



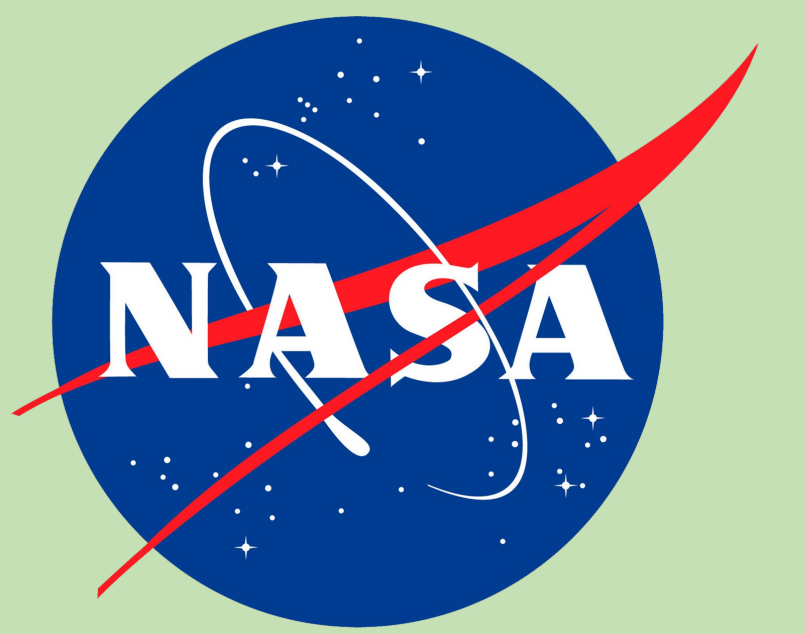
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FLUXPipe: Automated Fluxon Modeling of the Solar Wind from Magnetograms



SOUTHWEST RESEARCH INSTITUTE



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Overview

FLUX^[1,2,3] is a coronal forward-model which creates Fluxons then relaxes them to a linear force-free state.

Fluxons are equal-flux tracers of the magnetic field that follow field lines. This approach allows for multi-scale modeling of the corona, simulating plasma parameters along Fluxons and interpolating between them only if necessary.

FLUXPipe is a new pipeline which automates the individual steps from magnetogram to solar wind speed values.^[3]

The **solar wind speed** along the open fluxons is determined iteratively by finding the transonic solutions.

PUNCH Objectives of Relevance



Objective 1: Understand how coronal structures become the ambient solar wind.

