HEROES Pointing Analysis

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Motivation

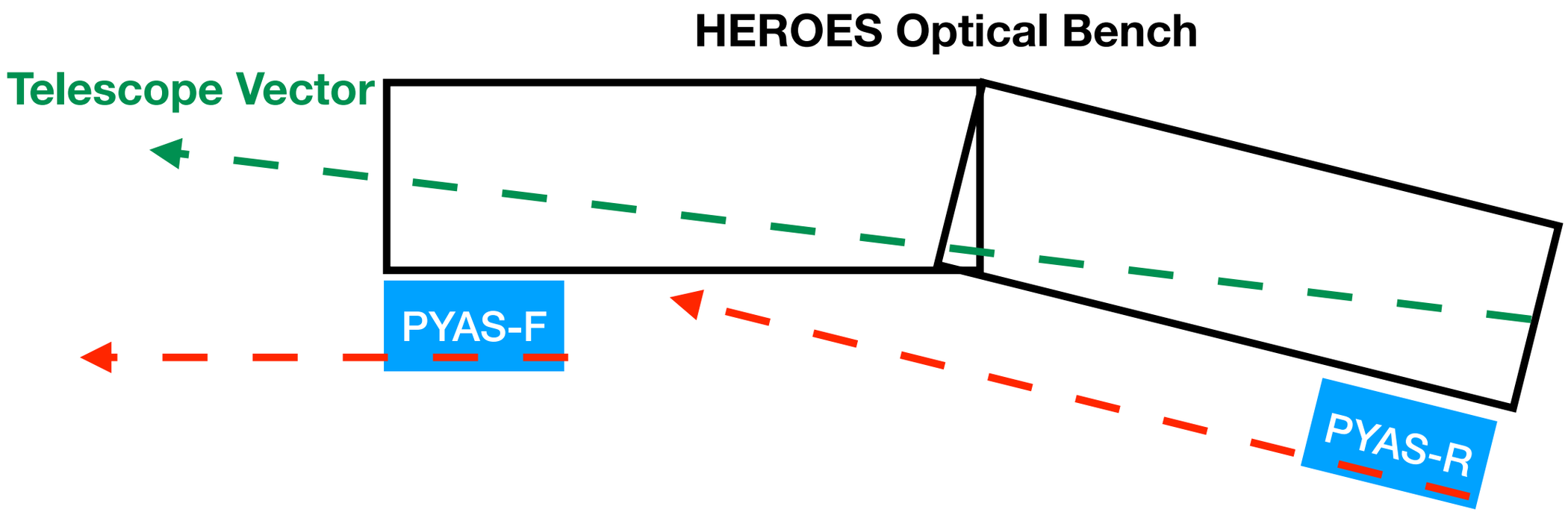
- Initial analysis of HEROES observations did not reveal signal from B-class flare known to have occurred during flight.

- Pointing for photon tagging was calculated roughly and may have prevented signal being detected.

