Assessment of CRF Solutions from Session-wise Normal Equation Systems

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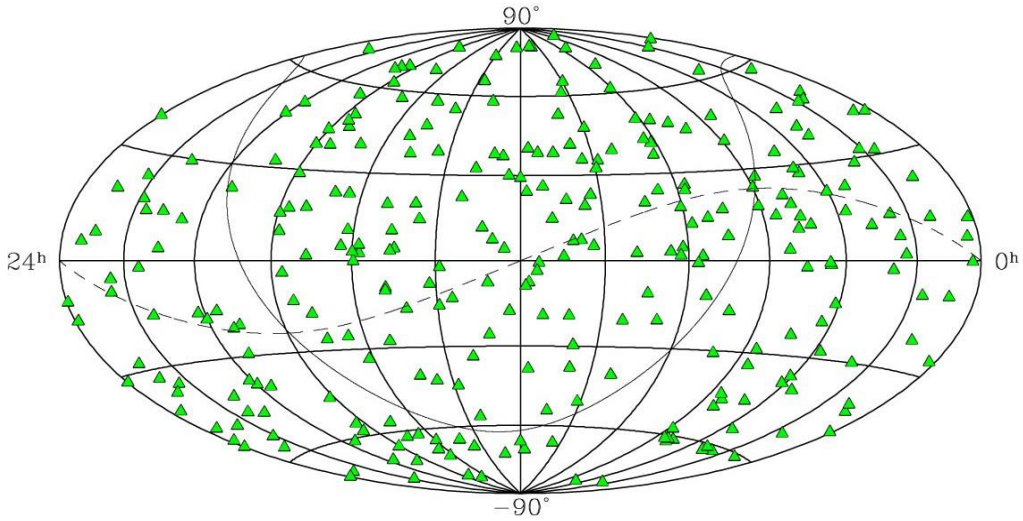
Motivation



ICRF2 (Defining-Sources) [www.nasa.gov]

Features of the ICRF2

- 3414 sources
  - 2197 single session sources
  - 295 defining sources
- NNR to ICRF1
- consistency with VTRF2008
- only X/S band observations
- only one single monolithic solution

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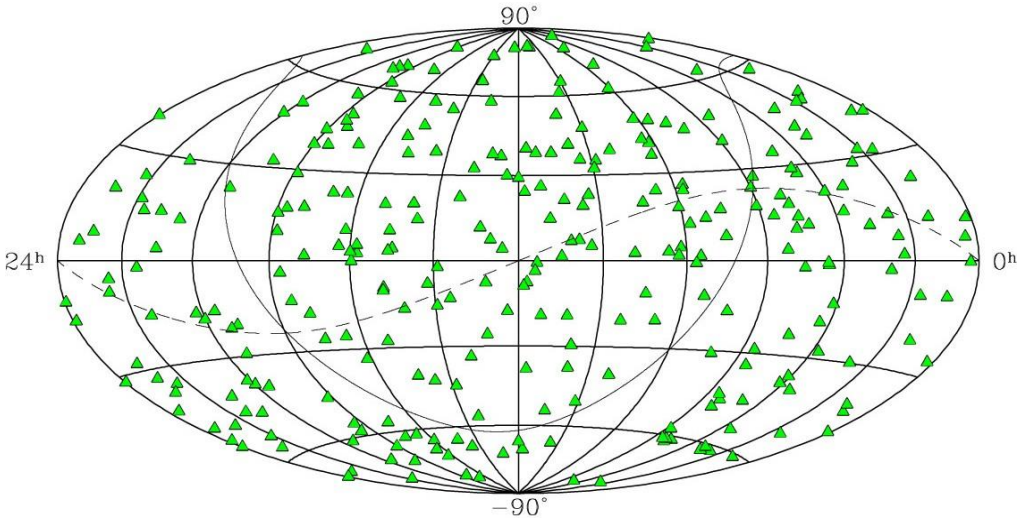

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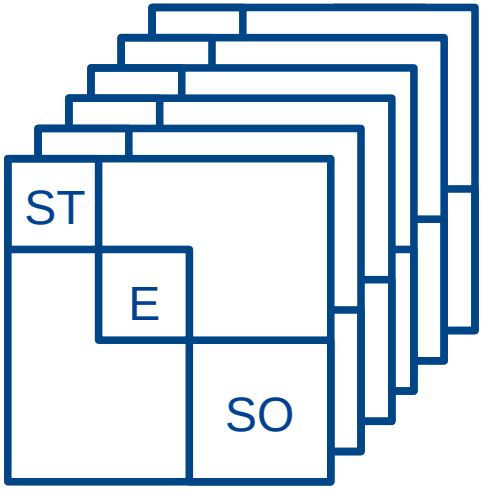
Goal for the ICRF3

