# Investigating HY2A radial offset for Precise Orbit Determination and Geodesy

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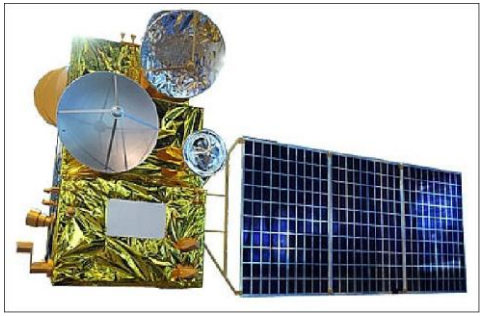
# OUTLINE

- Introduction
- Direct estimation (POD runs) – radial offset
  - Using phase center corrections from files
  - Computing phase center corrections
  - Comparing results from other satellites
- Indirect estimations (geodesy) – TRF scale
- Discussion
- Conclusions



# HY2A satellite

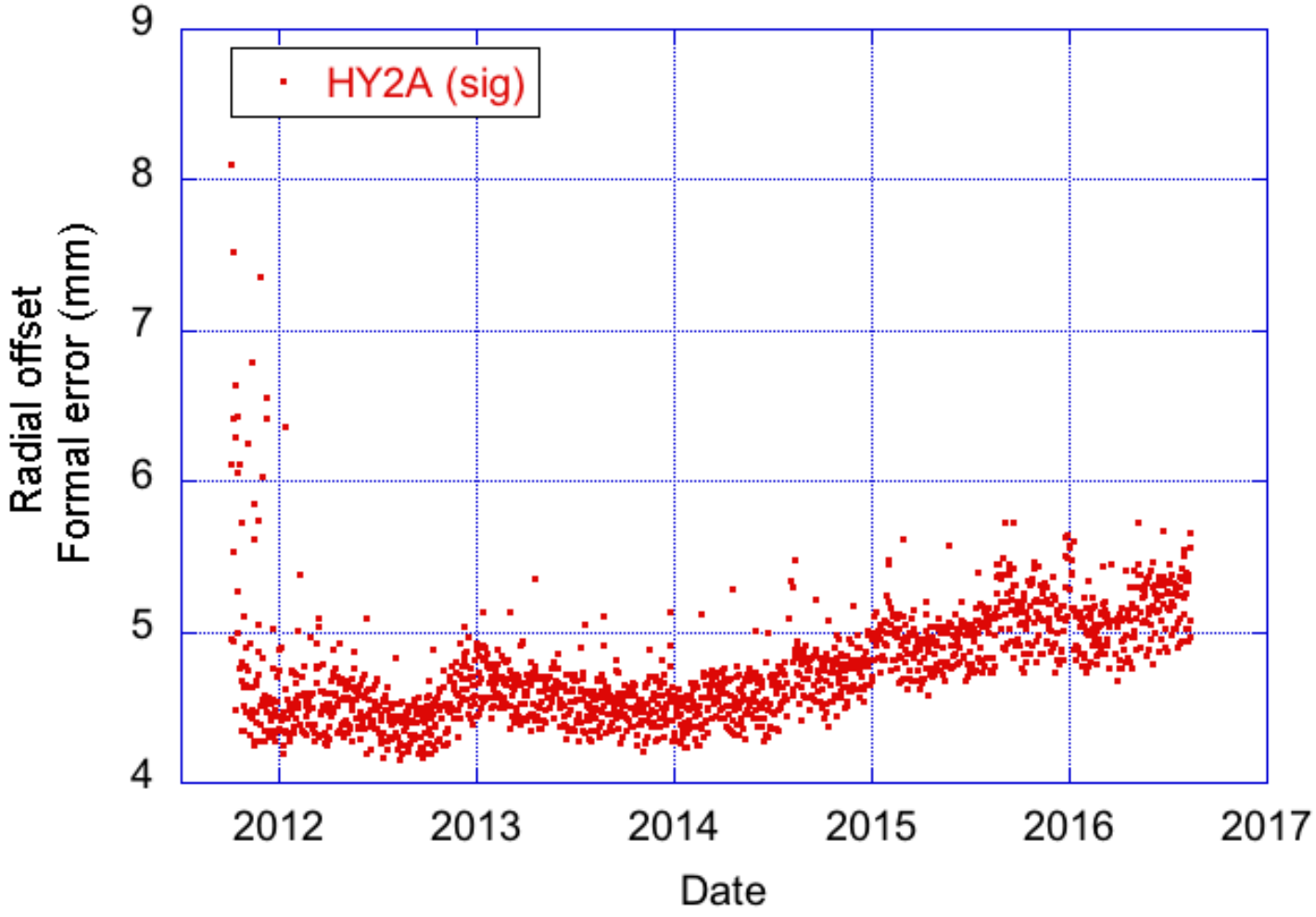
Vector: origin of the frame → center of phase of the DORIS antenna (R, X, Y)

