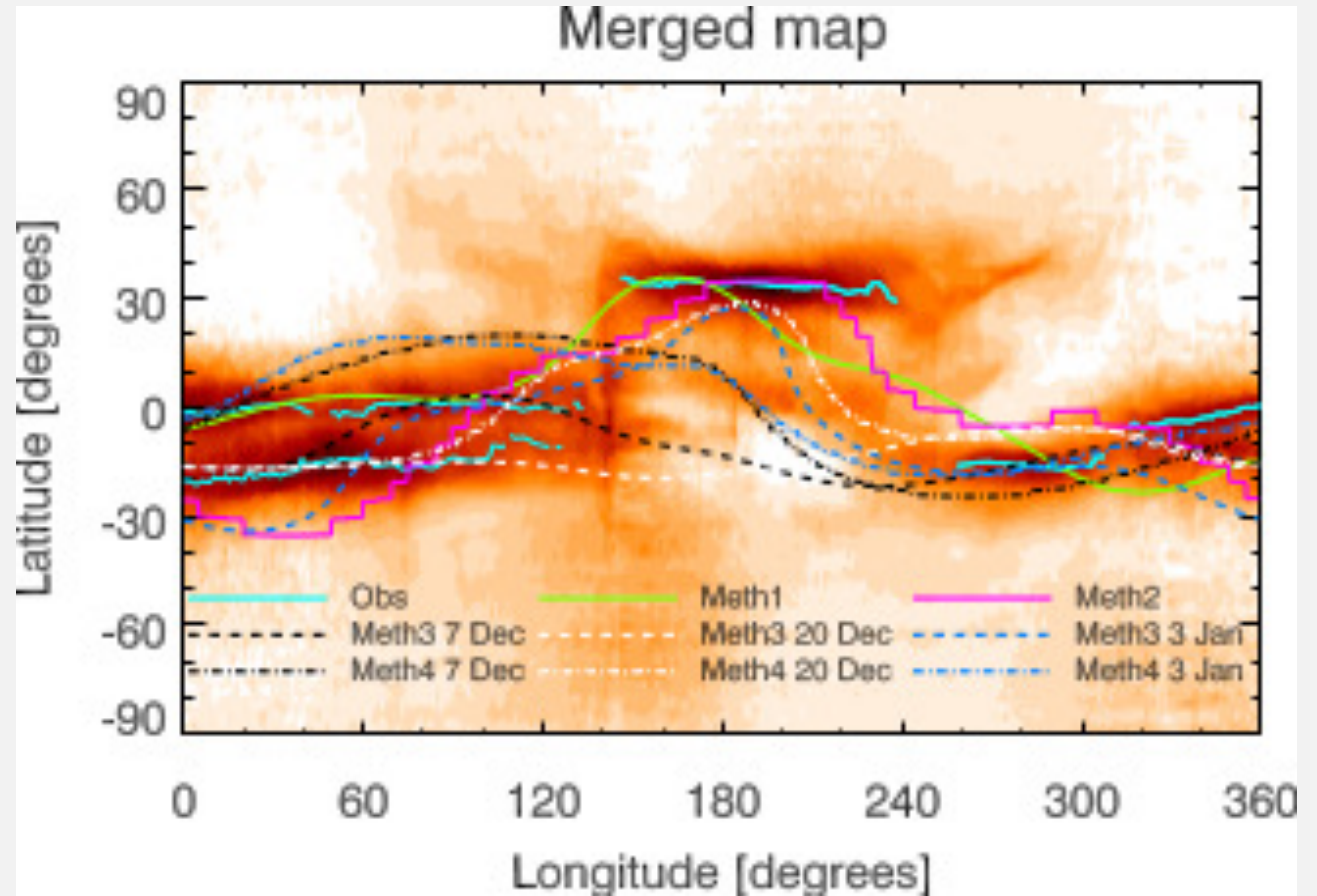


CORONAL MAGNETIC FIELD MODEL ASSESSMENT AND SELECTION USING TOMOGRAPHIC ELECTRON DENSITY RECONSTRUCTIONS

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Uritsky, Christopher Rura, Nathalia Alzate

