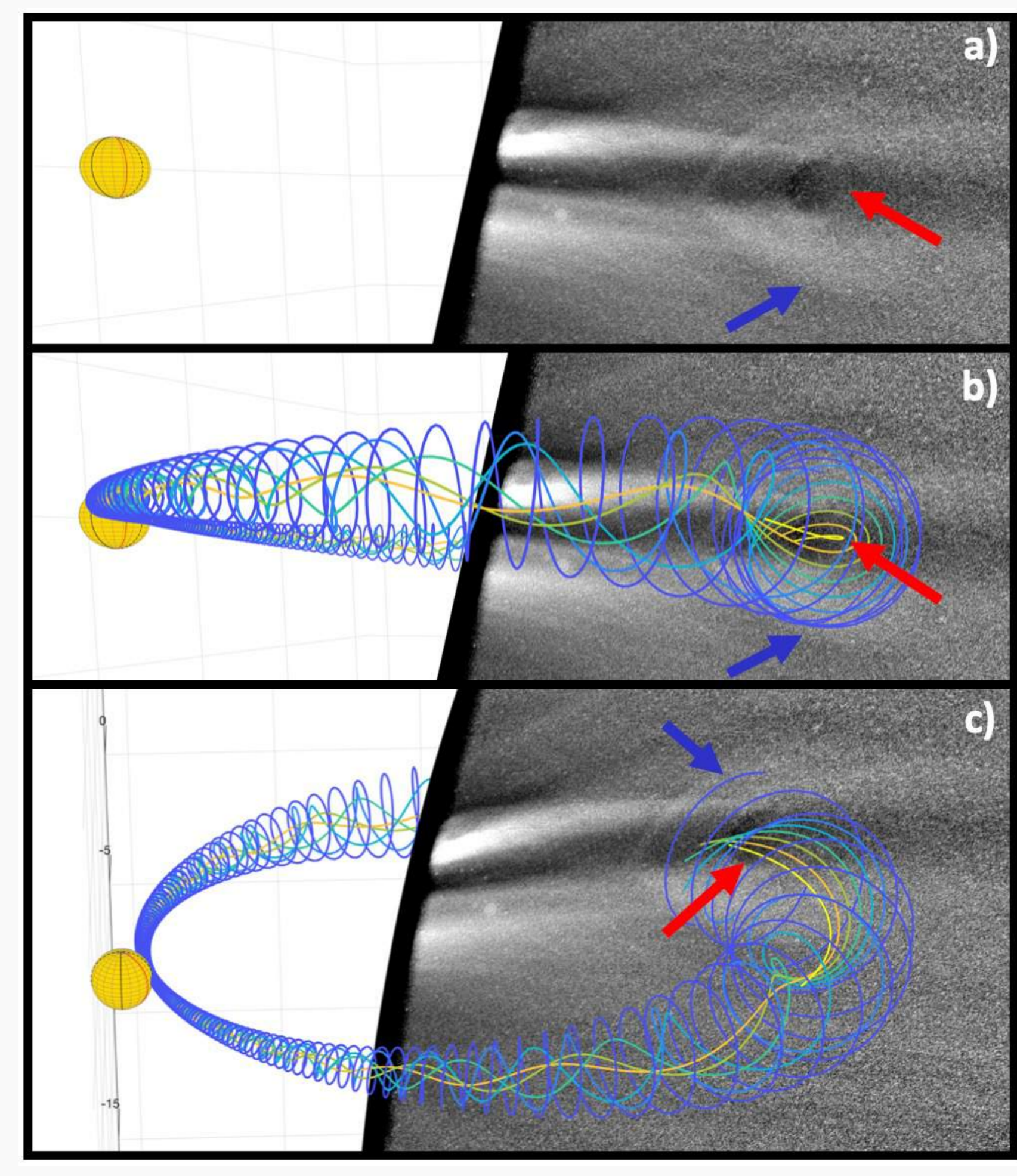
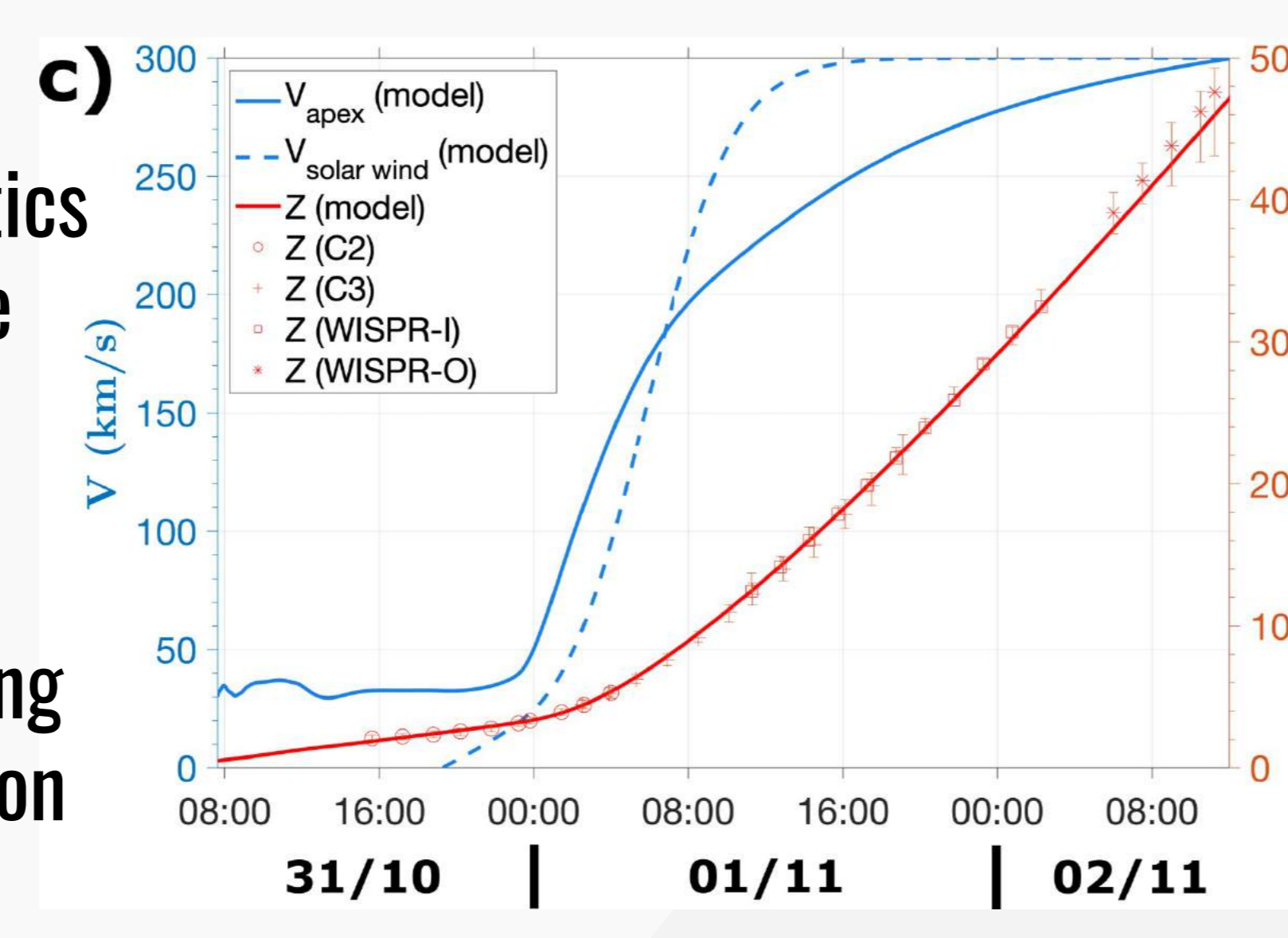