- Combined product of multiple VLBI solutions

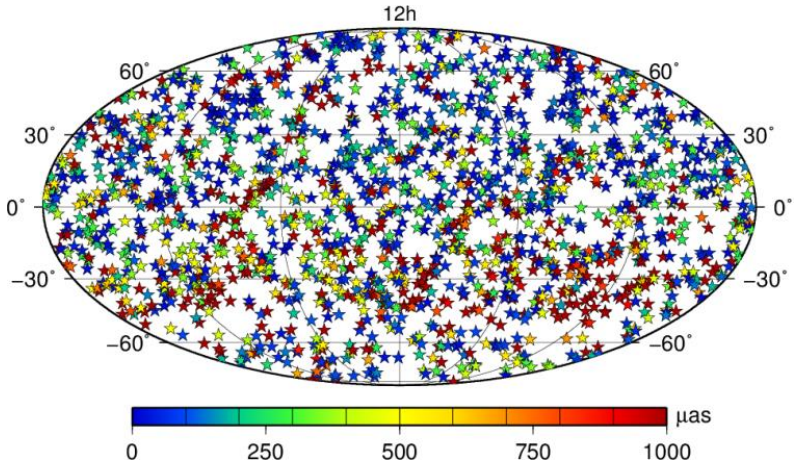
Goddard Solution Comparison

Goddard datum-free single session NEQs (SNX format)



comparison of
stacked normal equation systems
vs
final catalog from global solution

gsf2014a.sou



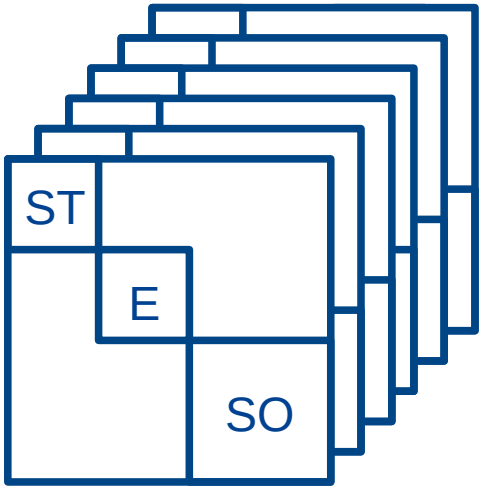
Goddard CRF – Level of agreement?

stacking of datum-free normal equation systems with full propagation of variance-covariane information

Generating a monolithic NEQ

1. Step: Generating a datum-free NEQ based on daily datum-free Goddard SINEX files (stacking of datum-free normal equation systems)

datum-free single session NEQs



Configuration Setup

- EOPs fixed or reduced
- global sources stacked
- arc sources reduced
- stations fixed

datum-free monolithic NEQ

Sources (Right Ascension & Declination)

Information from official global solution

- which 5425 session need to be used?
- EOPs of which sessions need to be fixed?
- which sources set up as arc parameter?

Station positions (ST) , EOPs (E) , Source positions (SO)

Generating a catalog

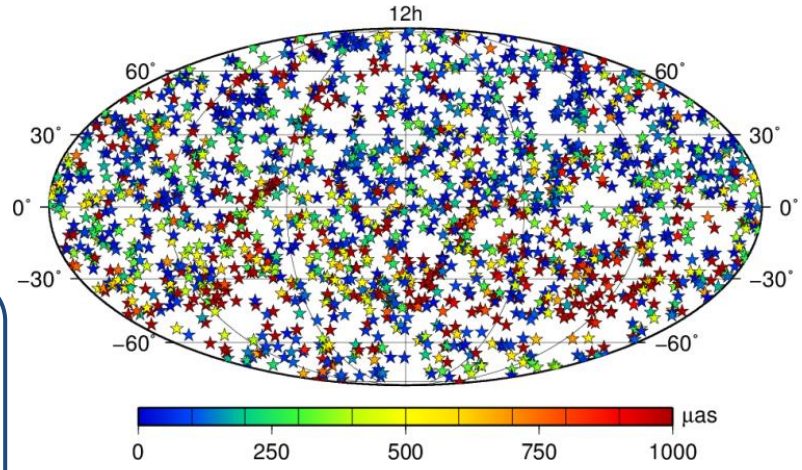
2. Step: Generating a solution catalog based on the generated monolithic NEQ (stacking of datum-free normal equation systems)

datum-free monolithic NEQ

Sources (Right Ascension & Declination)

Generating Solution

- NNR on sources
- solving the system



Information from official global solution

- Which sources have been used for NNR?

