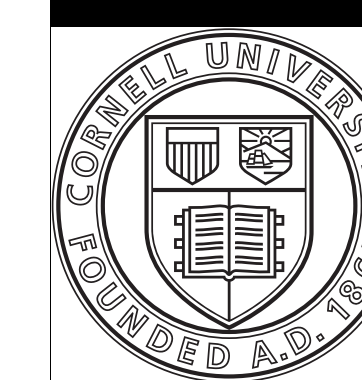


Multi-Instrument Full-Surface Coronal Hole Tracking: Boundary and Flux Evolution



Cornell University

D. Stauffer, C. Lowder

Abstract

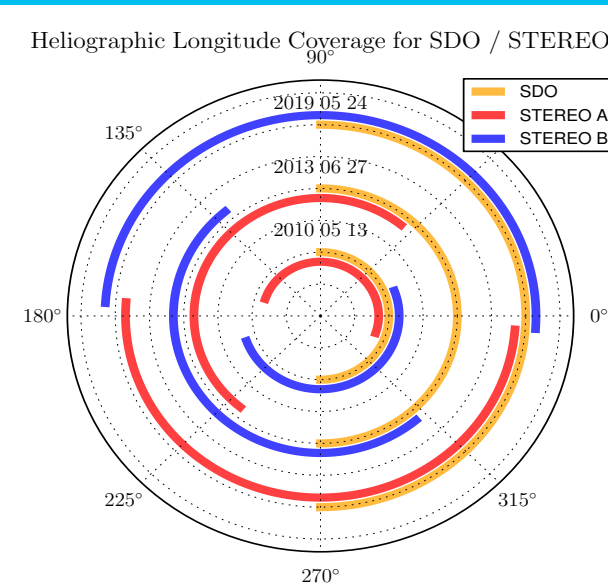
Coronal holes are areas of open field lines in the sun's magnetic field where magnetic flux escapes. We have tracked the changes in in the boundary of a specific, large coronal hole and the resulting change in flux over the course of several weeks at one hour cadence.

Motivation

- How are coronal holes shaped by magnetic fields?
- Are daily hmi-updated synoptic magnetic charts more accurate than the full rotation hmi charts for this purpose?
- Can we consistently track how a coronal hole's boundary evolution over multiple rotations?
- How do changes in coronal hole boundaries encompass new flux?

Data Collection

EUV data comes from SDO, STEREO A and B satellites. 193 and 195 Å images were obtained at one hour cadence. Magnetic field data is collected by the HMI sensor only on SDO. STEREO A and B are placed around the sun so as to obtain a full view of the sun (see graphic).

