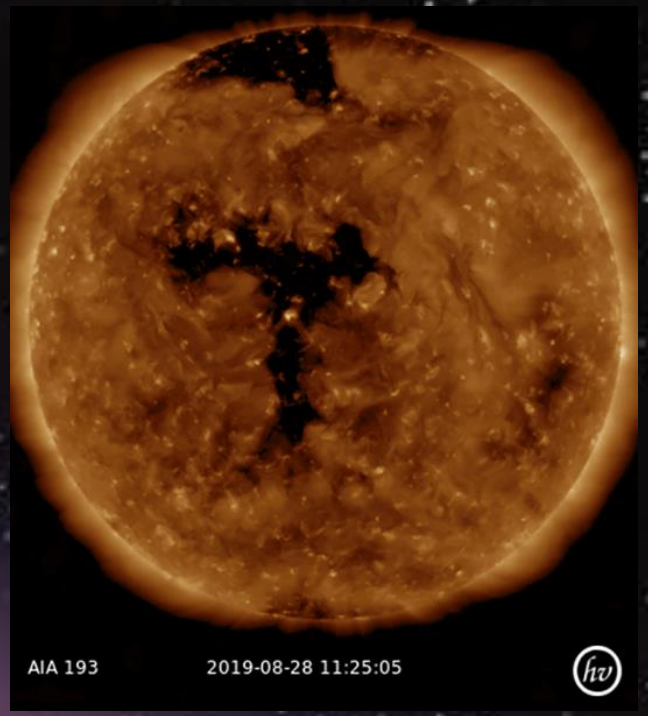
The Sun-Heliosphere Mosaic

Welcome to Solar Minimum 24 – 25!

Ian Hewins – Barbara Emery – Sarah Gibson

HAO/NCAR

There are many ways to look at the WHPI data. A primary goal of the WHPI initiative is build a mosaic of the system during minimum and make connections from the Sun to Earth and throughout the Heliosphere.



Daily Images such as this SDO (Solar Dynamics Observatory) EUV (Extreme Ultra Violet) image.

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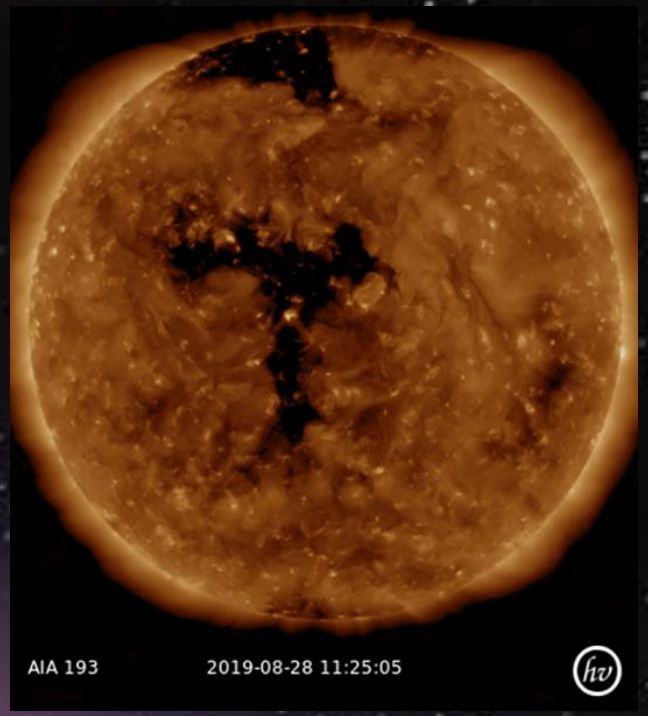

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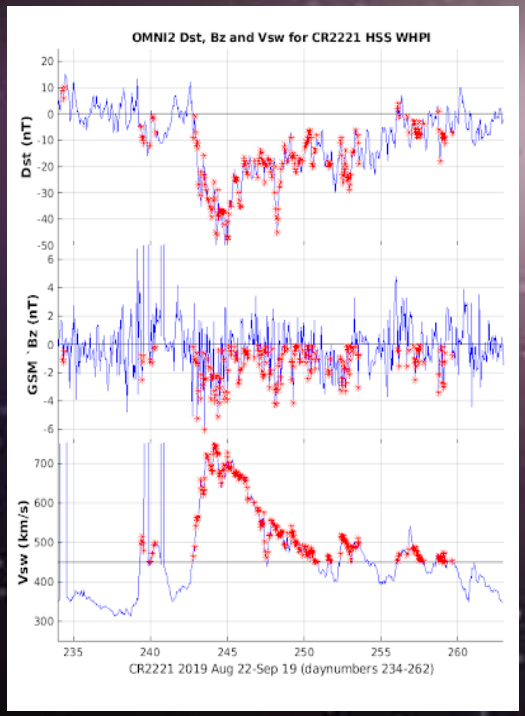

Solar wind Data such as this Omni plot showing Dst (Disturbance Time Index), Bz (Orientation of IMF) and Vsw (Velocity in Km/s).