Generating a catalog

2. Step: Generating a solution catalog based on the generated monolithic NEQ (stacking of datum-free normal equation systems)

datum-free monolithic NEQ

Sources (Right Ascension & Declination)

Scaling sources is essential

[rad] to [mas]

Generating Solution

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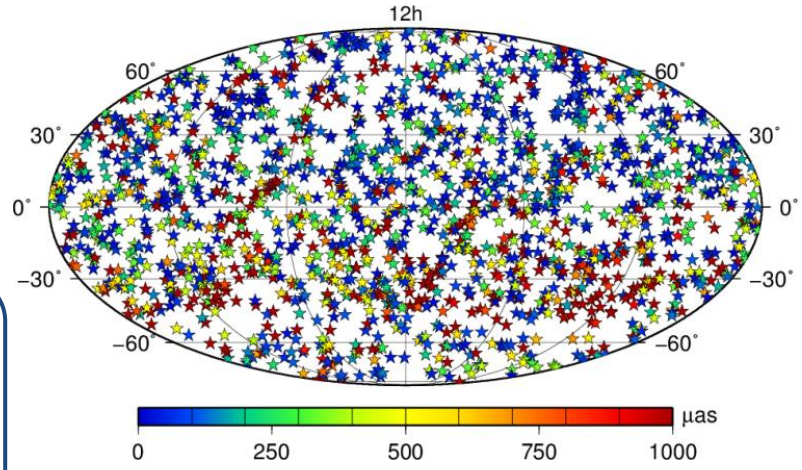

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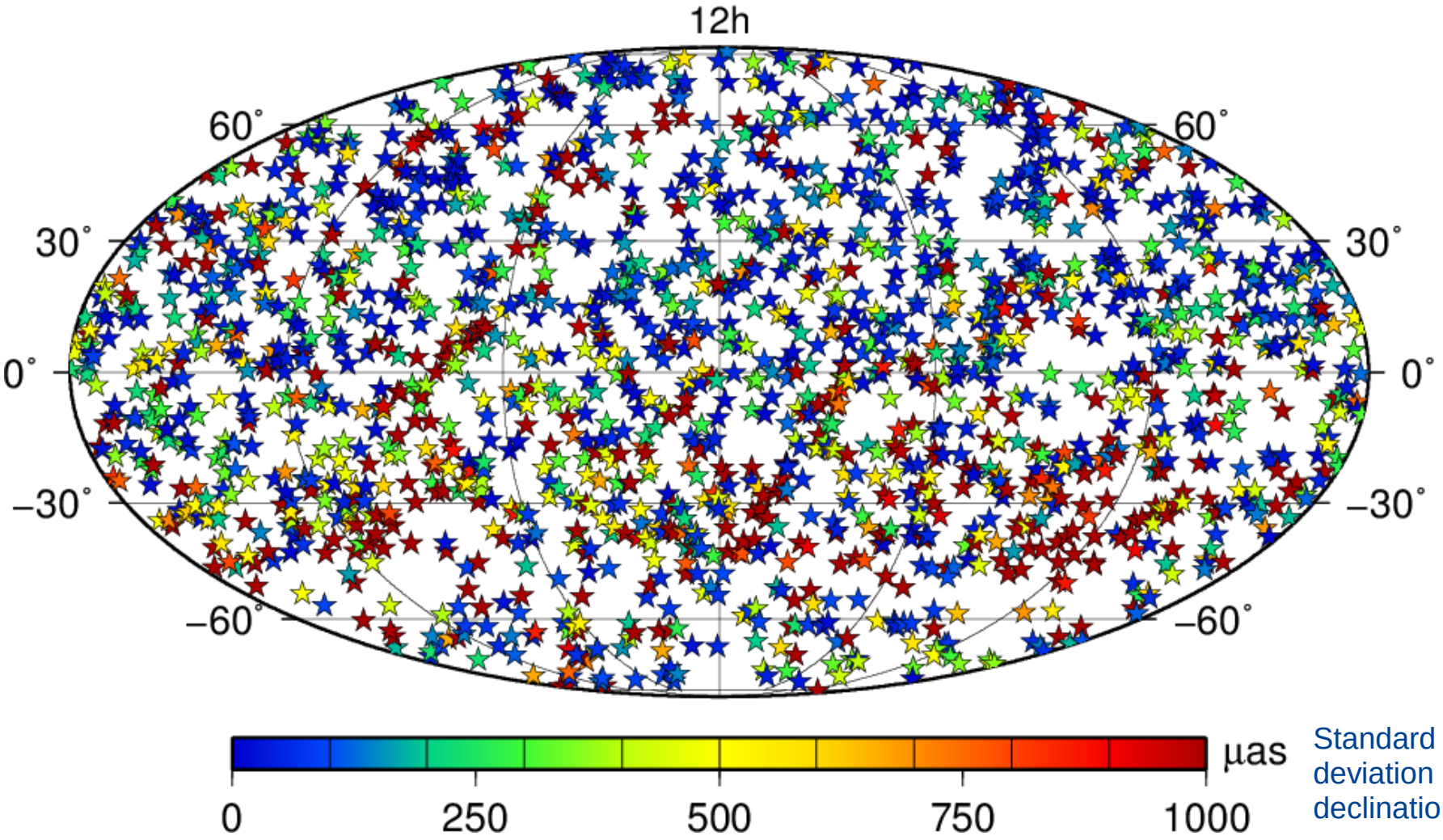
Generated GSFC Catalog

