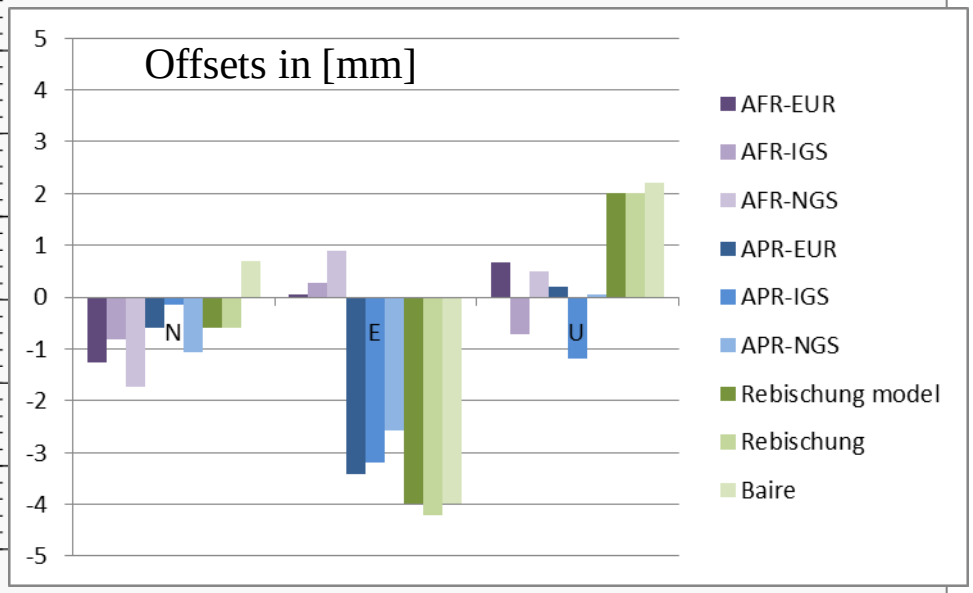
RABT

(Rabat, Morocco)

TRM29659.00 SCIS

IGS NGS EPN igs05.atx

AFR APR igs08.atx



ANTENNA MODELING: MITIGATION ??

- Offsets coming from PPP estimations

  (Values or Rebischung et al. model)

  - Not miraculous
  - Can not be applied blindly !
  - depends on the solutions
  - depends on the stations

Need accurate information (in the SINEX) concerning antenna/radome type used in the analysis