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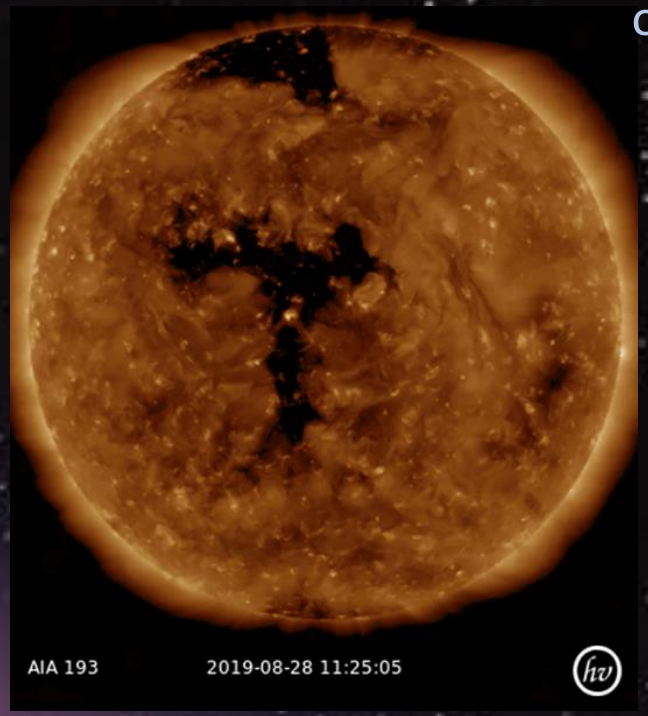

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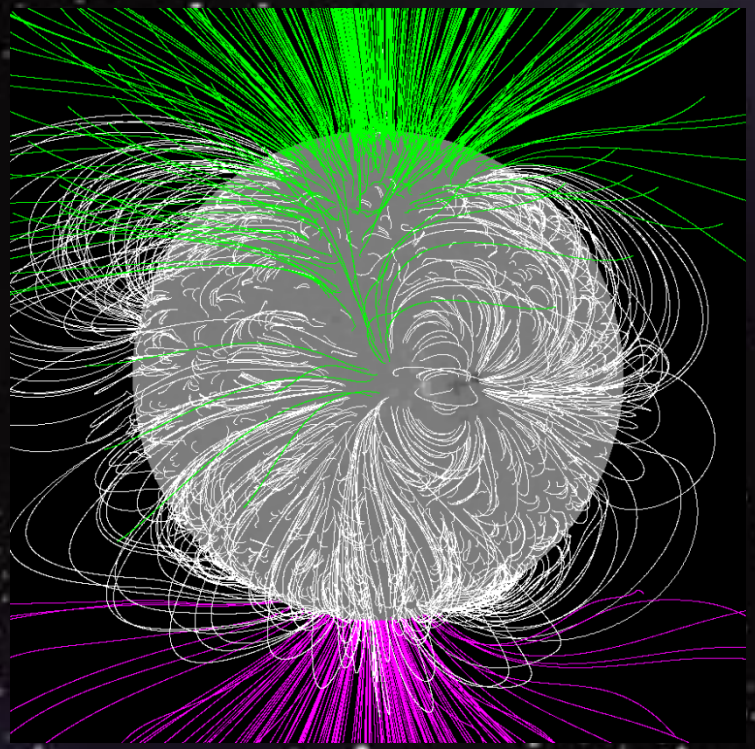
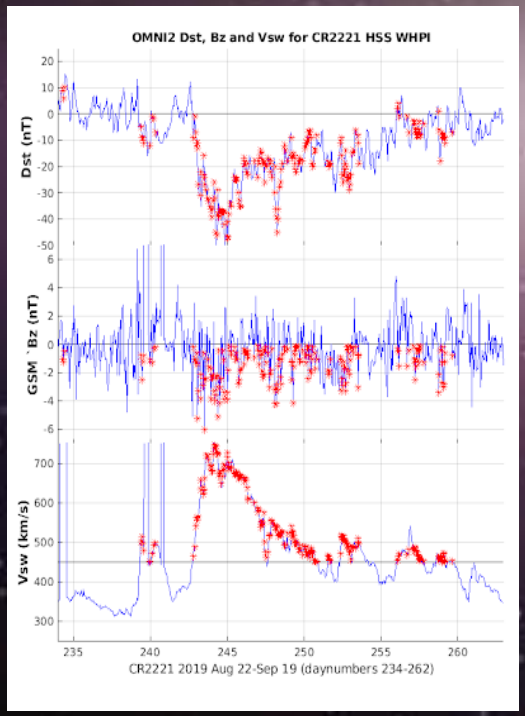
De Rosa PFSS (Potential Field Source Surface) Model, know as the “Hairy Sun”.