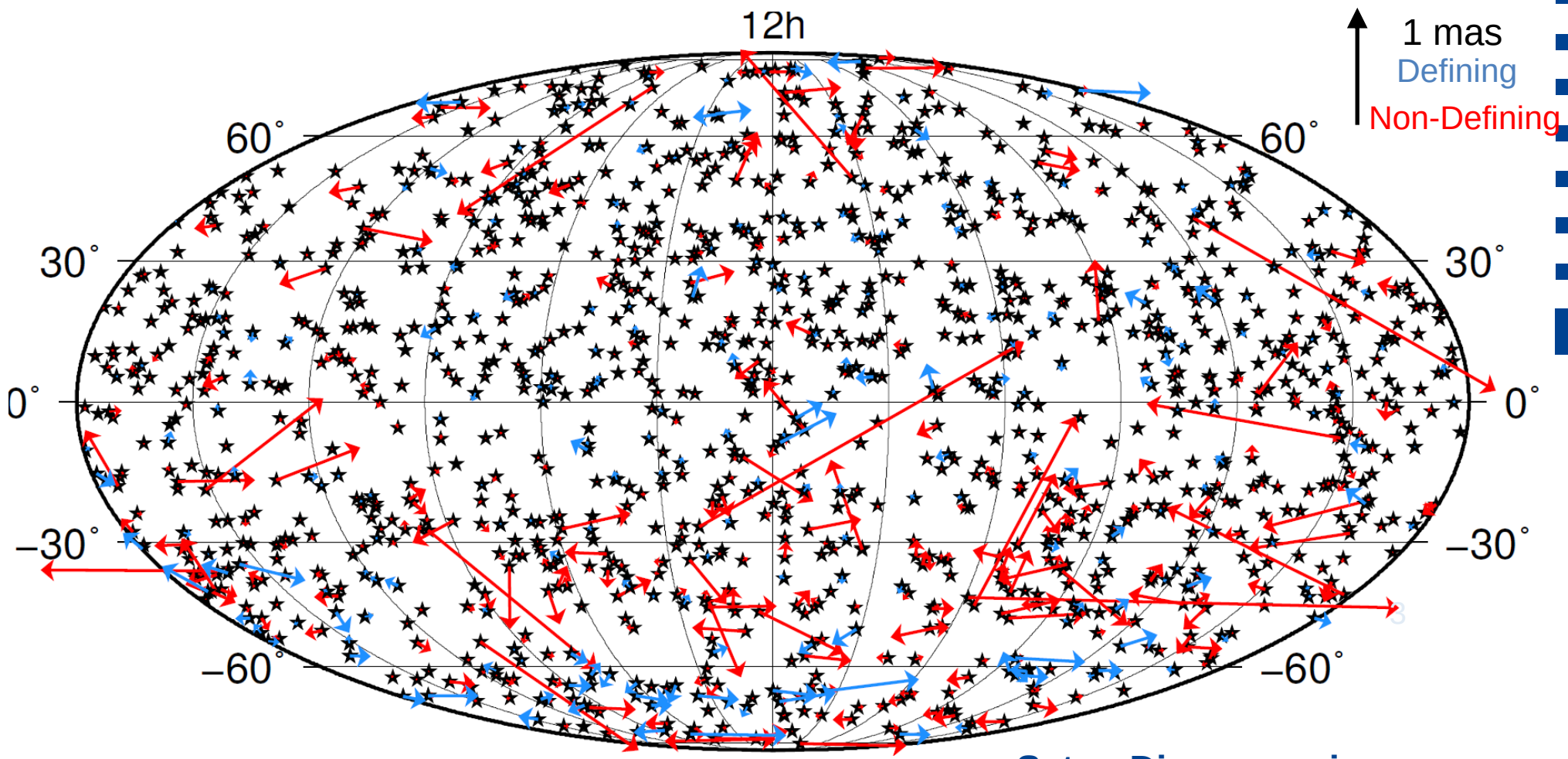
Generated catalog based on daily datum-free Goddard SINEX files