- a priori value (this study)
- time evolution
- orientation in space (attitude)

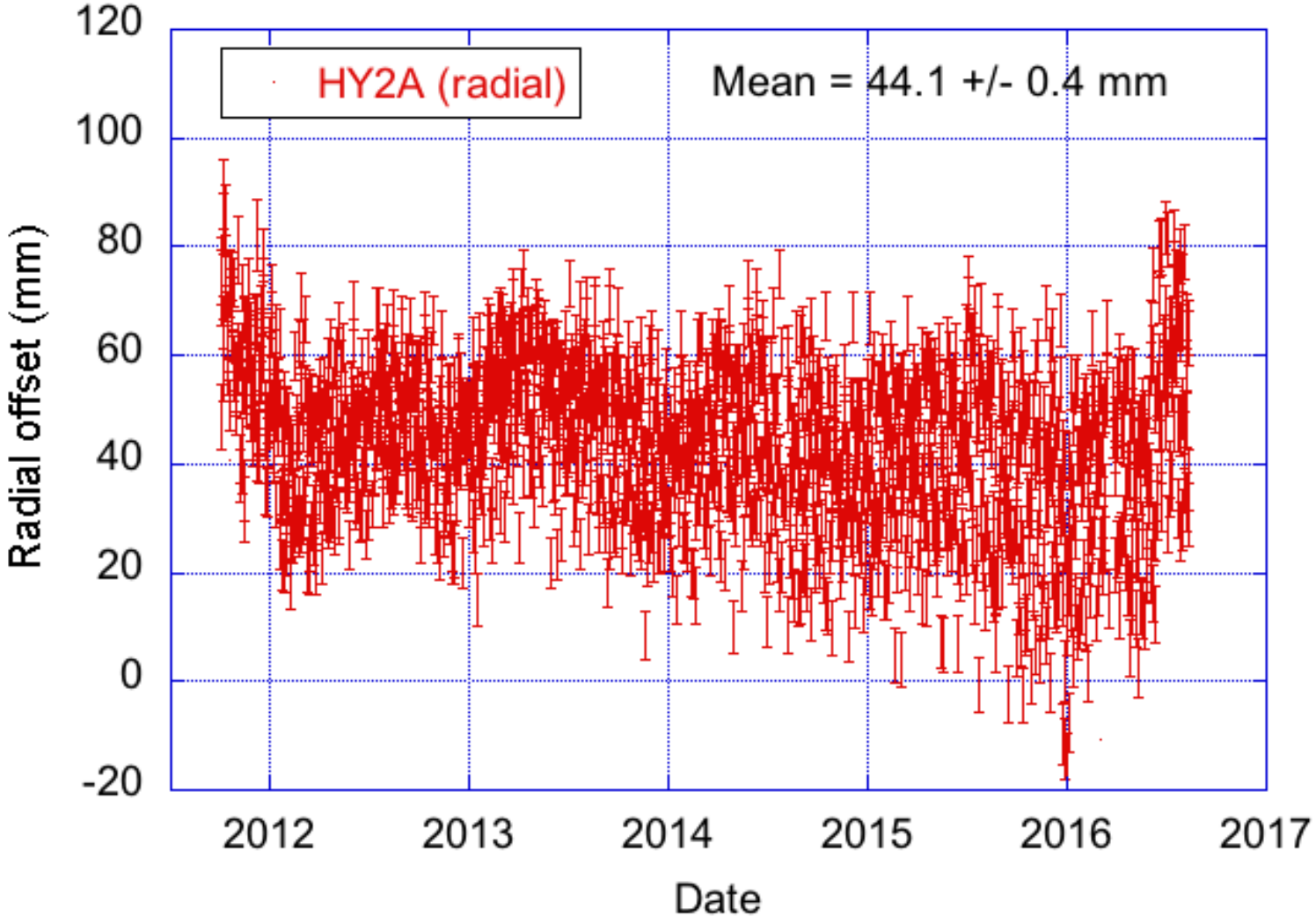
# Data processing

- POD runs
  - Daily runs
  - Station coordinates fixed (DPOD2008 v1.13)
  - No opr empirical accelerations (dynamic modelling)
- Geodetic runs
  - Daily runs
  - Orbit and station coordinates estimation
  - Weekly combinations
  - Projection/transformation using internal frame