## Modeling the Early Evolution of a Slow Coronal Mass Ejection Imaged by the Parker Solar Probe [Rouillard et al. 2020, ApJS]

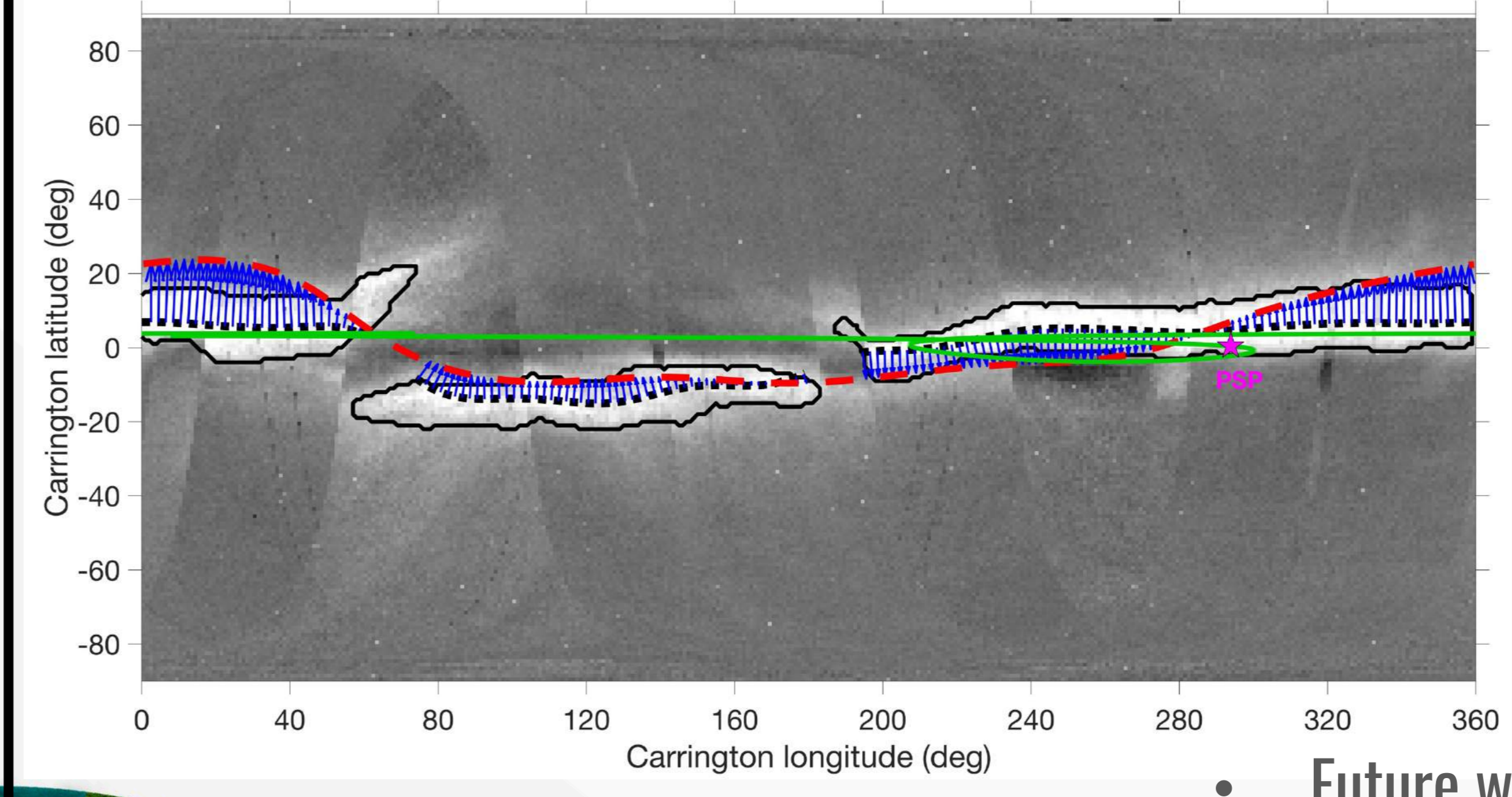
<https://doi.org/10.3847/1538-4365/ab6610>



- Modeling the CME kinematics solving a 1-D force balance [James Chen 1996]
- Reconstructing the 3-D internal magnetic field using the Grad-Shafranov equation [Priest E., 1996]
- Reproducing the observed propagation of a slow CME by a two-phase injection of poloidal flux
- Future work:  
Reconstruct CME signatures measured in situ at PSP & SoLo.  
Compare synthetic vs observed white-light images.