- configuration setup best possible based on gsf2014a global solution

Catalog Comparison

Residuals between stacked solution and Goddard catalog after transformation (3 rotations)



Estimation of 3 rotation angles between the two catalogs (Transformation based on the 295 defining sources)

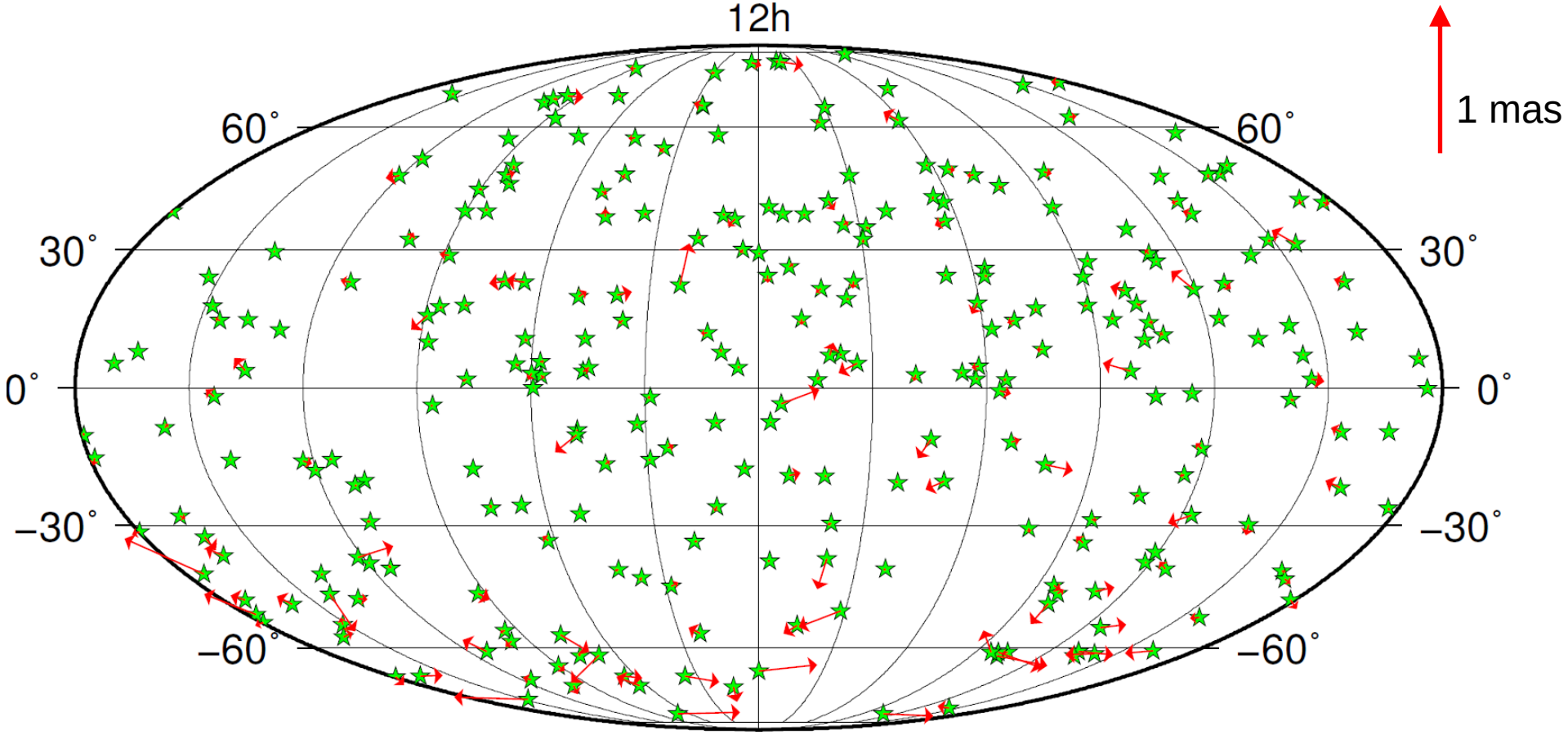
Catalog Pair	Rotation angles (x,y,z) [mas]
stacked vs. Goddard	(-0.005 , 0.007, 0.002)