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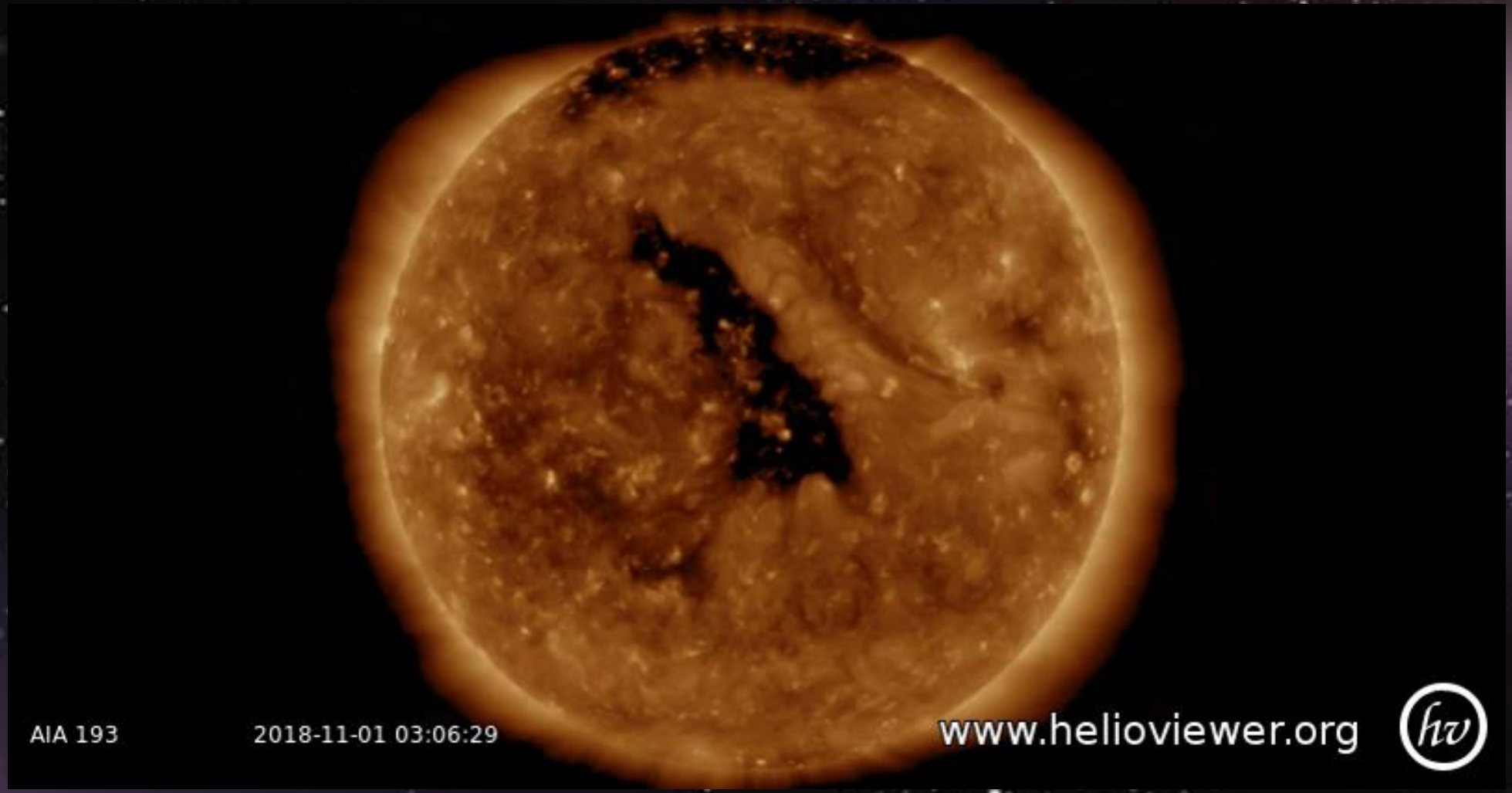
What we undertake is no small feat. There is a myriad of data for this solar minimum.

