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Time-dependent tomography & streamer belt variability:
12-hour to few day density variations

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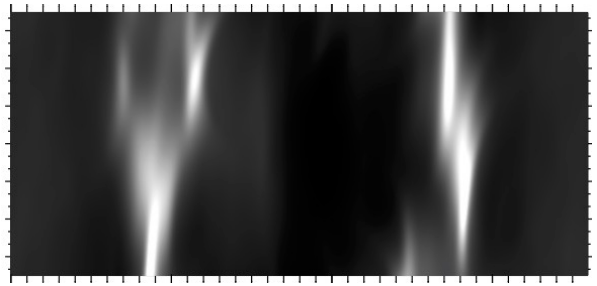
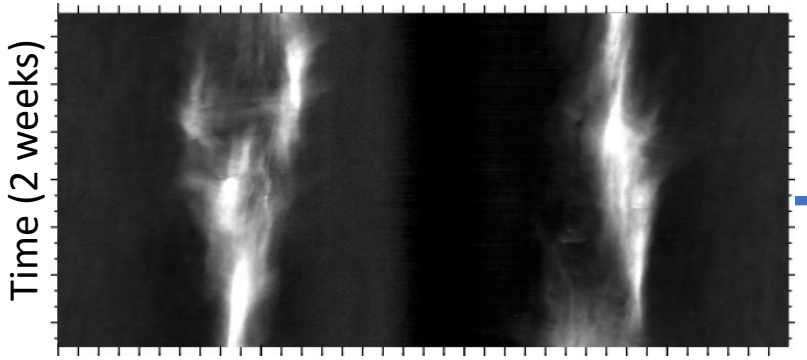
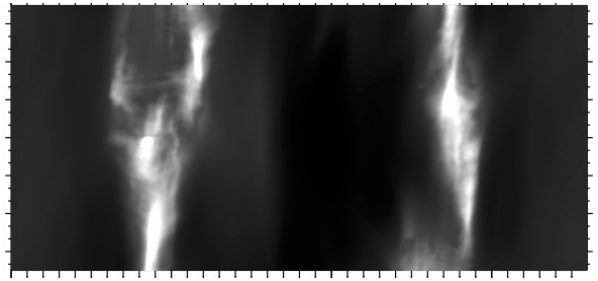
Static => Time-dependent

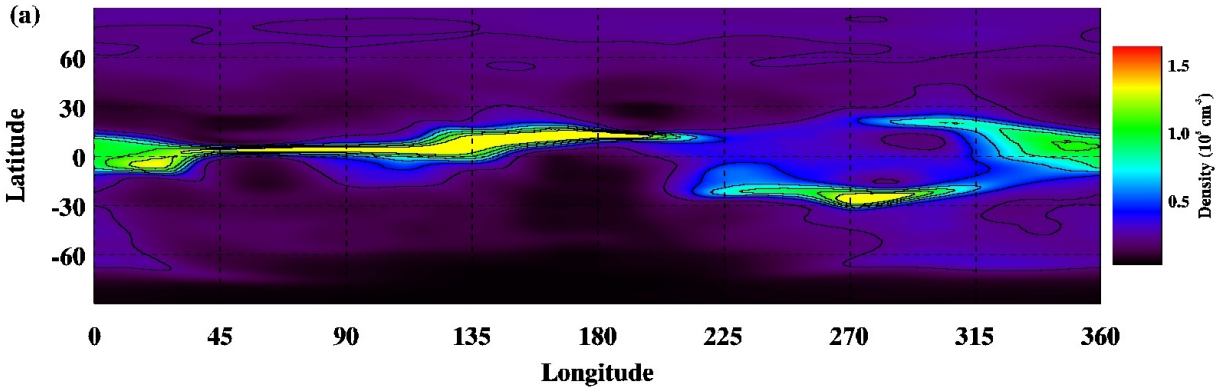


2 weeks of input data (height=4Rs)