Setup Discrepancies

- unequal sessions used
- hidden constraints
- unequal quantity of soucres
- singularity inconsistencies

Defining Sources: Stacked minus ICRF2

Residuals between stacked solution and ICRF2
(Only Defining Sources)



cutoff-date for stacking: March 2009 (last ICRF2 observations)

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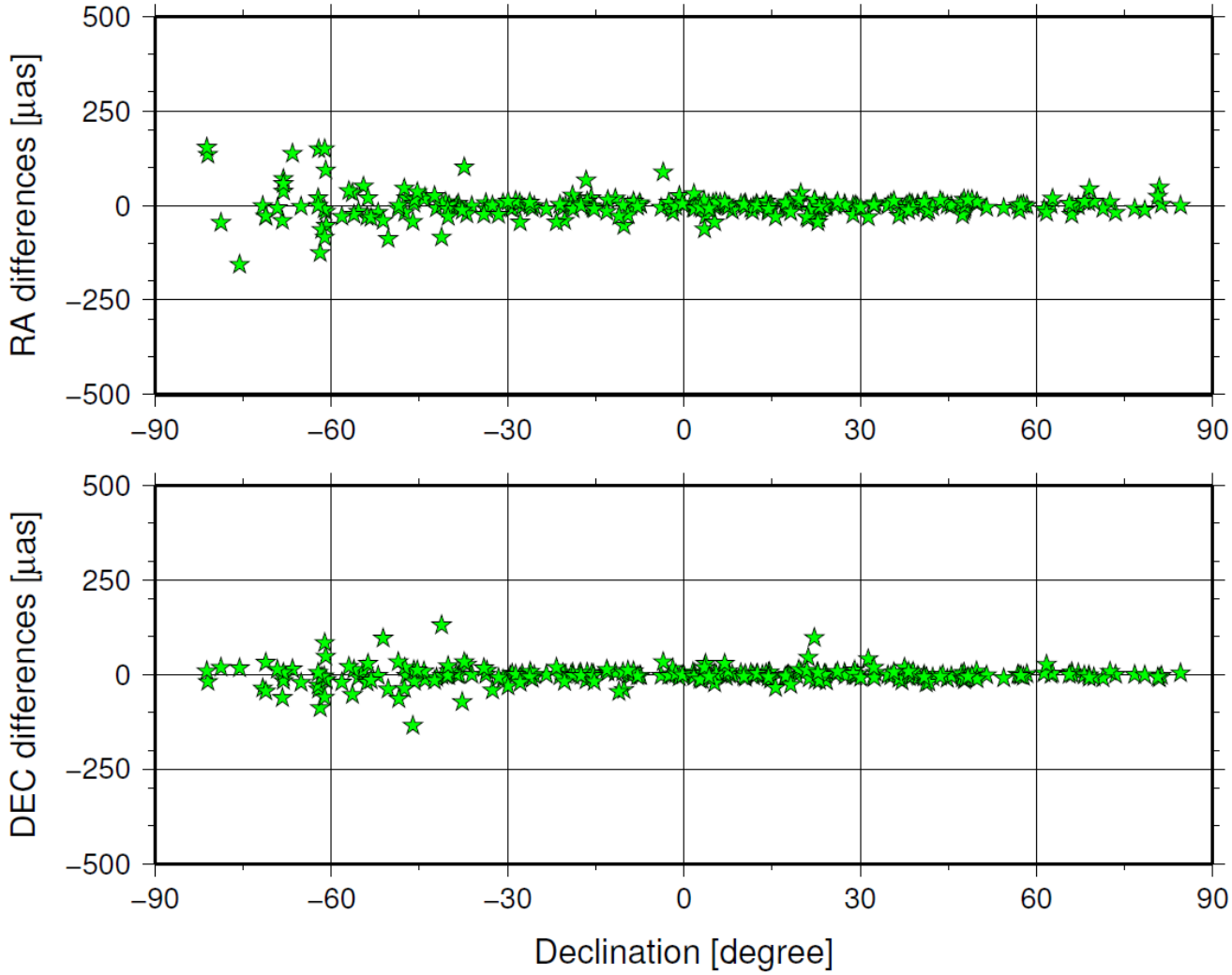