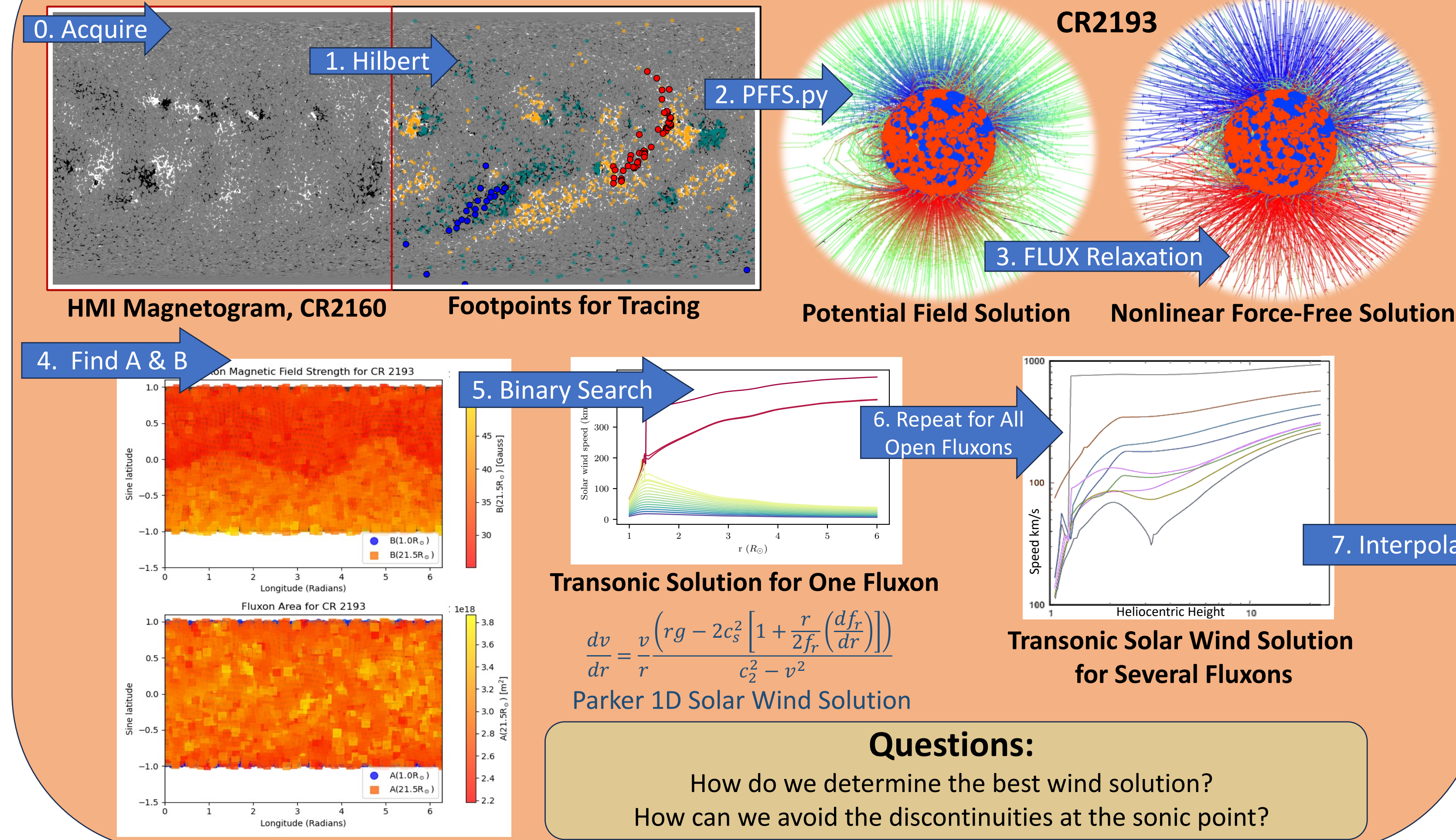
1A: Global solar wind flow

- Determine large-scale flow context necessary to relate coronal structure to in-situ measurements
- Characterize the global solar wind conditions through which transient structures propagate.

1C: Alfvén Zone

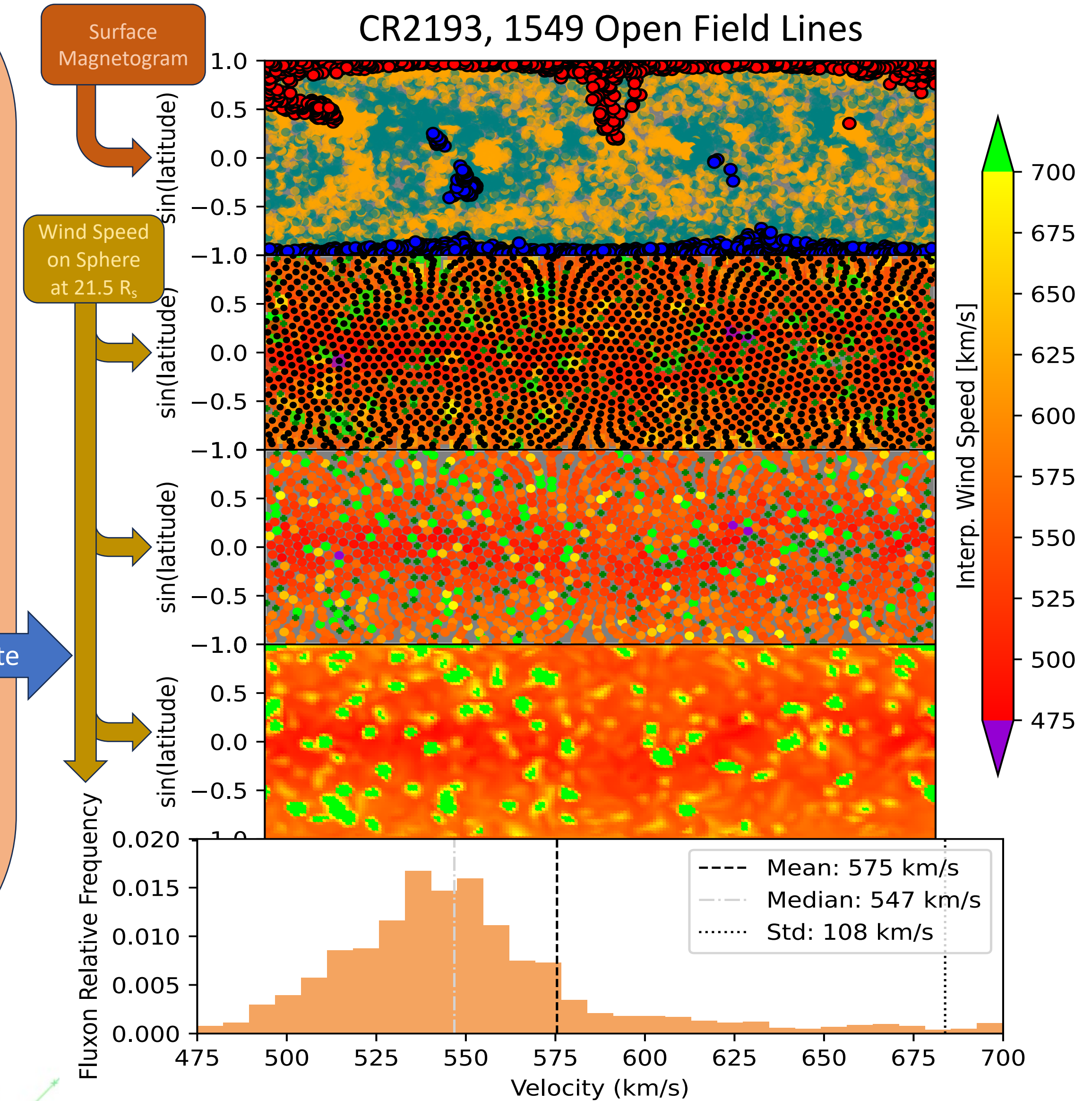
- Determine the height where the solar wind exceeds the fast MHD speed