- Two potential sources of pointing error…

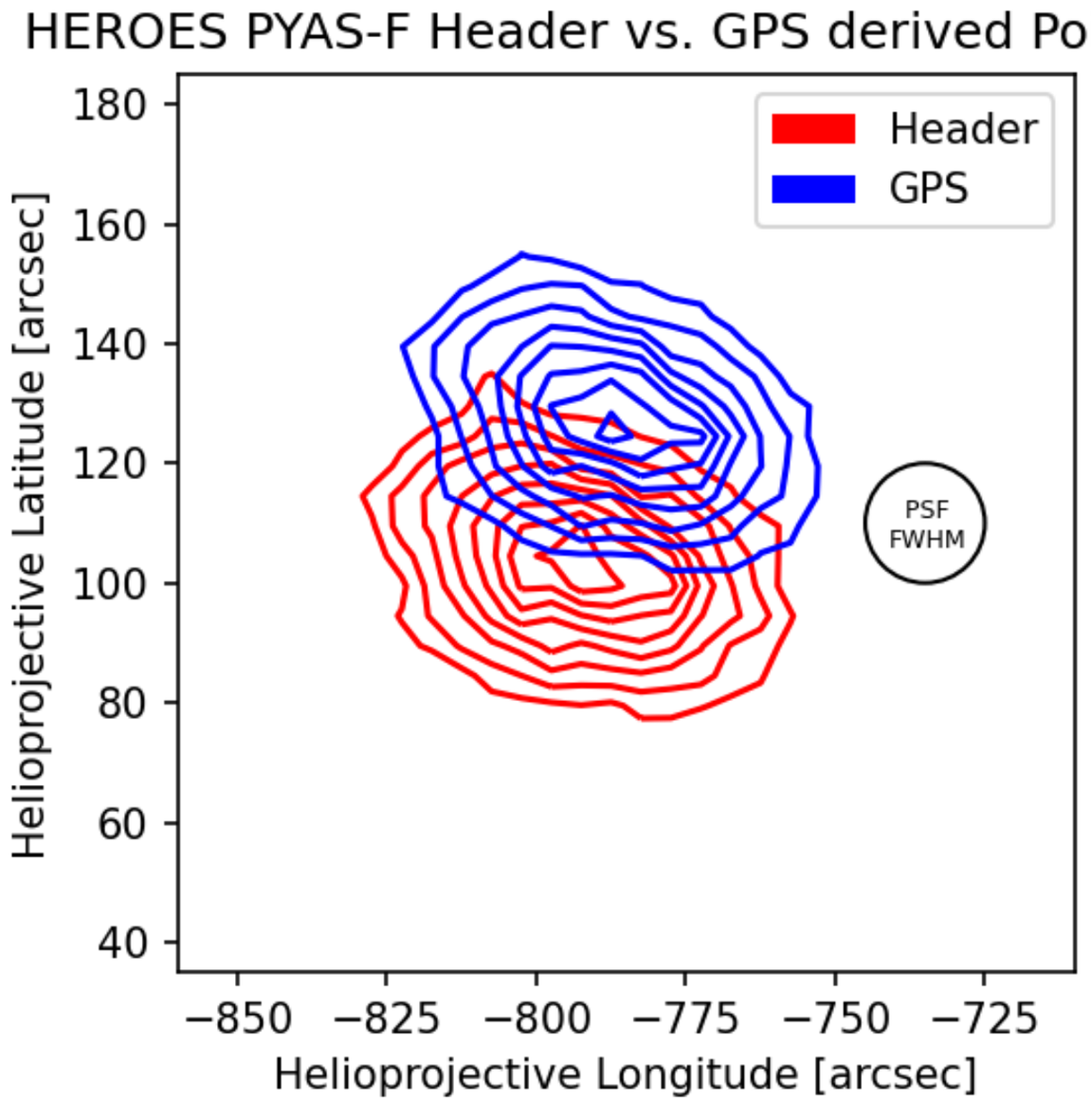
Sources of Pointing Error

- **Solar orientation calculated onboard and stored in headers incorrect (off by ~1.6 deg).**
    - Orientation recalculated in this work using full GPS info and SunPy transformations.
- **Telescope pointing vector not calculated.**
    - PYAS-F pointing used in initial analysis.
    - Gravity-induced bend halfway along optical bench would cause telescope pointing to be average of PYAS-F and PYAS-R pointing.