META DATA & ANALYSIS

Site Log

RINEX

META DATA & ANALYSIS

Site Log

Ideal World

RINEX → Analysis → SINEX

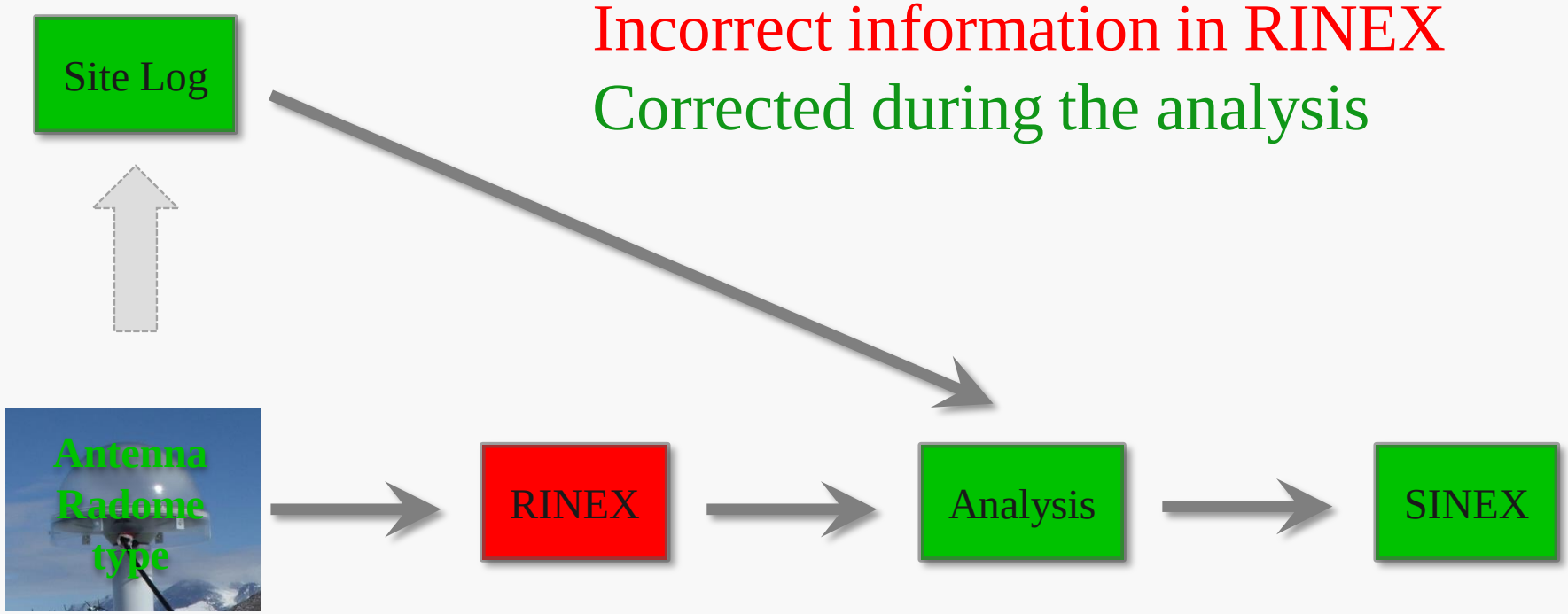
META DATA & ANALYSIS

Incorrect information in RINEX

Site Log

RINEX

META DATA & ANALYSIS



META DATA & ANALYSIS