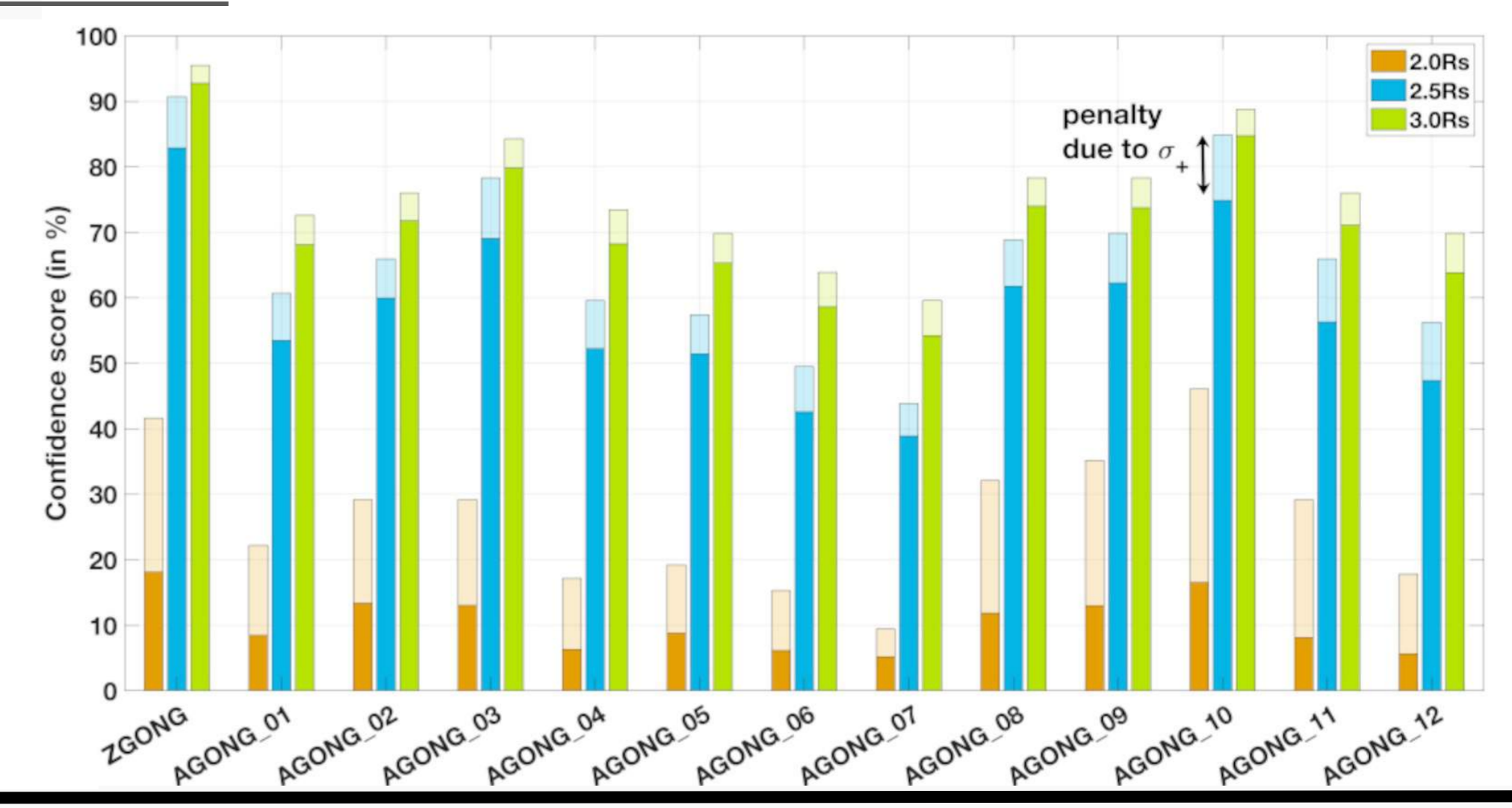