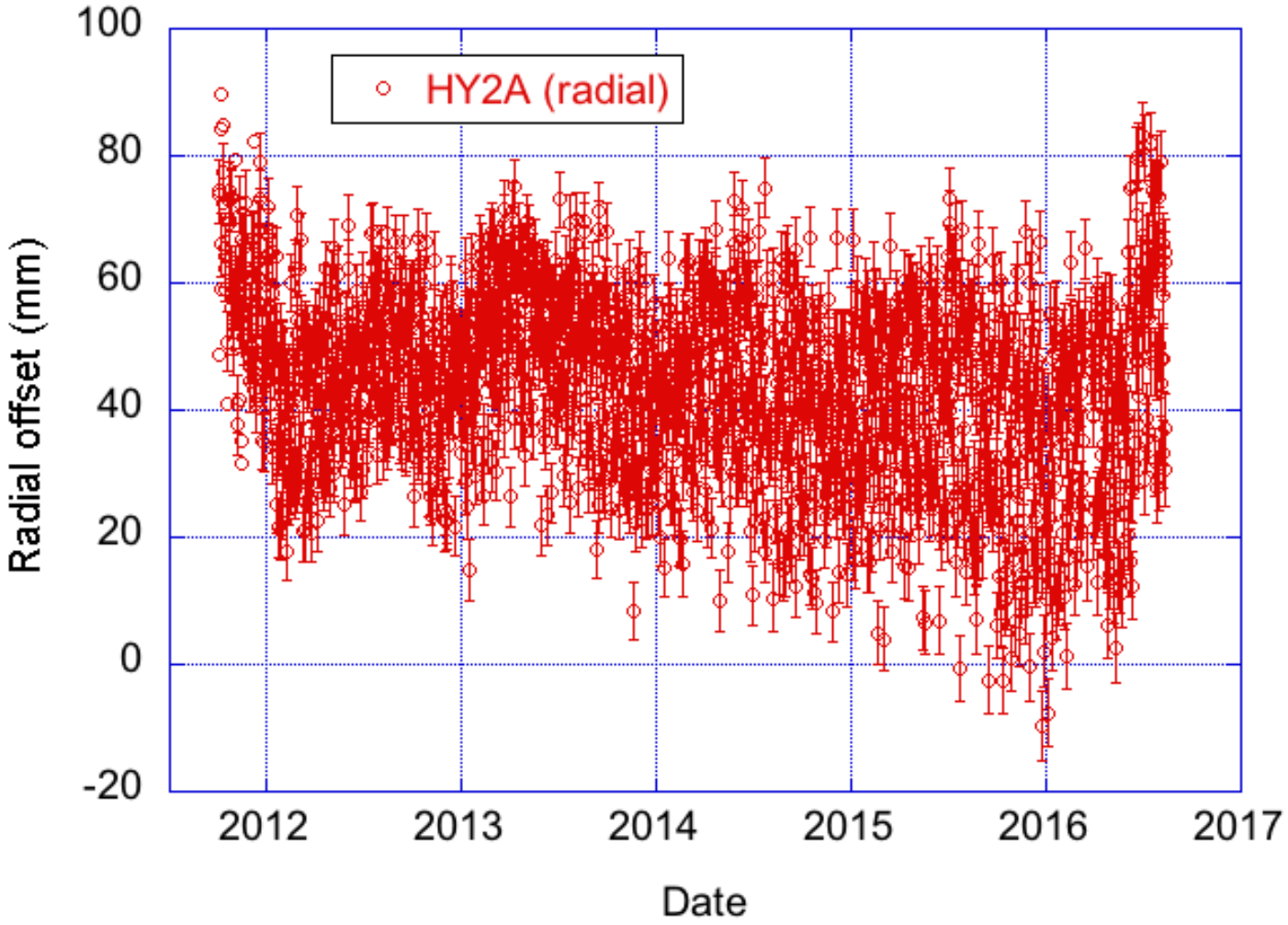
# Direct estimations (POD)
# Formal errors