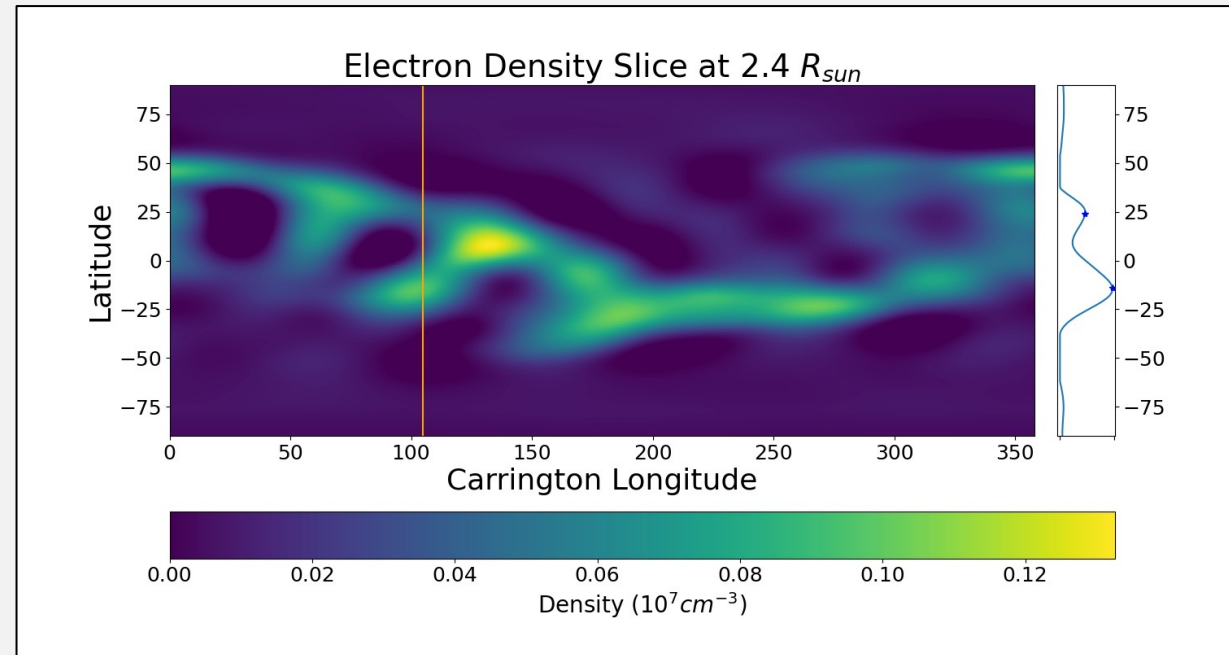
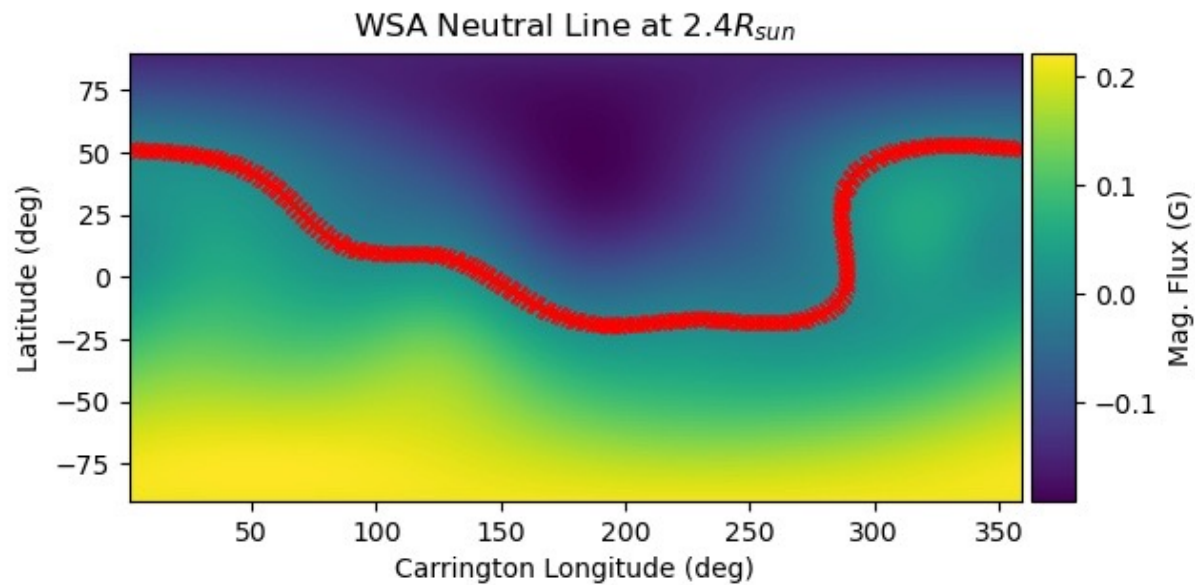
BACKGROUND