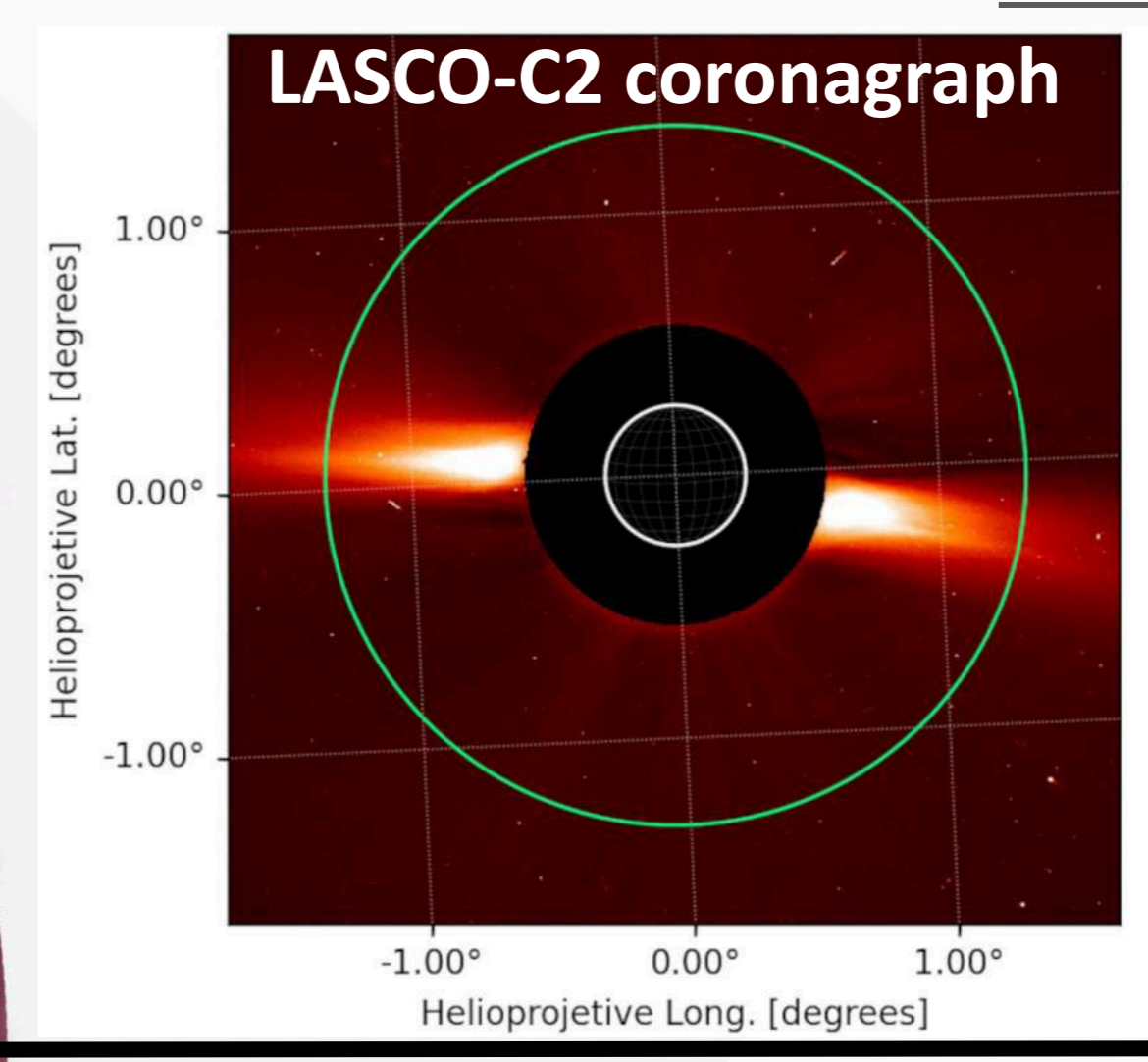