Header-derived vs GPS-derived Balloon Position

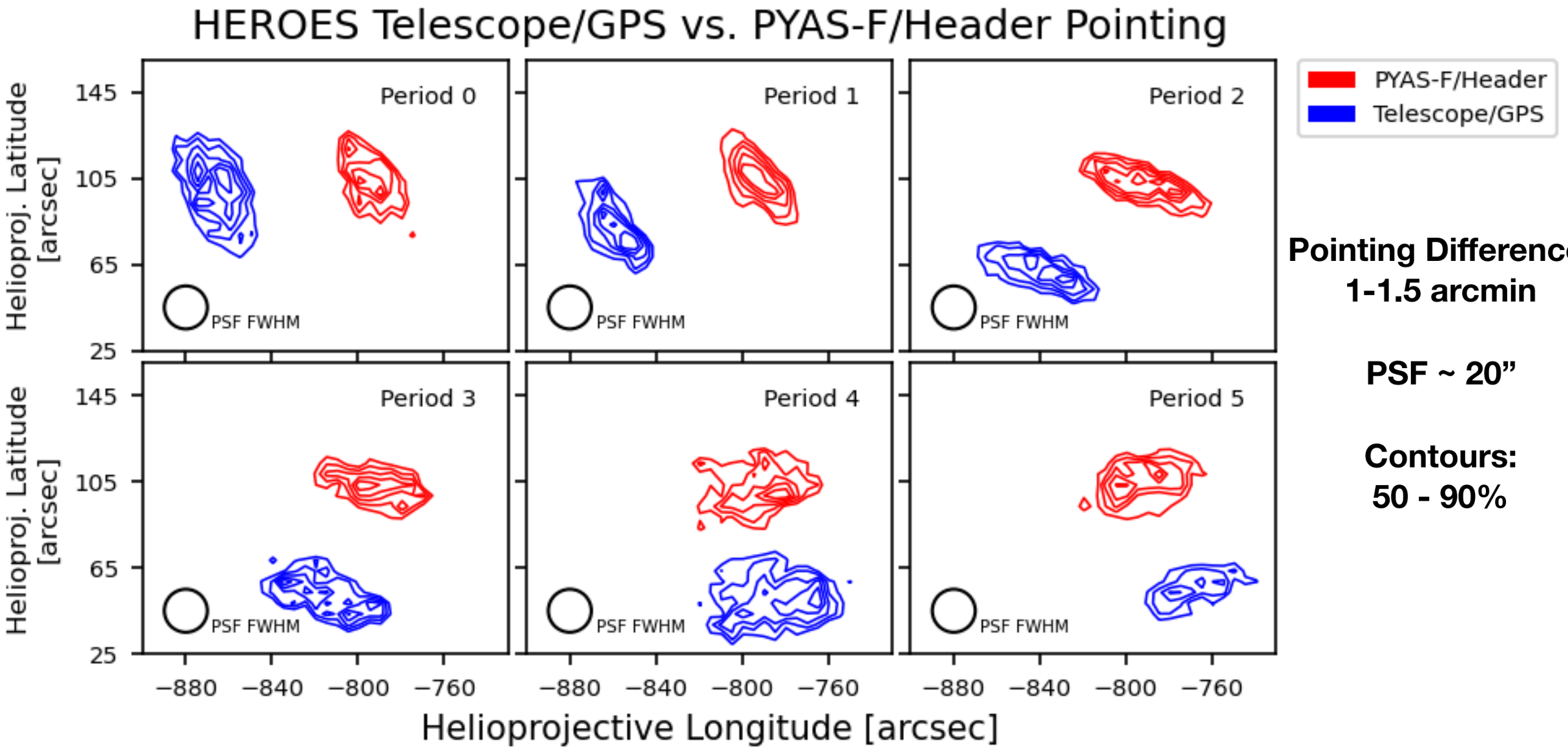
- Pointing Difference (22-27”) slightly more than PSF.



Contours: 25 - 95%

PSF FWHM ~20”

Header-derived Position + PYAS-F Vector
vs
GPS-derived Position + Telescope Vector