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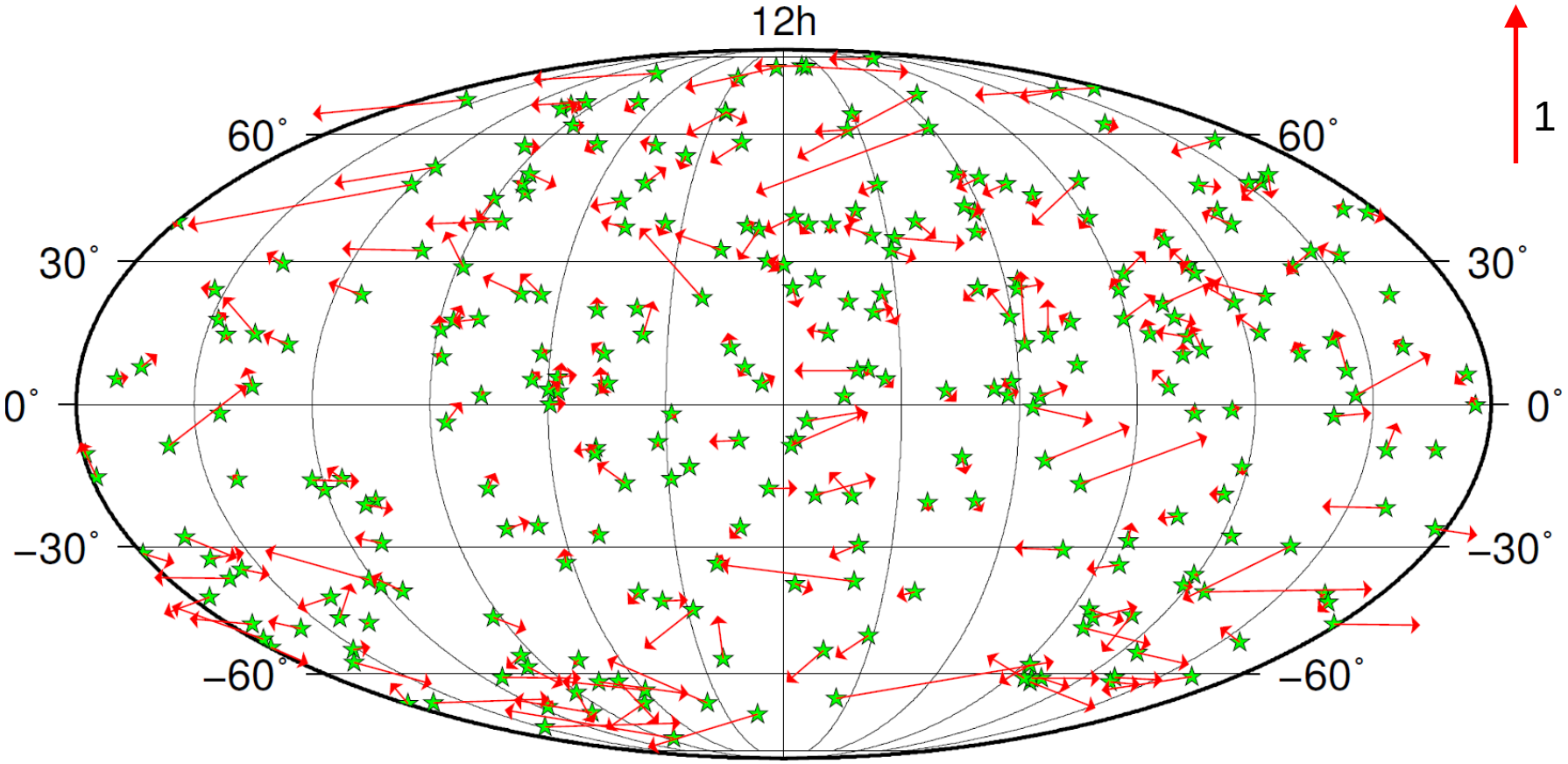

exactly same configuration setup **but** all databases until 2015.
This includes new operational sites in the southern hemisphere