FLUXPipe Steps

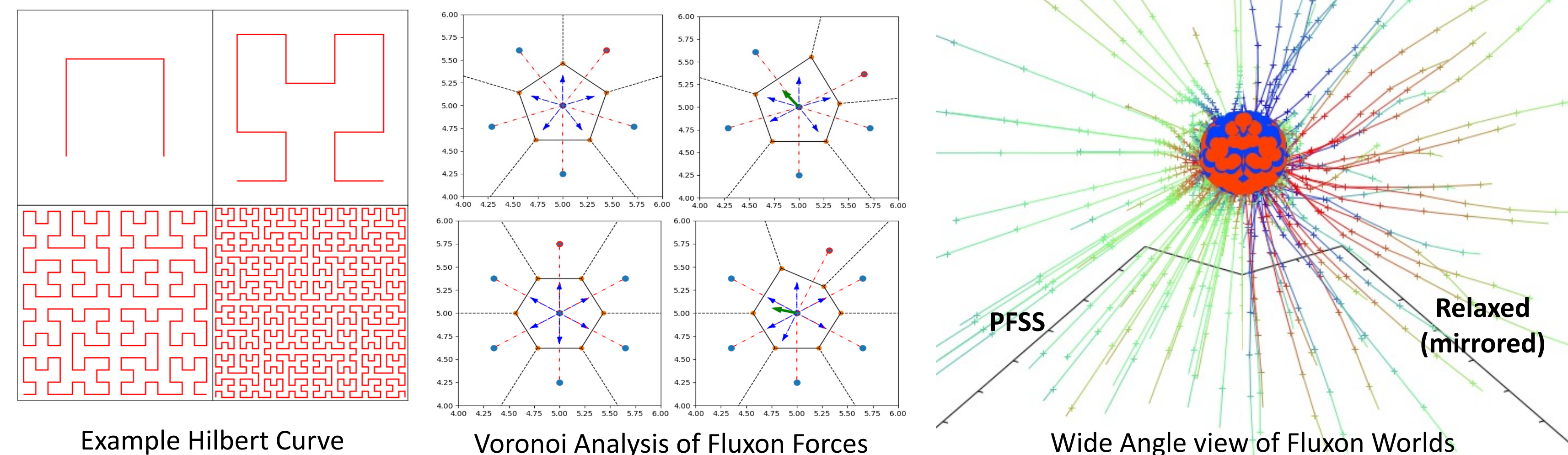


Solar Wind Speed Results

CR2193, 1549 Open Field Lines



Extra Plots



Questions:

- Why are there so many outliers?
- How can we connect source features to wind speed?
- Will ADAPT maps converge better than HMI Synoptic?

References

- [1] <https://github.com/lowderchris/fluxon-mhd>
- [2] Deforest, Kankelborg 2006
- [3] Lowder, Gilly, Deforest 2023