- Different input maps and/or model parameters can lead to significant differences in coronal magnetic field models and space weather predictions
- In absence of coronal field measurements, we must compare field structure to other observables
- Sasso et al. (2019), Poirier et al. (2021) compared model magnetic field neutral lines to max brightness at each latitude in coronal synoptic maps
- Challenges
 - Smearing streamer belt structure – abrupt jumps in latitude
 - Streamer belt configuration must be single-valued function of longitude



Sasso et al. (2019) Fig. 8, showing neutral lines from multiple coronal magnetic field models computed for CR 2091, plotted over multi-spacecraft coronal synoptic map

TOMOGRAPHIC COMPARISONS



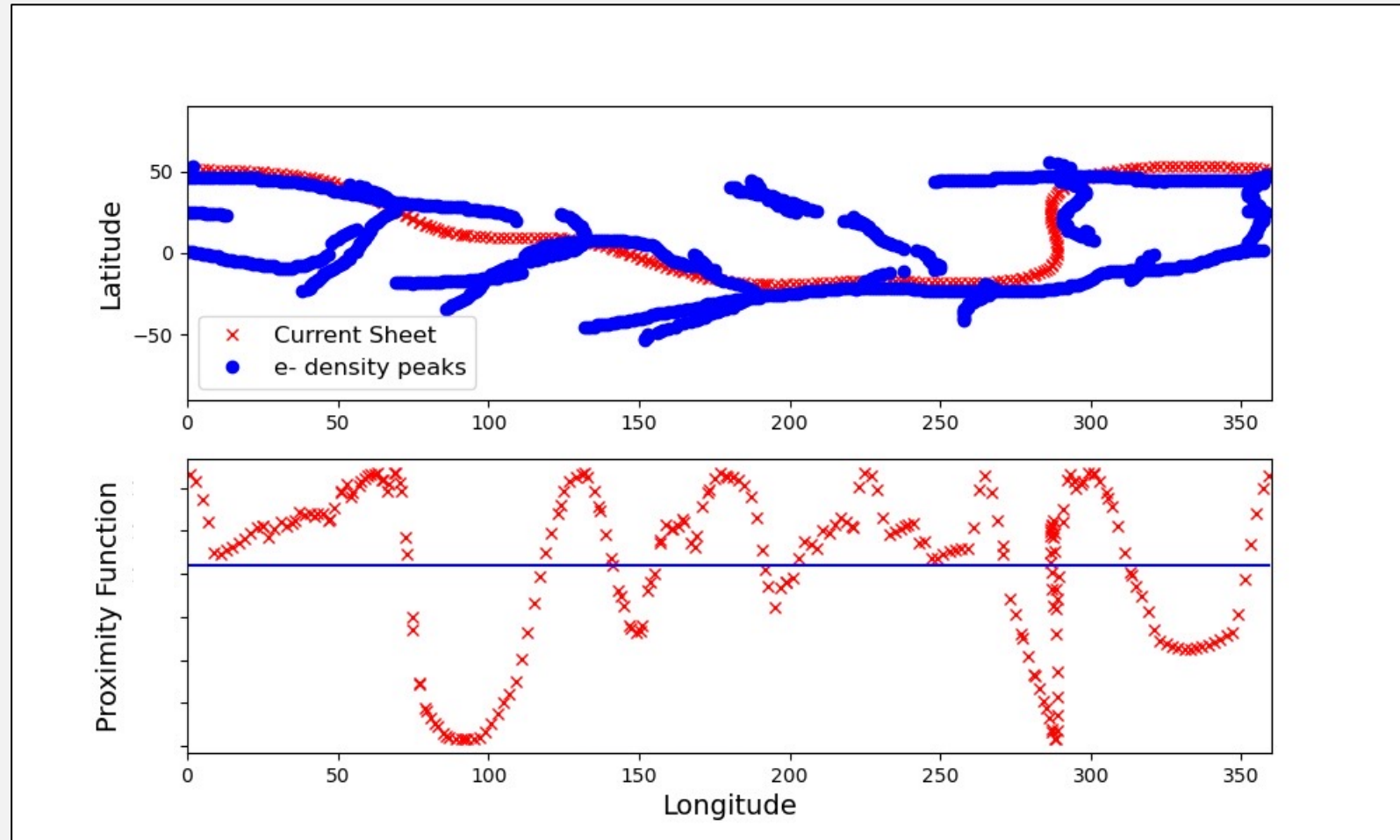
Wanted a quantitative way to compare the location of the magnetic neutral line in a coronal magnetic field model (left) with observed peaks in the coronal electron density (right) that allowed for arbitrary streamer belt configurations

TOMOGRAPHIC COMPARISONS

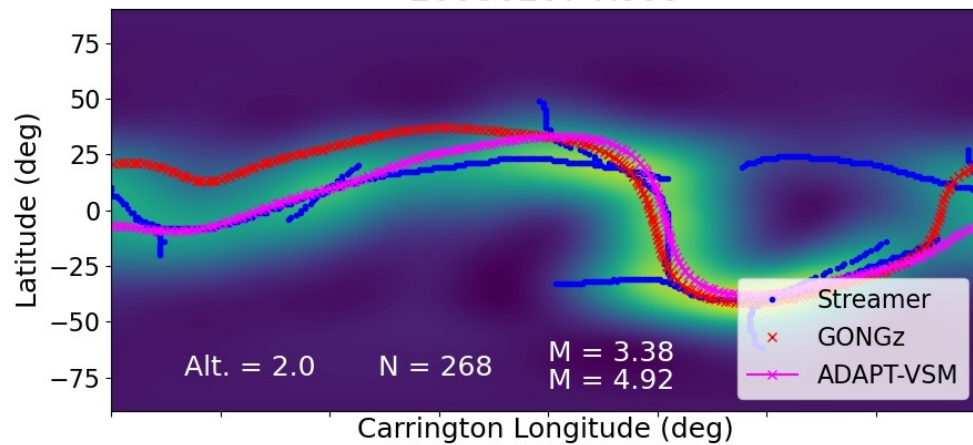
$$P(\chi_i) = e^{\kappa \cos(\min(\theta_i))}$$

where $\min(\theta_i)$ is the separation angle between the point χ_i and the nearest electron density peak