SDO – EUV
AIA 193
One Year
Minimum
SC24-25

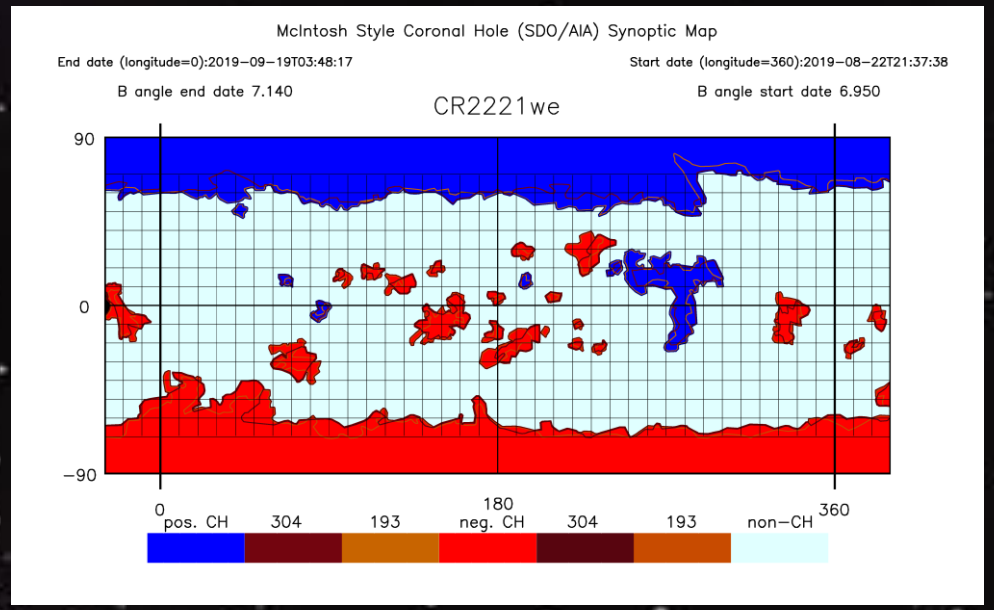


So, how do we rise to the challenge? One way to, look at each rotation of the sun in it's entirety is a synoptic or Carrington map.

A Carrington map is a form of map projection used to flatten a sphere's surface into a plane. Although the resulting rectangular shape creates some distortion, particularly towards the poles, it remains one of the best ways to view and track feature evolution over time.

Time tracks from right to left, beginning at 360 longitude and moving towards 0. Regardless of B angle, the equator is the horizontal central latitudinal line and the poles, stretched out as they are, are at the top and bottom of the maps at 90 degrees.

Coronal hole Carrington maps made with SDO EUV data allow us to focus on the dominant form of space weather during minima, high speed solar wind streams, connecting them to open field at the sun.



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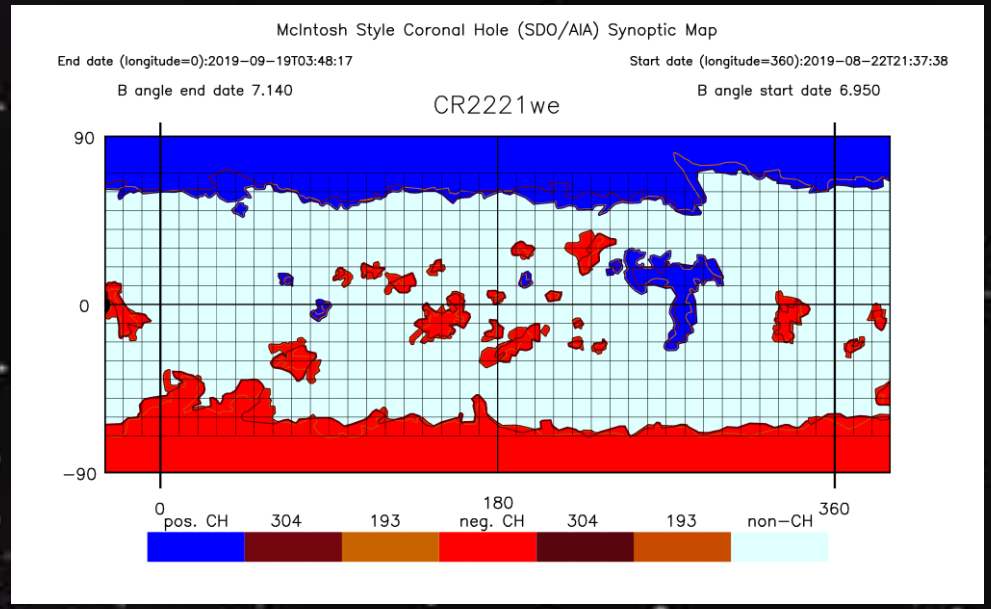