# Direct estimation (POD)
# using phase center corrections from data files



# Direct estimation (POD)
# Computing phase center corrections

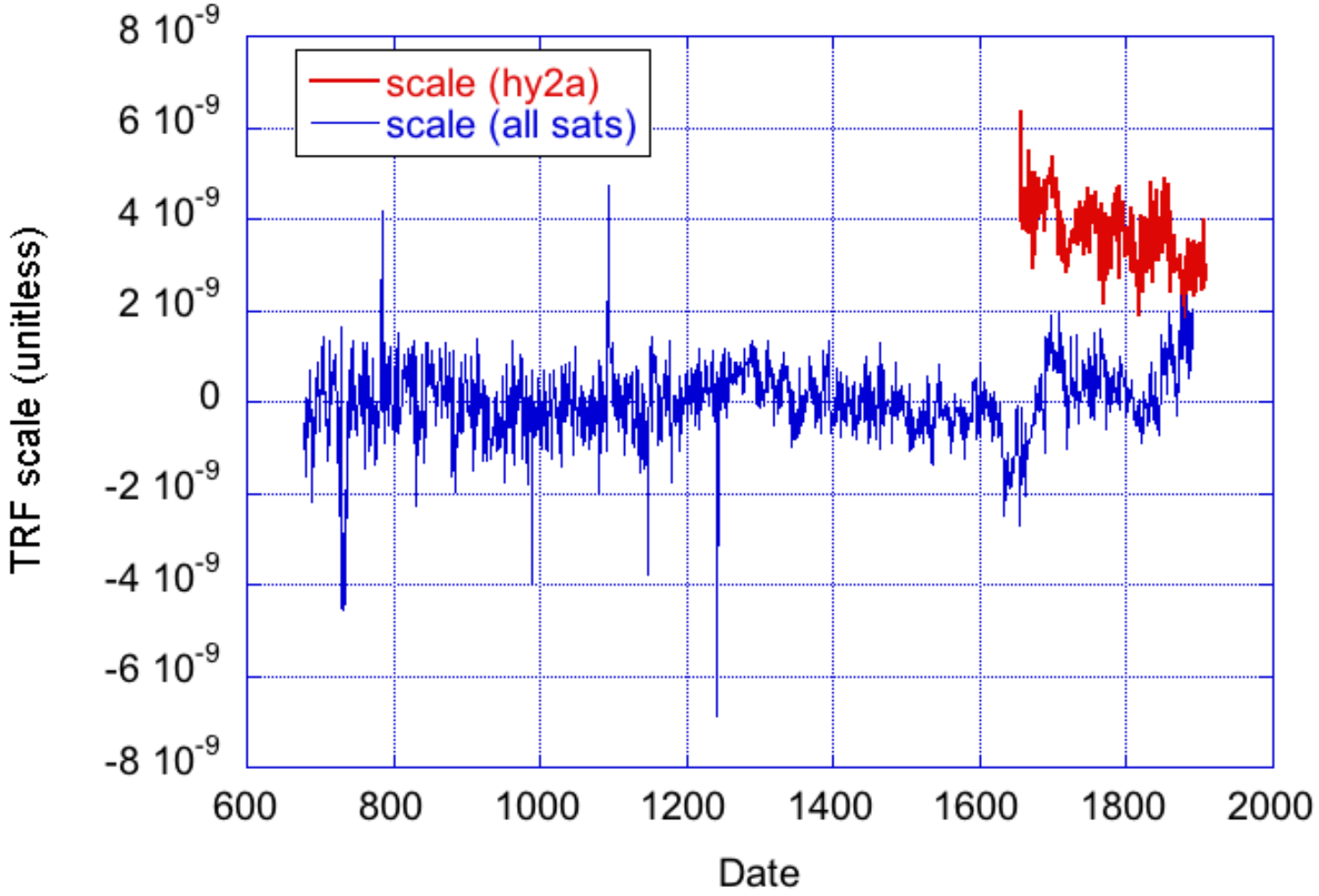


# Direct estimation (POD)
# Other DORIS satellites

| Satellite | Radial offset (mm) | Formal error (mm) |
|---|---|---|
| Cryosat2 | 10.7 | 0.4 |
| Envisat | 9.0 | 0.7 |
| Hy2a | 44.1 | 0.4 |
| Jason | (100.3) | (1.0) |
| Jason-2 | 0.2 | 0.5 |
| Saral | 23.9 | 0.4 |
| Spot-4 | 0.9 | 0.7 |
| Spot-5 | 16.4 | 0.4 |