Incorrect information in RINEX

Site Log

RINEX

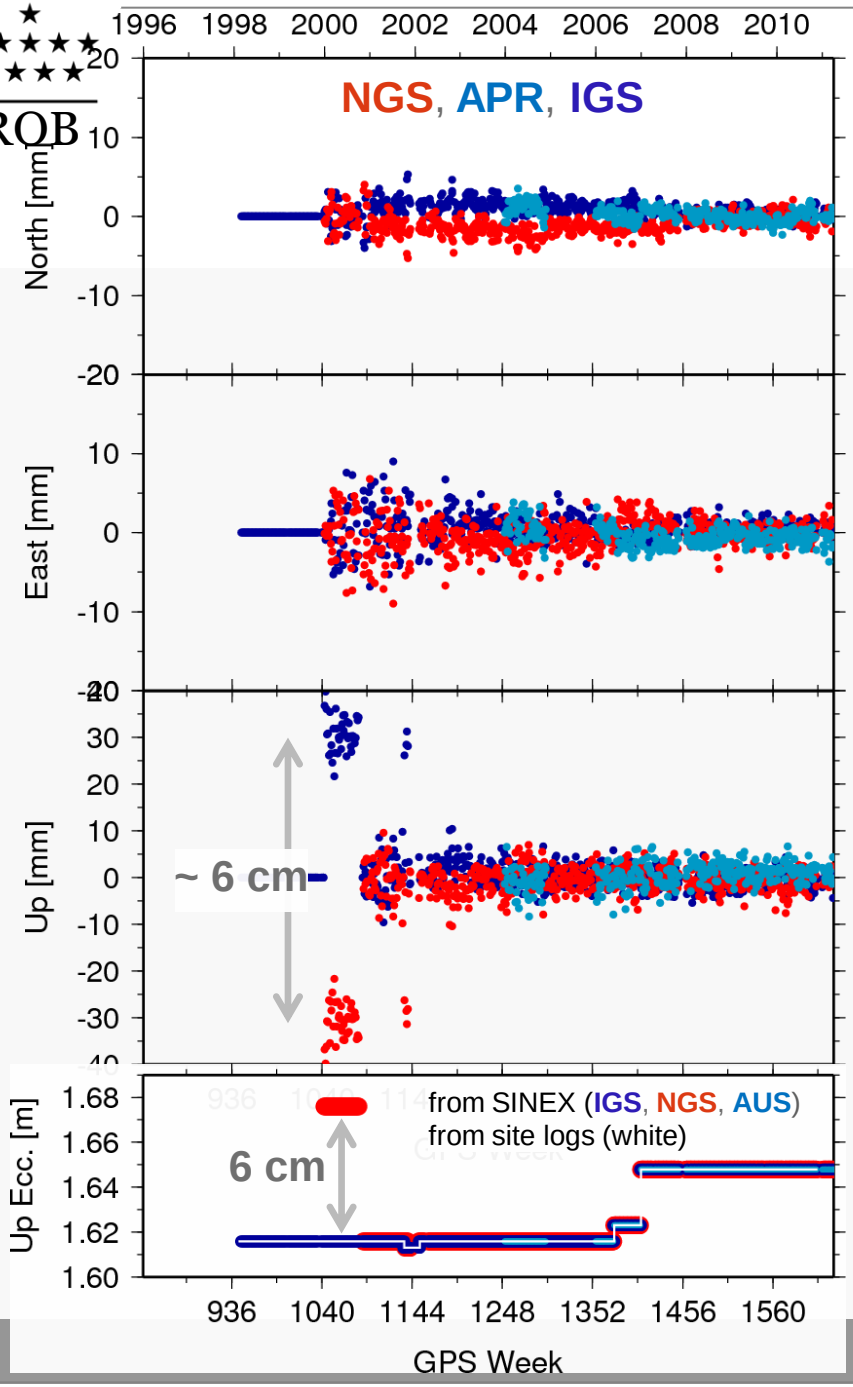
META DATA & ANALYSIS

Incorrect information in RINEX
Not Corrected during the analysis

Site Log

RINEX → Analysis → SINEX

INTER-AC DIFFERENCES



BAKO (Cibinong, Indonesia)