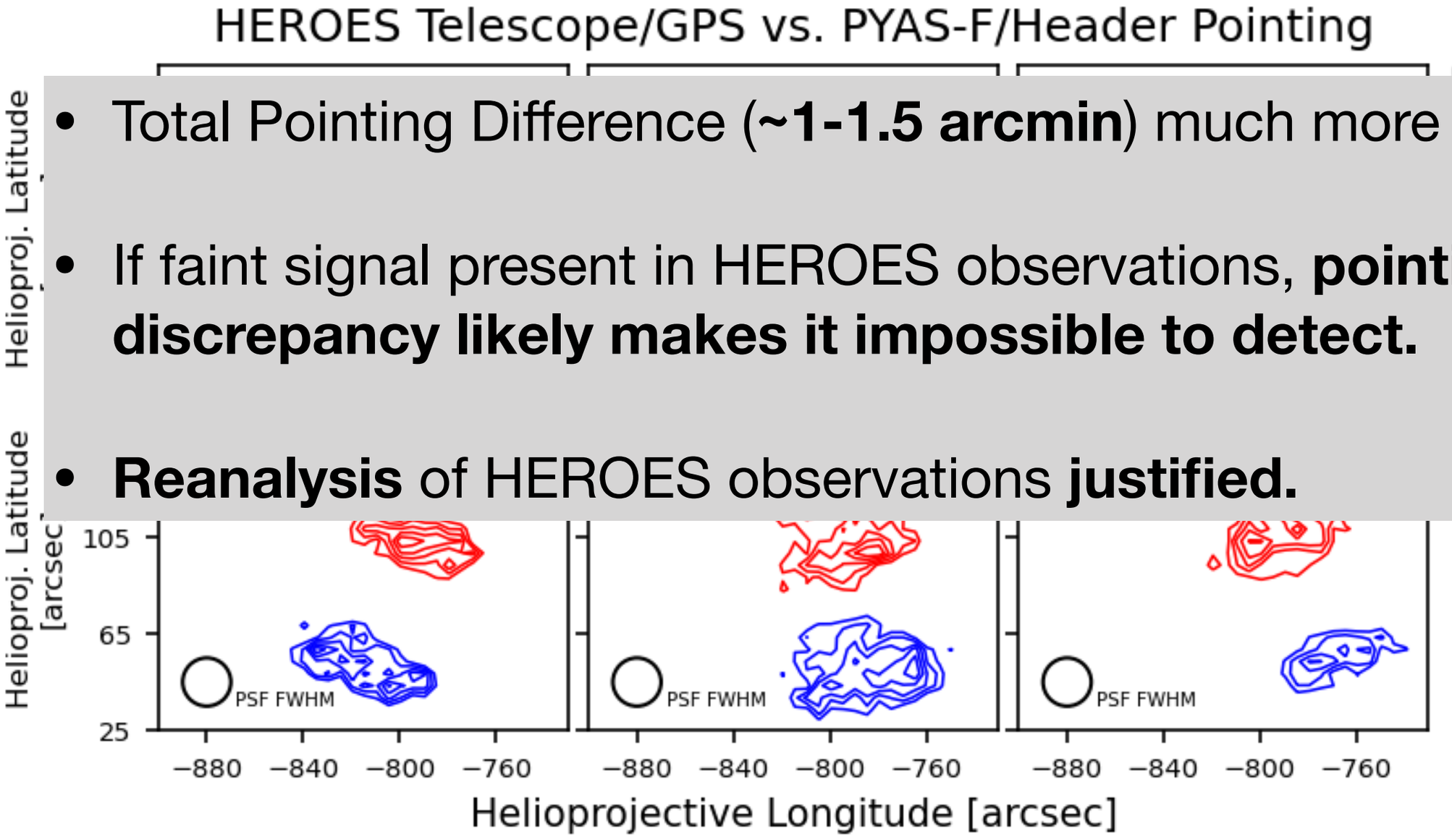


Pointing Difference: 1-1.5 arcmin

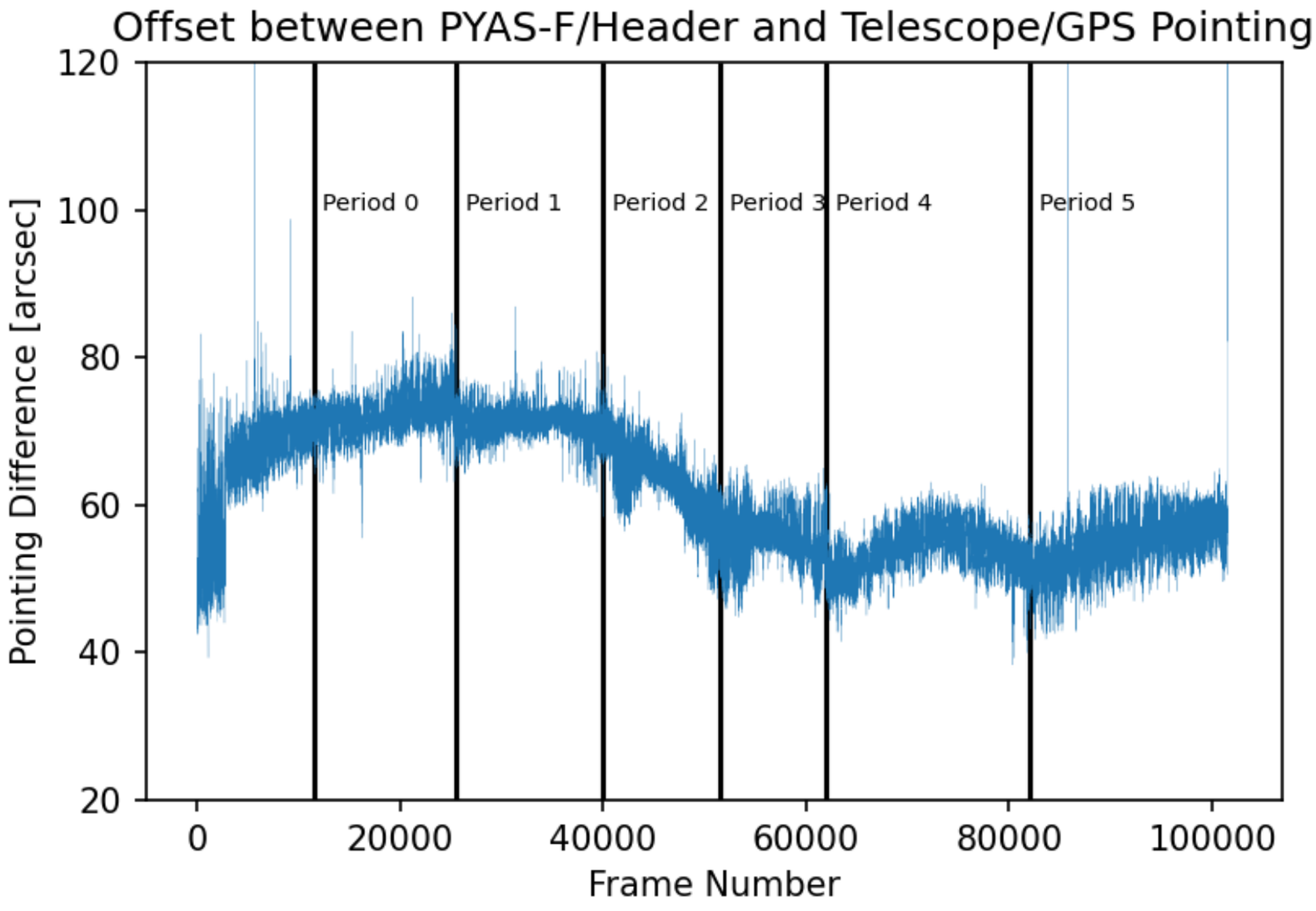
PSF ~ 20”

Contours: 50 - 90%

Header-derived Position + PYAS-F Vector
vs
GPS-derived Position + Telescope Vector



- Total Pointing Difference (**~1-1.5 arcmin**) much more than PSF.
- If faint signal present in HEROES observations, **pointing discrepancy likely makes it impossible to detect.**
- **Reanalysis** of HEROES observations **justified.**

50 - 90%

Header-derived Position + PYAS-F Vector
vs
GPS-derived Position + Telescope Vector