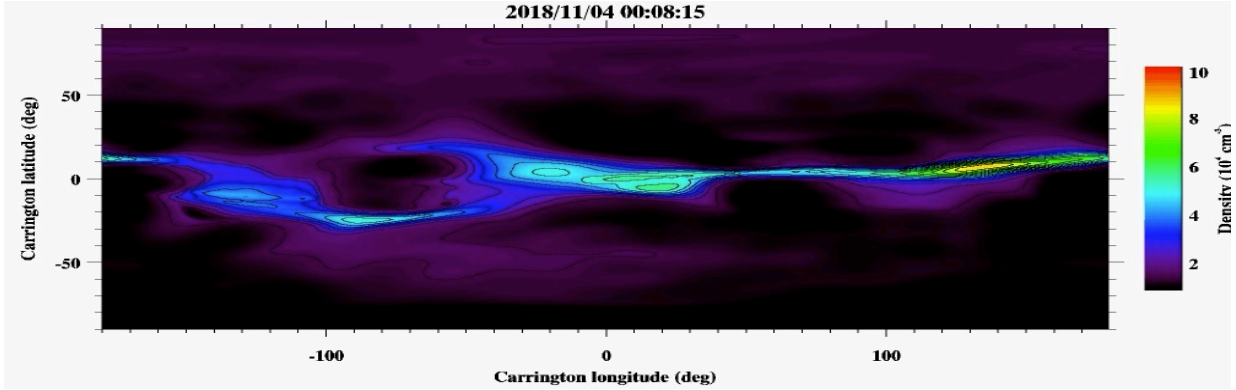




One reconstruction (static)



Time series of reconstructions

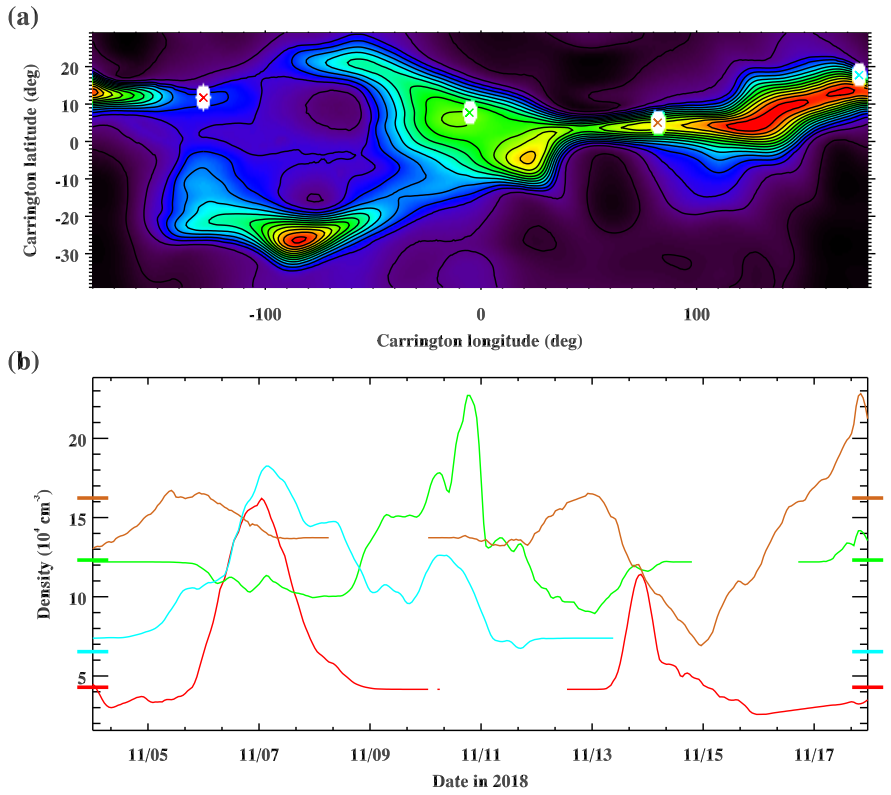


- Static density distribution that best satisfies input data
- Regularized (spatially smooth)
- Other refinements (narrowing of streamers, correction for ‘excess densities’ in coronal holes)

- Time-dependent distribution fits input data ***closely***
- Spatially smooth, temporally smooth
- Temporal variations confined to streamer regions only

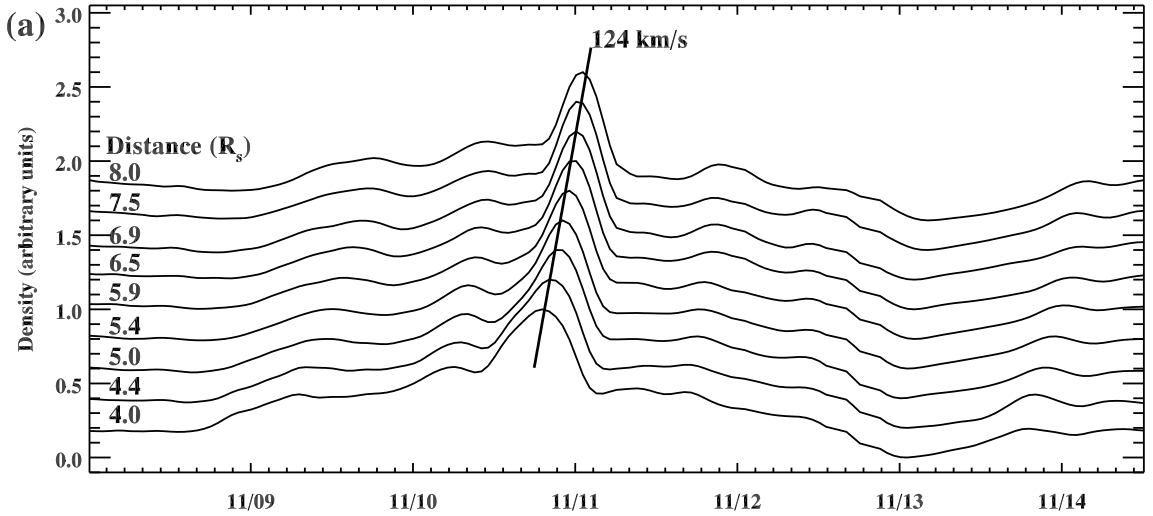
Characteristics of the density variations