## Exploiting white-light observations to improve estimates of magnetic connectivity [Poirier et al. 2021, accepted]



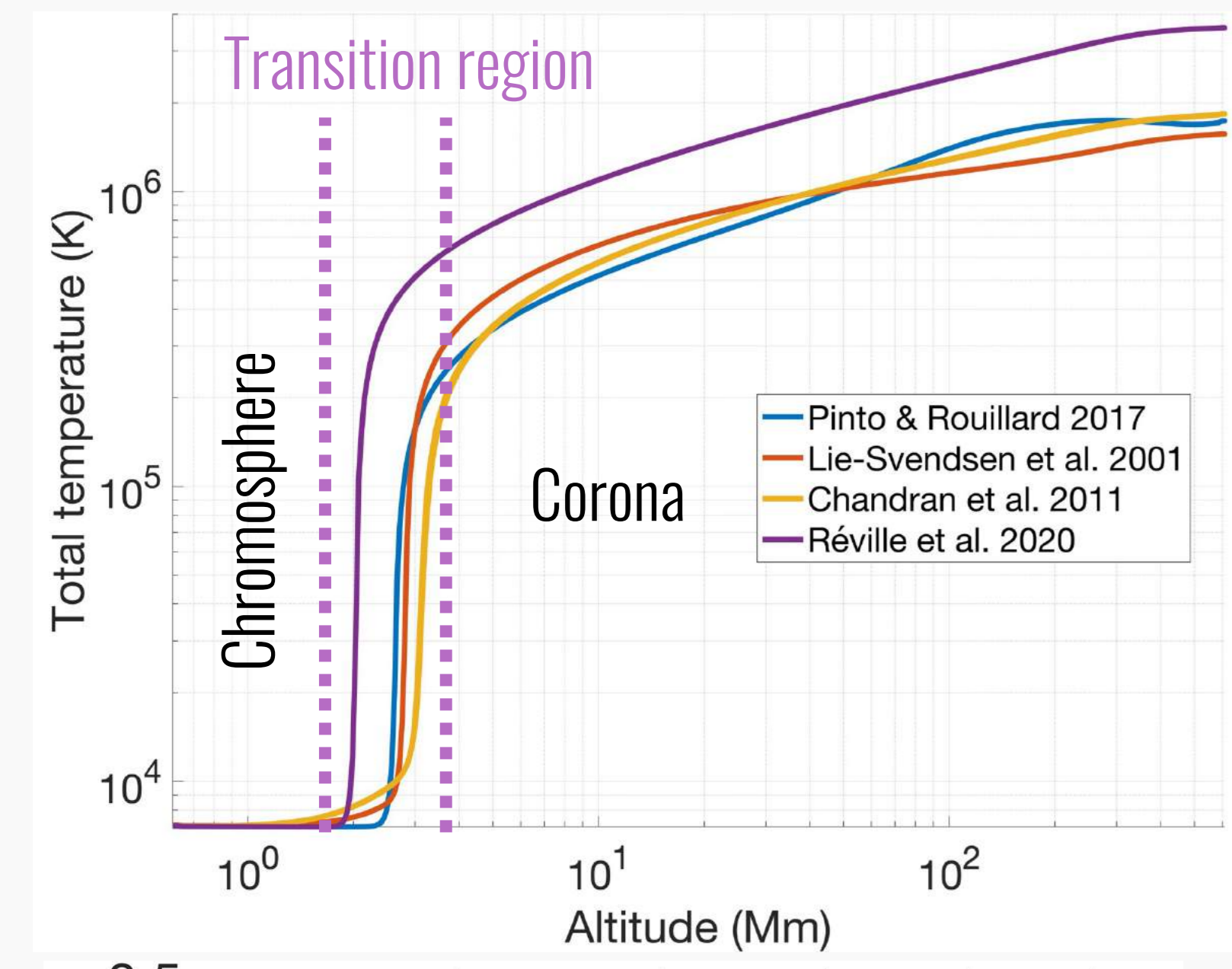
- Comparing white-light observations of the streamer belt against coronal models in a systematic manner
- Ranking automatically models according to their performances
- Suitable for any magnetogram and model type (e.g. PFSS, MHD)