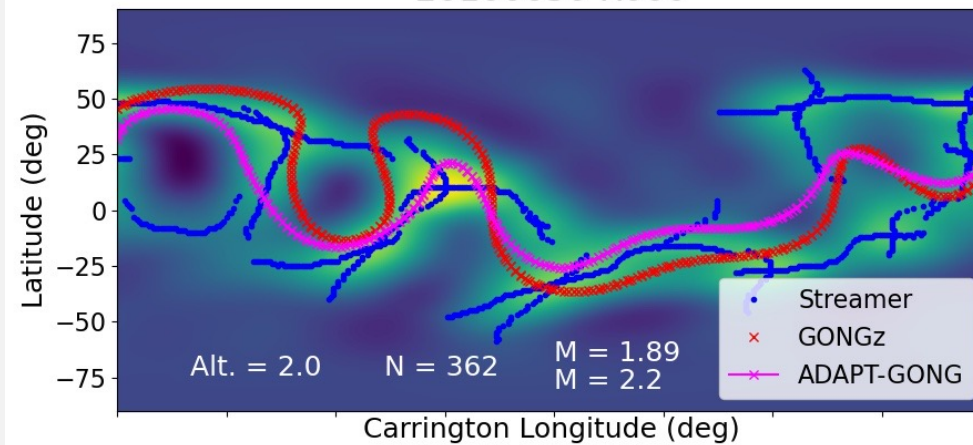
$$M = \frac{\overline{P(\chi_{NL})}}{\overline{P(\chi_{shell})}}$$