Magnitude & timescale



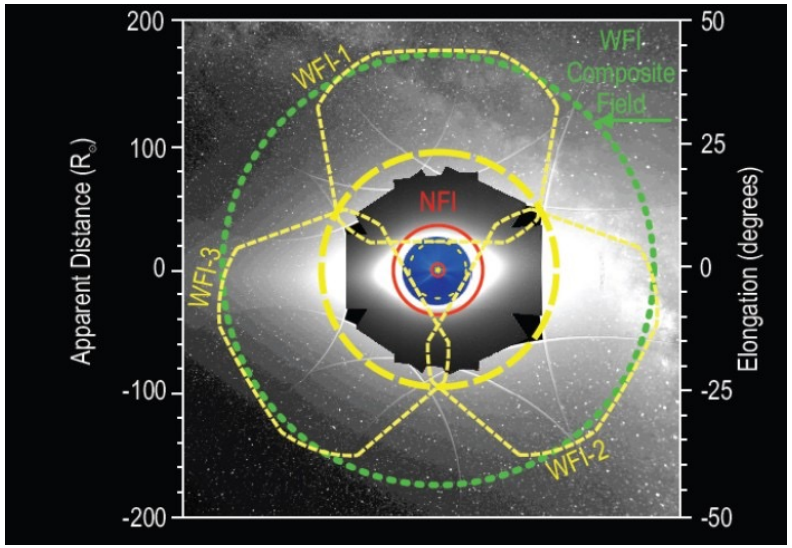
- Example of density variations at 4 locations
- Large variations – occasional factor of 3 increases
- Timescales of 12 hours to 2 or 3 days
- Tomography crucial to reveal this variation (else how do we distinguish from rotation effects...)

Outward propagation



- Density variations occur at later times with increasing distance
- Typical lag corresponds to speeds of ~120km/s
- Bulk outflow velocity? (density variations within ‘rigid’ magnetic structure)
- Sound speed? (‘constant’ density within a moving magnetic structure)
- Combination of density & structural variations.

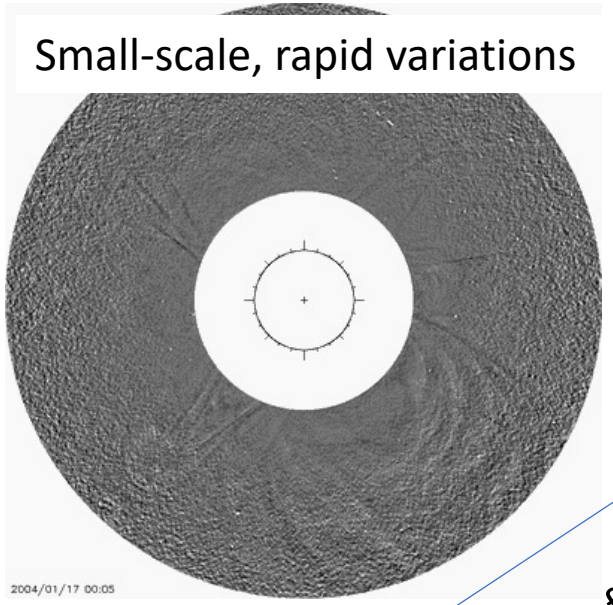
Looking forward to PUNCH



- NFI most suited for current implementation
- WFI composite field should work
- High-quality pB observations, regular cadence
- At larger distances, F-Corona increasingly problematic. However, F-corona is much smoother than K-corona, and varies less over 2-week timescales
- Tomography may help characterize F-corona contribution

- Crucially, time-dependent tomography opens a window to variations on multi-hour to few day timescales.

Small-scale, rapid variations



Multi-hour => few day variations

Large-scale, slow (days>weeks) variations