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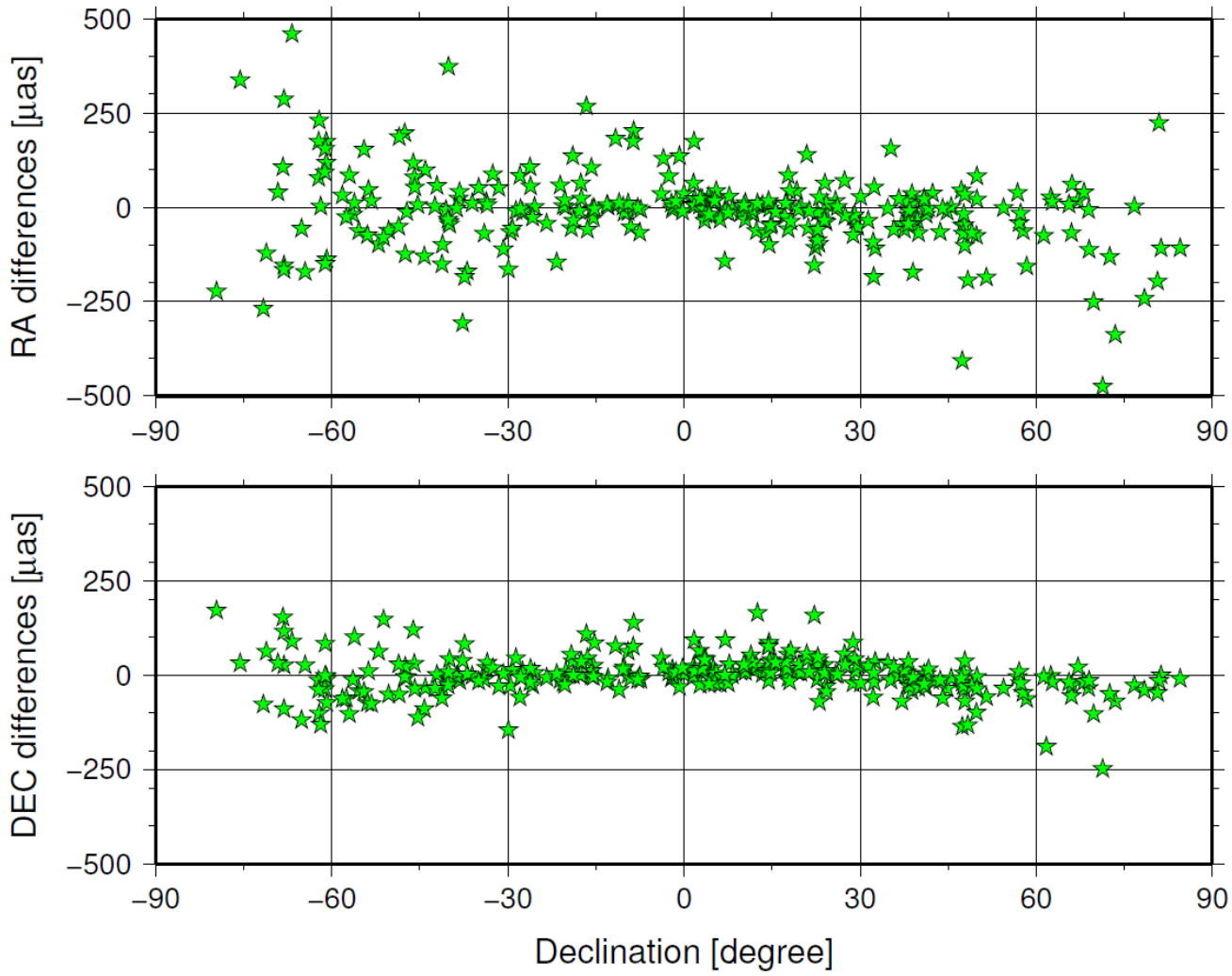

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Conclusion & Outlook

- Occurring discrepancies need to be analyzed in detail
- Further analysis center specific catalogs need to be generated and compared (among each other)
- Investigations concerning the declination zonal issue

→ Computation of a combined CRF

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Thank you for your attention!