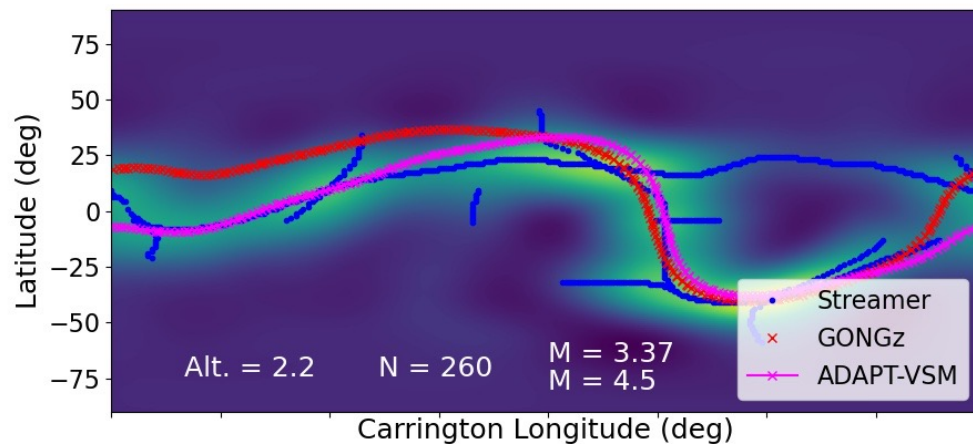
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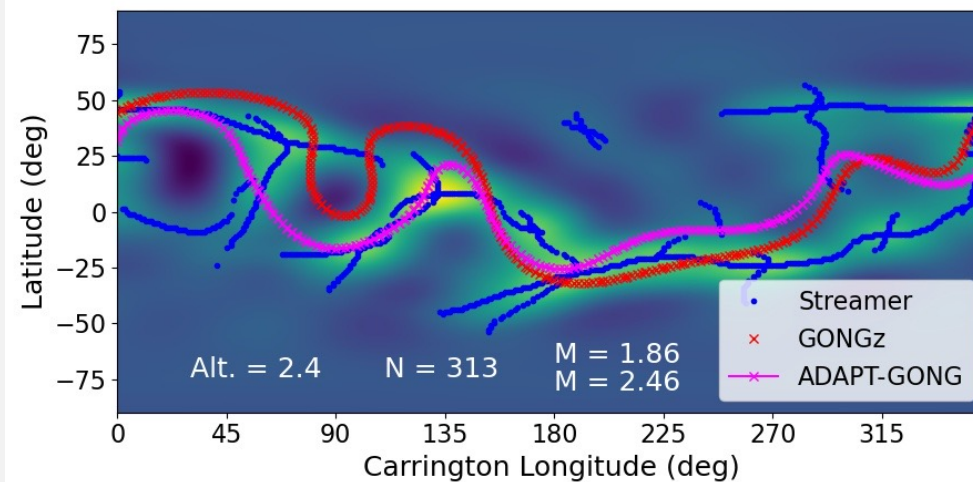
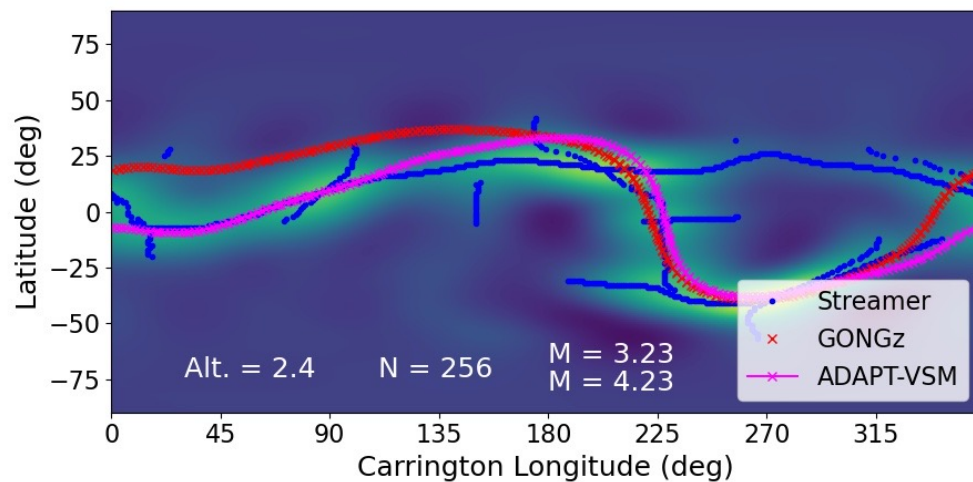
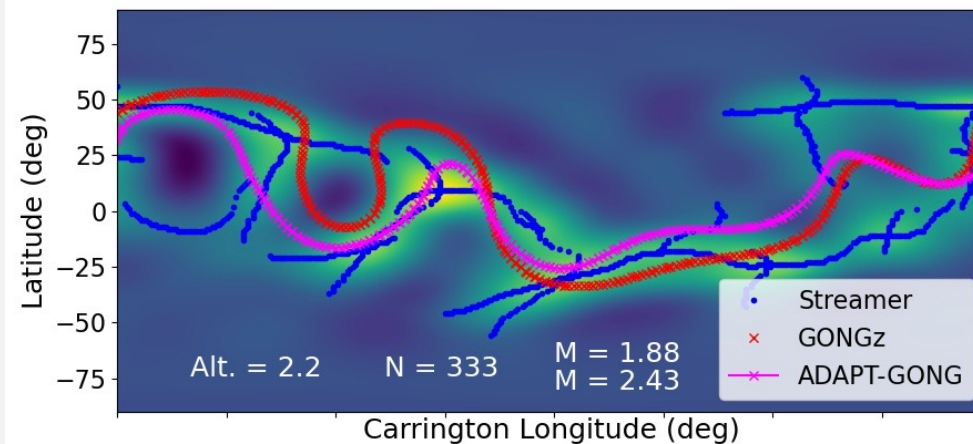
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CR 2066