Future work: Combine LASCO-C2 with STA-COR2 + METIS

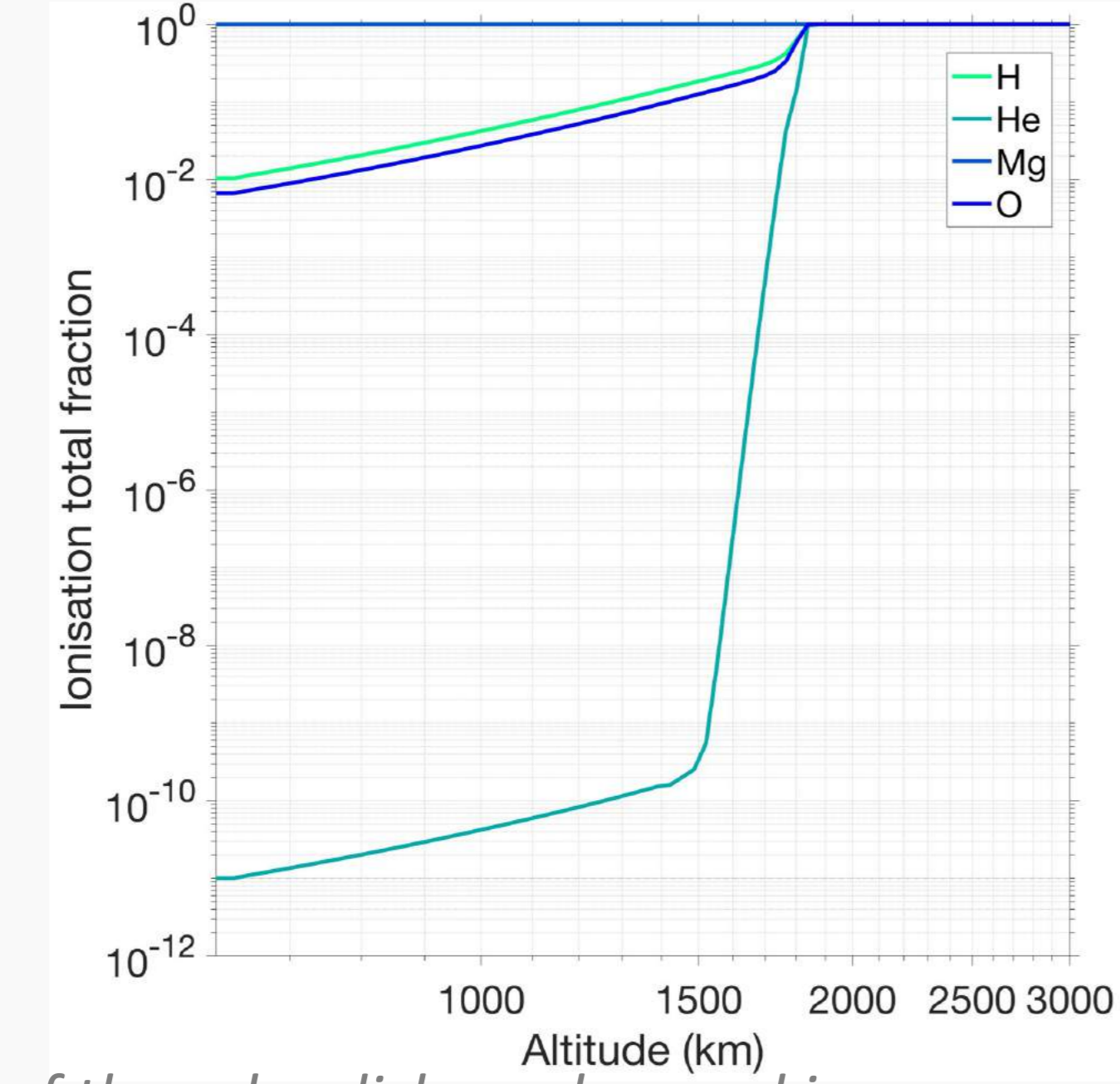
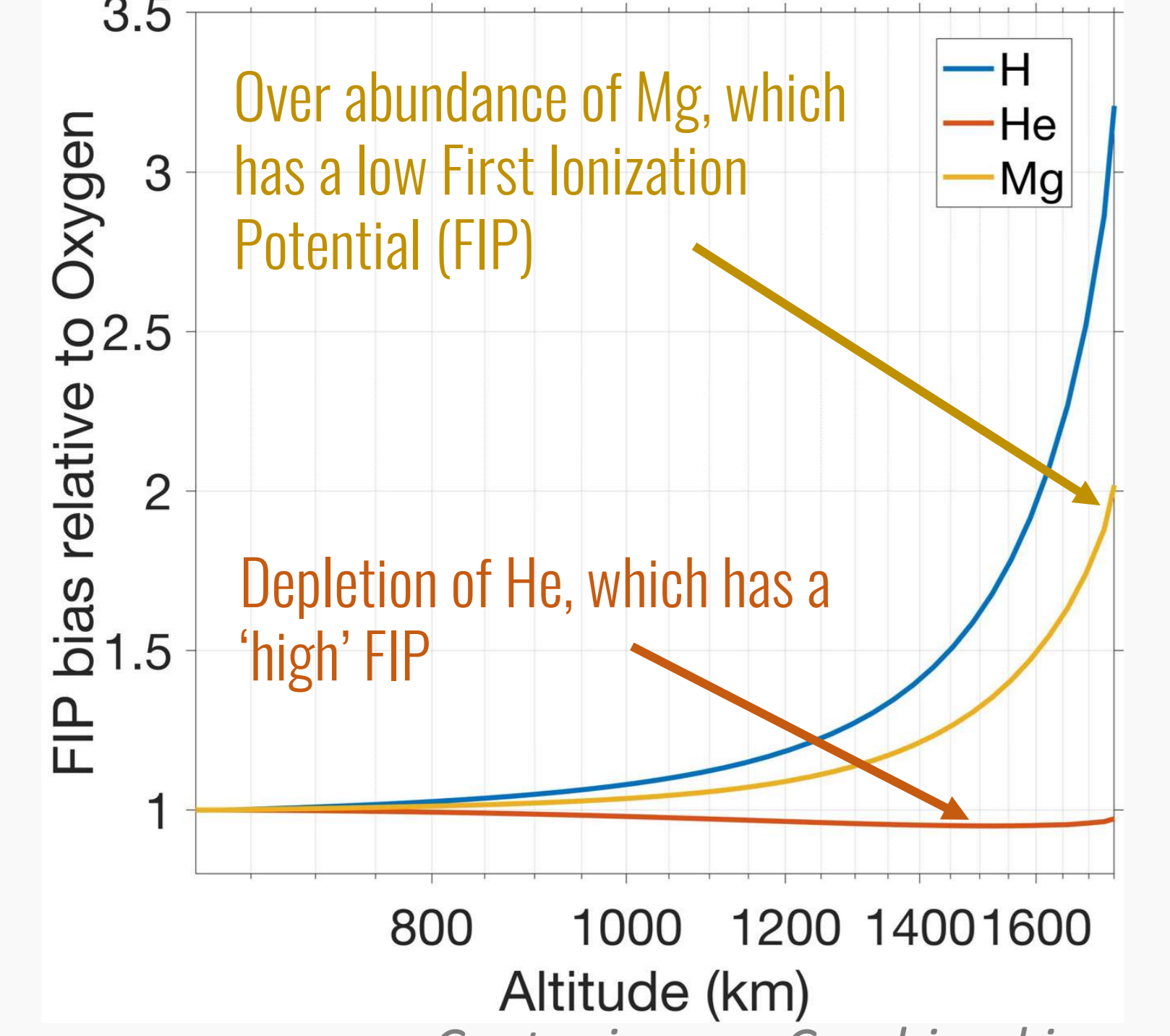