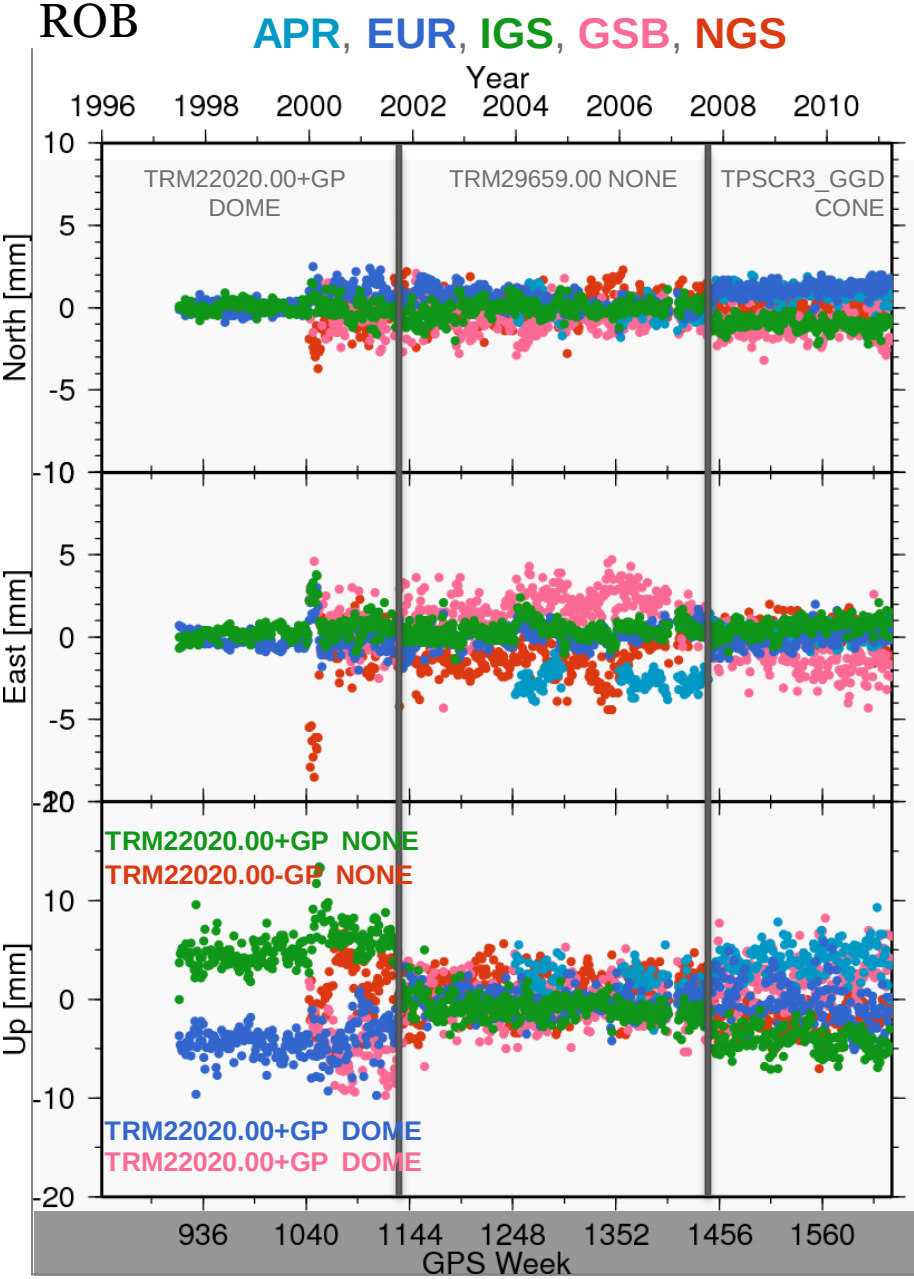
Disagreement between RINEX and site log

Incorrect antenna eccentricities in NGS SINEX

6 cm bias in the up component between NGS and IGS

Site log information (even if available) not used by all ACs

INTER-AC DIFFERENCES

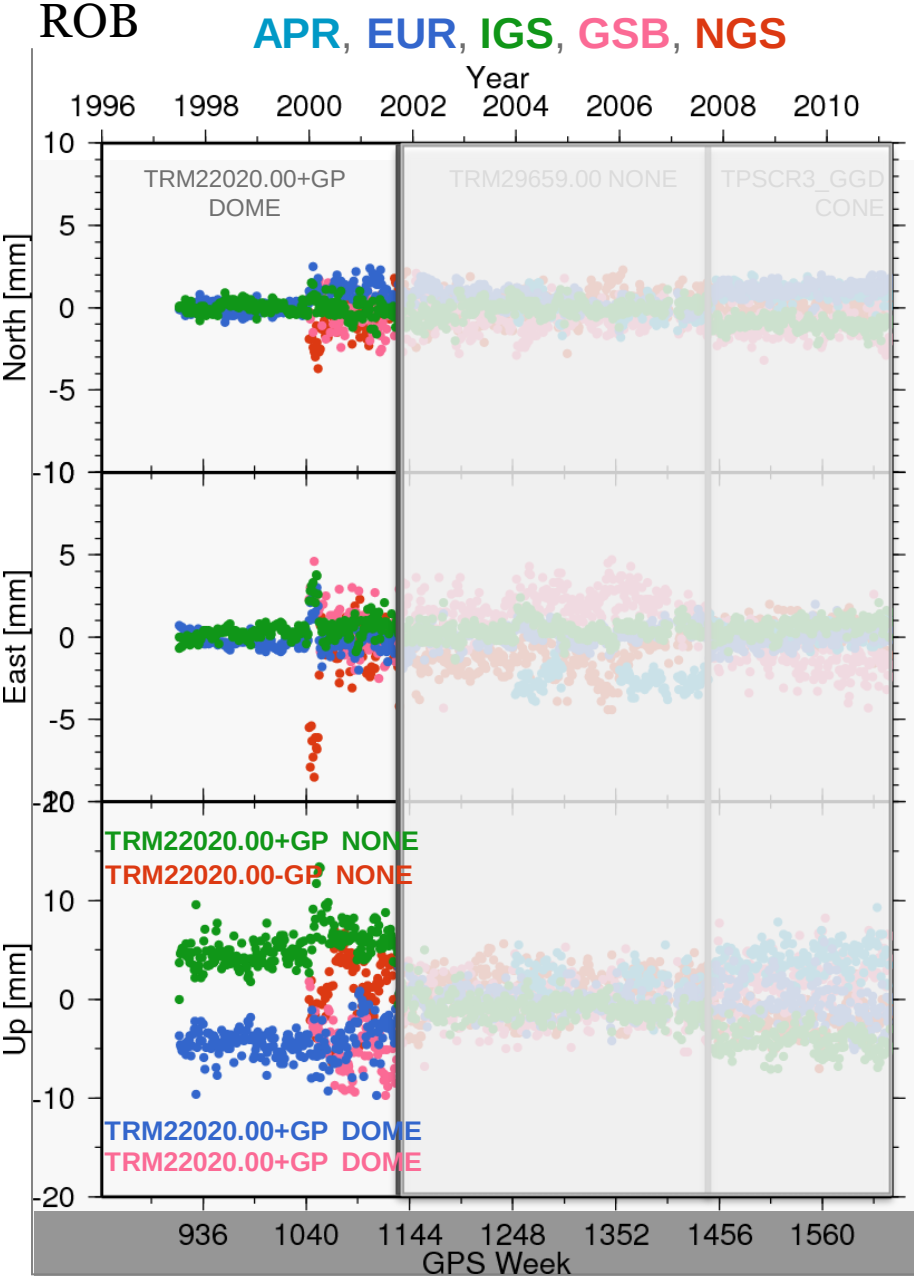


HOFN (Hoefn, Iceland)

According site log:

1997-05-27	2000-03-13	TRM22020.00+GP	DOME	0.0550
2000-03-13	2000-05-25	TRM22020.00+GP	DOME	0.0554
2000-05-25	2001-09-21	TRM22020.00+GP	DOME	0.0550
2001-09-21	2007-09-22	TRM29659.00	NONE	0.0510
2007-09-23		TPSCR3_GGD	CONE	0.0675

INTER-AC DIFFERENCES



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2000-05-25	2001-09-21	TRM22020.00+GP	DOME	0.0550
2001-09-21	2007-09-22	TRM29659.00	NONE	0.0510
2007-09-23		TPSCR3_GGD	CONE	0.0675

Metadata in SINEX:

- correct for IGS, EUR and GSB
- incorrect for NGS (TRM22020.00-GP NONE)

IGS biased wrt EUR and GSB

IGS more in agreement with NGS

Is IGS SINEX header consistent with the analysis?