Daily estimations , 2011-2016 data span

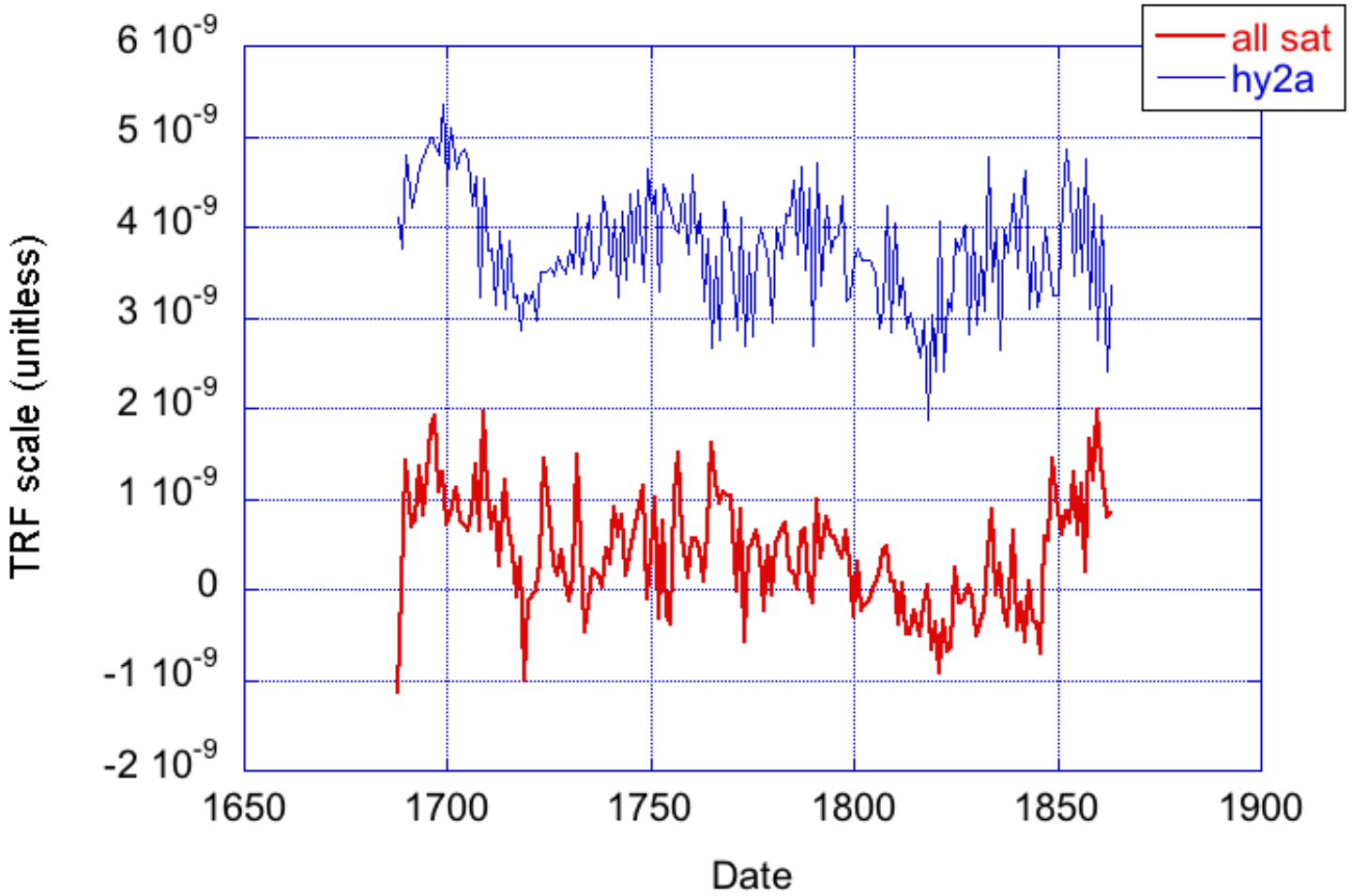
# Indirect estimation (geodetic runs)



# Indirect estimation (geodetic runs)

Scale = 3.47 +/- 0.15 ppb

HY2A solution vs. ignwd15



# Discussion
# Should we correct a priori values?

- POD runs
  - No effect on orbit radial component
- Geodetic runs
  - Direct effect on TRF scale
  - Potentially important for combined (multi-satellites) solutions
  - Potential problems :
    - Consistency between Acs solutions (software dependency?)
    - use of information from prior ITRF to determine data to estimate future ITRF
    - What about time evolution of this parameter?

# CONCLUSIONS

- HY2A Radial offset
  - Direct estimation (POD): 44.1+/- 0.4 mm
  - Indirect estimation: TRF scale: 3.47 +/- 0.15 ppb
- Similar study on other satellites
  - Systematic study required for all satellites and all components
  - Could it explain current TRF variations (amount and availability of data per satellite)?
- Should we correct this effect for future IDS solutions?