## Simulating the FIP Effect in Coronal Loops Using a 1-D Multi-Species Kinetic-Fluid Model [Lavarra et al. 2021, in prep] [Poirier et al. 2021, in prep]

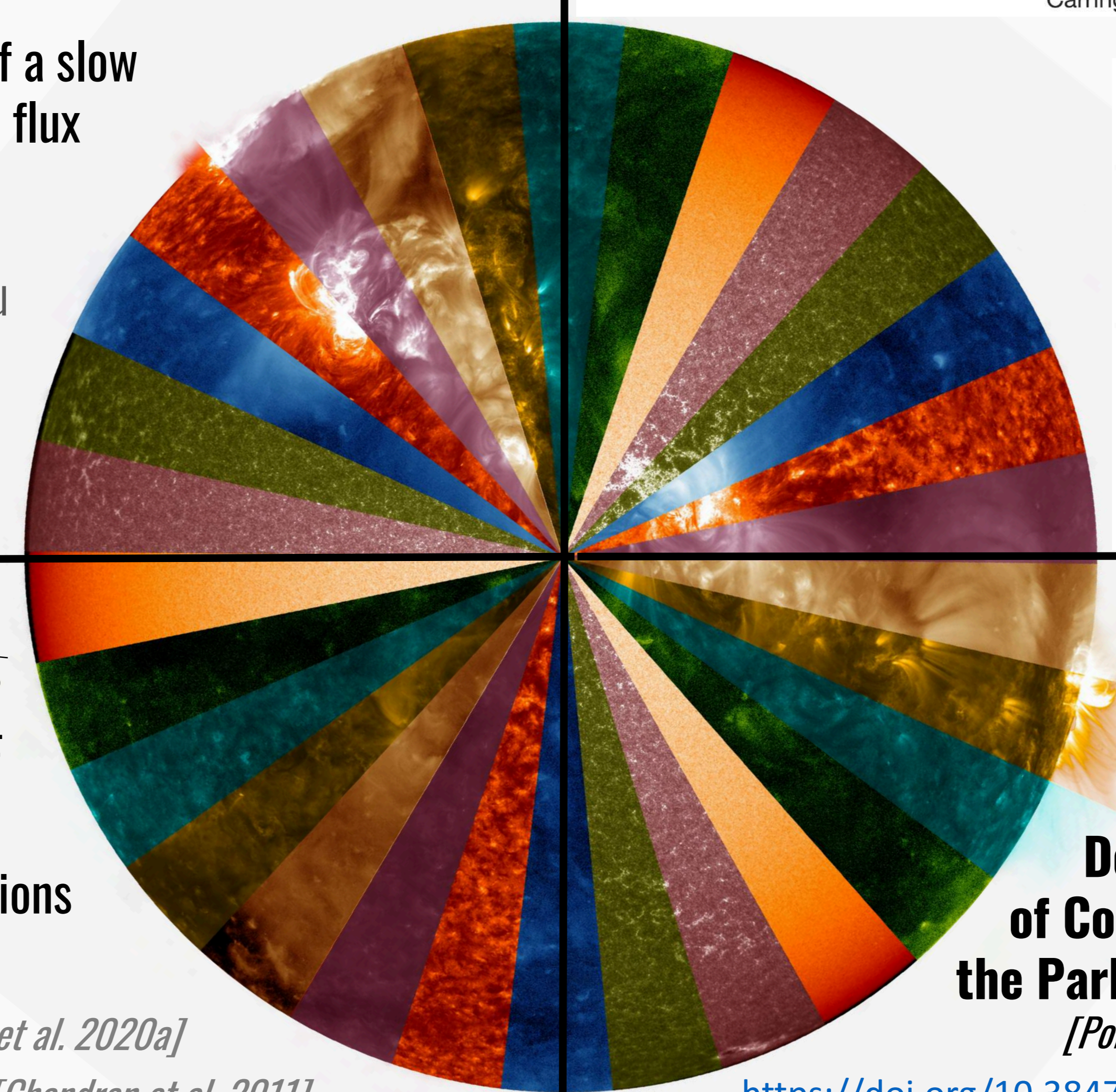
[Lavarra et al. 2021, in prep]  
[Poirier et al. 2021, in prep]



- neutrals, protons, electrons, heavy ions
- ISAM solves the 16 transport eq of the VDF ( $n, u, T^{\pm}, T^{\parallel}, Q^{\pm}, Q^{\parallel}$ )
- Momentum and energy exchanges by collisions
- Testing different heating models
- Ad-hoc functions: [Pinto et al. 2017], [Réville et al. 2020a]
- Alfvén waves dissipation: [Lie-Svensden et al. 2001] [Chandran et al. 2011] [Buchlin & Velli et al. 2007] [Verdini et al. 2009]
- Including physical mechanisms to study the FIP effect: Ponderomotive (waves) & thermal (pressure) forces, collisions, gravitation
- Photoionization, radiative & di-electronic recombination, direct ionization by collisions with  $e^-$ , auto-ionization



- Future work:  
Compare our model with composition measurements made by spectrometry and in situ at Hinode, SoLo & PSP.  
Include radiative transfer.  
Test magnetic reconnection between open and closed fieldlines.



## Detailed Imaging of Coronal Rays with the Parker Solar Probe [Poirier et al. 2020, ApJS]

<https://doi.org/10.3847/1538-4365/ab6324>

- Understanding the fine structure of streamer rays
- Making synthetic WISPR images
- Exploiting 3-D coronal models to help the interpretation of WISPR observations
- Future work: Making synthetic white-light images of streamer perturbations with time-dependent simulations.

## PSP/WISPR white-light synoptic map