META DATA & ANALYSIS

Incorrect information in RINEX

Site Log

RINEX

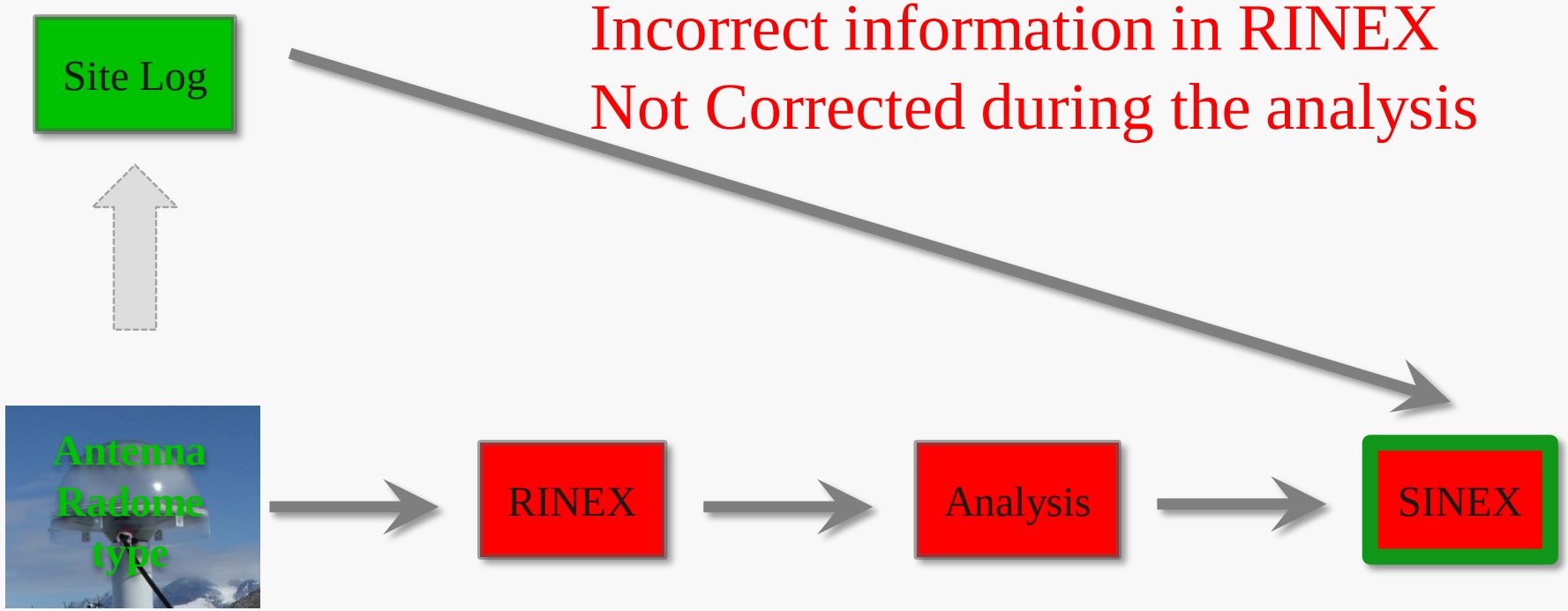
META DATA & ANALYSIS

Site Log

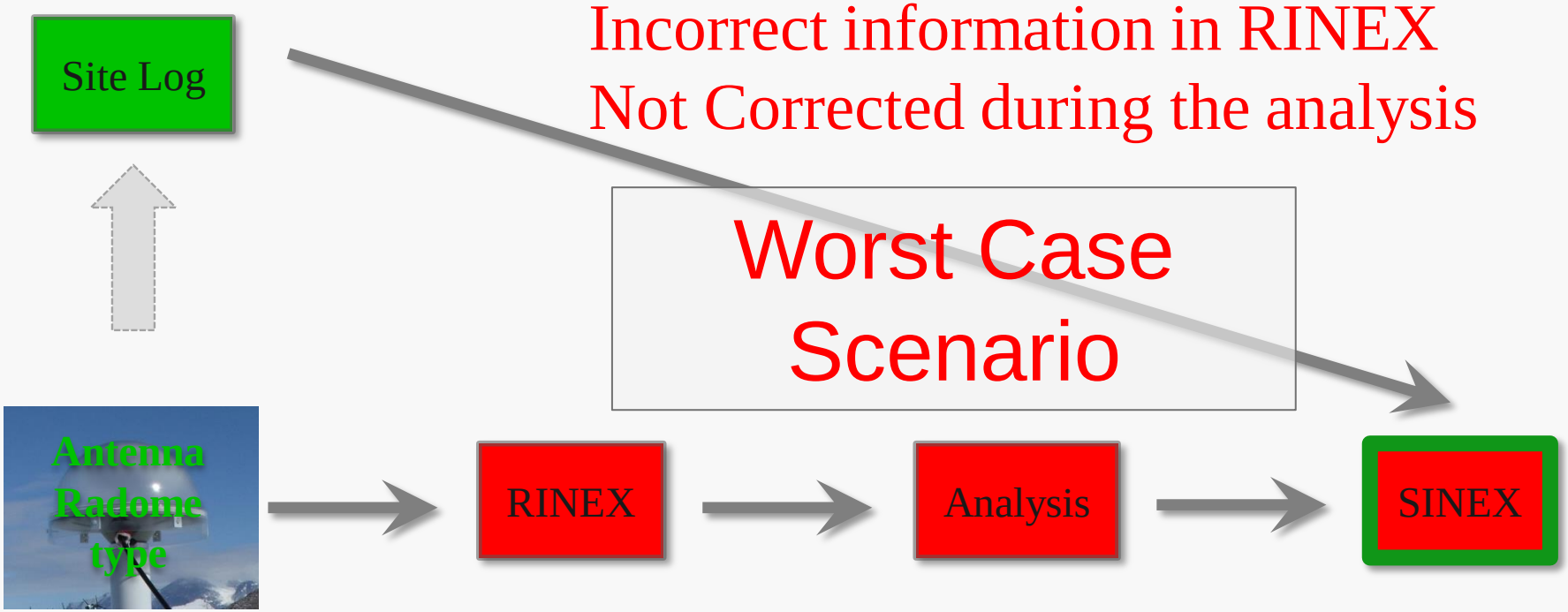
Incorrect information in RINEX
Not Corrected during the analysis

RINEX → Analysis

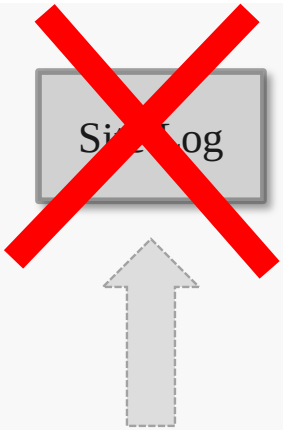
META DATA & ANALYSIS



META DATA & ANALYSIS



META DATA & ANALYSIS



No site log (>50%)

Incorrect information in site logs

Different information depending on the AC hosting the site log

No SINEX header

FUTURE

- Finalization of the current combination
  - Finalization of the weekly combinations
    - Inconsistent antenna modeling
      - Several position offset models available
        - Requires correct and available antenna meta data
        - Not satisfactory in some cases even degrades the agreement
      - Significant disagreements will be managed case by case
  - Stacking of the weekly combined solutions
    - Harmonization of the discontinuities
    - First dense velocity field ready for september?
- New combination using IGS Repro 2 and new submissions

FUTURE/RECOMMENDATIONS FOR NEW SUBMISSIONS

- IGS Repro2 compliant
  - Analysis strategy
  - igs08.atx mandatory
    - conversion using Rebischung et al. (2011) model is not allowed
    - Individual calibrations are allowed (EUREF!)
- Global network mandatory
- Representative/Correct metadata available in SINEX…

EXPECTED NEW SUBMISSIONS

	Solution expected	Network
IGS	Repro 2 spring 2014	Global
AFREF	fall 2013	Global
APREF	winter 2013	Global
NAREF - GSB	summer 2013 or summer 2014	Global
NAREF - NGS	summer 2014	Global
SIRGAS	autumn 2013	Global
EUREF	??	??

EPN only or EPN + densification (Kenyeres) ?