CR 2098



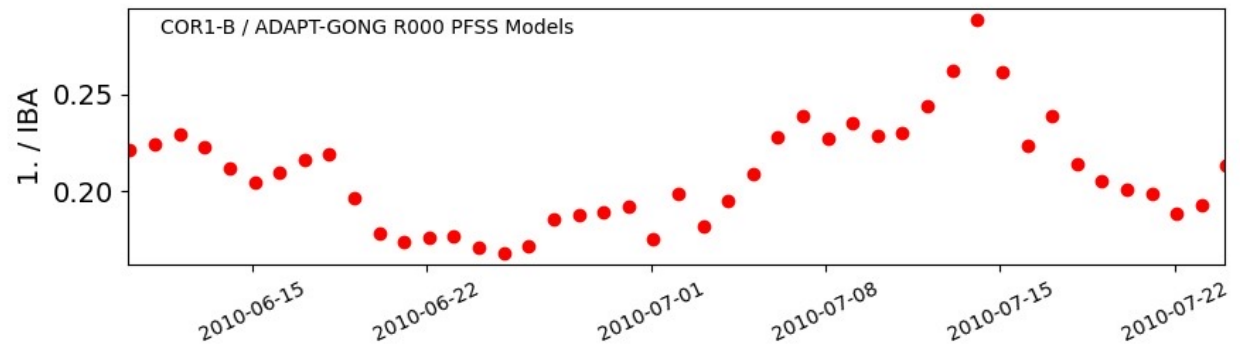
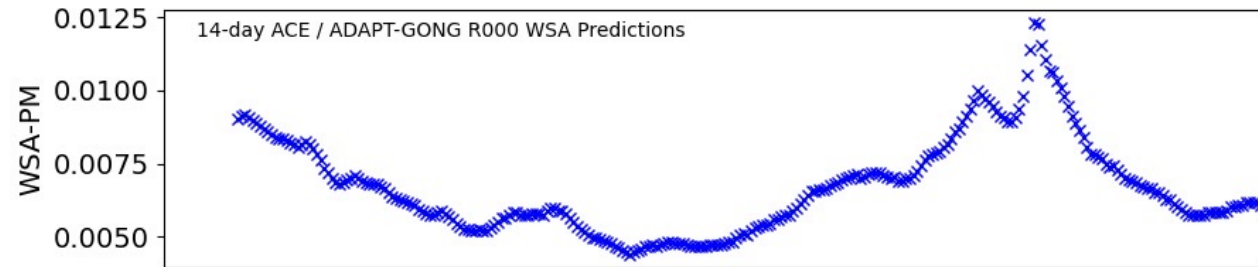
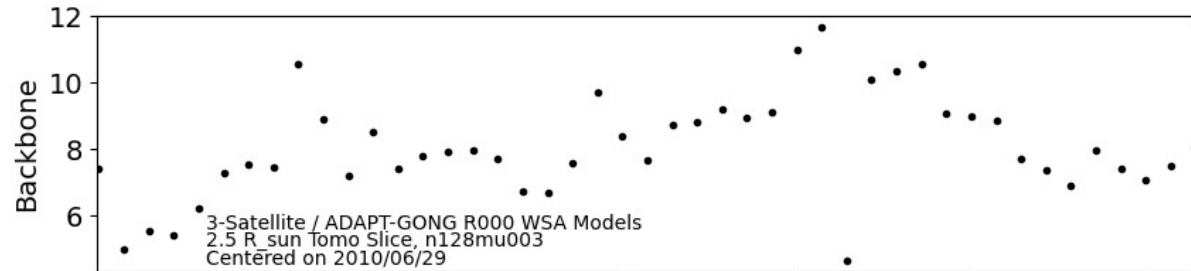
CONCLUSIONS AND FUTURE WORK

- Created a new metric for comparing coronal magnetic field models to tomographic electron density reconstructions
- Describing streamer belt and magnetic neutral line with discrete points allows comparison of even complex coronal structures
- Future work:
 - Extend to additional time periods
 - Compare to other model assessment metrics (*in situ* measurements, coronal holes, feature tracing)

EXTRA SLIDES

COMPARISON TO OTHER METRICS

- Different strengths and weaknesses
- Application determines the ideal approach



THE IMPACT OF FAR SIDE ACTIVE REGION EMERGENCE