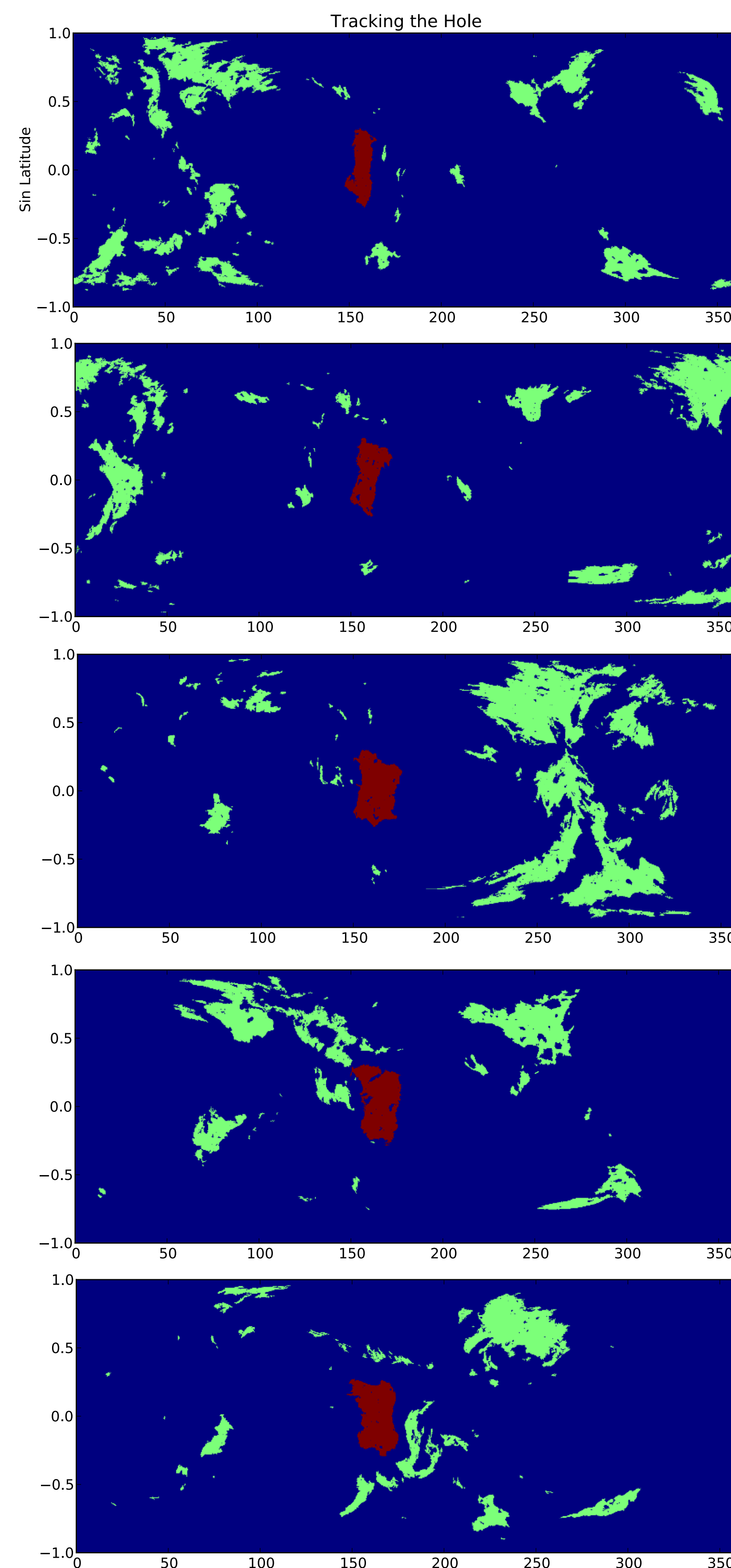


Previous Work

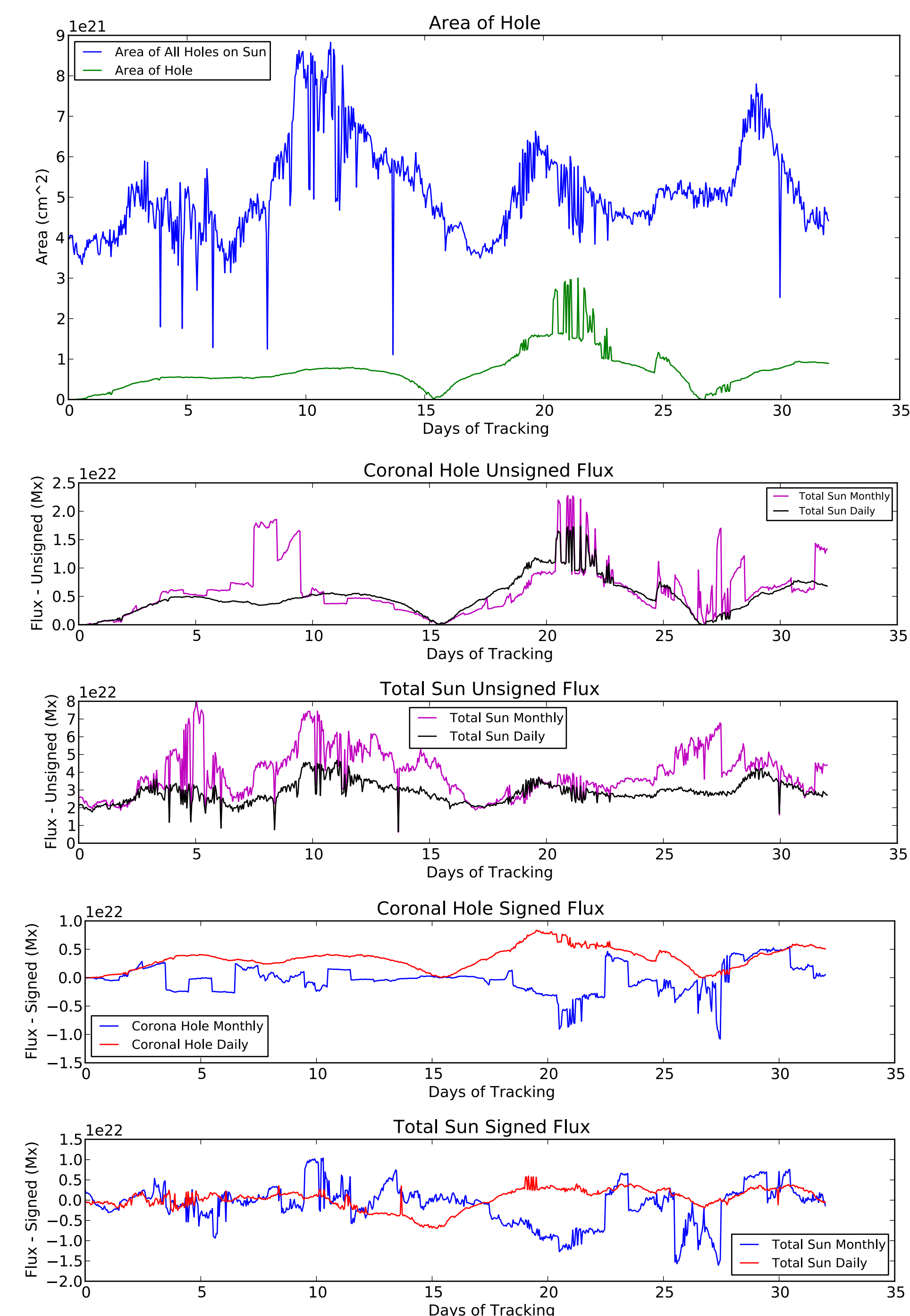
- Previously, Chris Lowder has tracked coronal holes across the sun at a twelve hour cadence. We redid this procedure at a 1 hour cadence looking at one specific hole
- Earlier work looked at the entire sun, this work focuses on a mid-latitude coronal hole

Works Cited

- Cranmer, Steve R. "Coronal Holes." *Living Reviews in Solar Physics* 6 (2009): n. pag. Web. 1 July 2013. <http://www.livingreviews.org/lrsp-2009-3>
- C. Lowder, et al. Full Surface Automated Coronal Hole detection and Characterization to Constrain Global Magnetic Field Models. Unpublished.



Results



Conclusions

- Accurate tracking of coronal holes at high cadence for multiple rotations is possible.
- To track coronal holes accurately, daily-updated hmi charts are needed because they produce smoother/more consistent development than the monthly hmi charts.