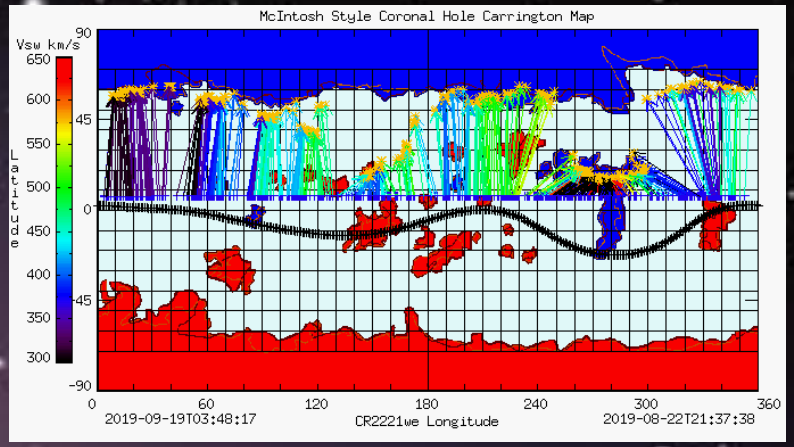

The De Rosa PFSS software (See Hairy Sun above) can also be applied to a Carrington map, tracing the solar wind and its velocity back to its coronal hole origins.

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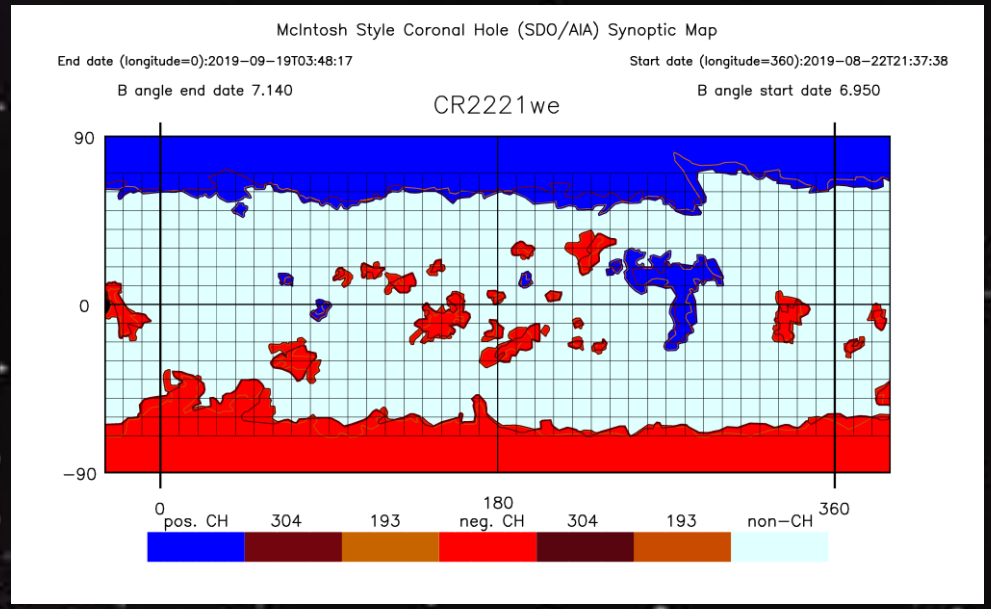
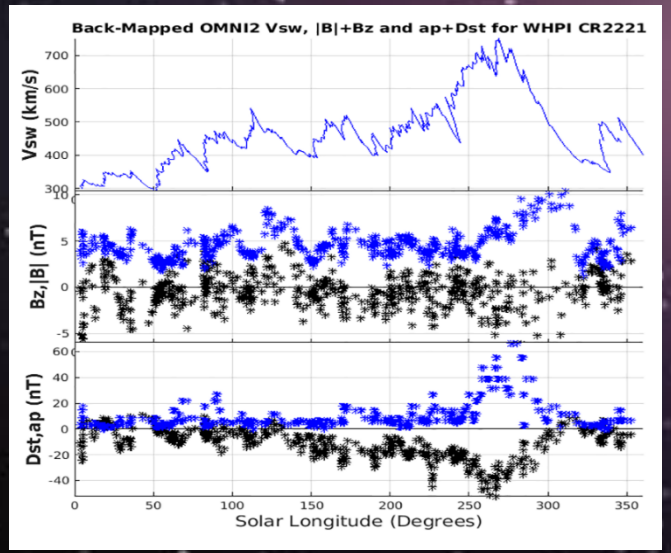


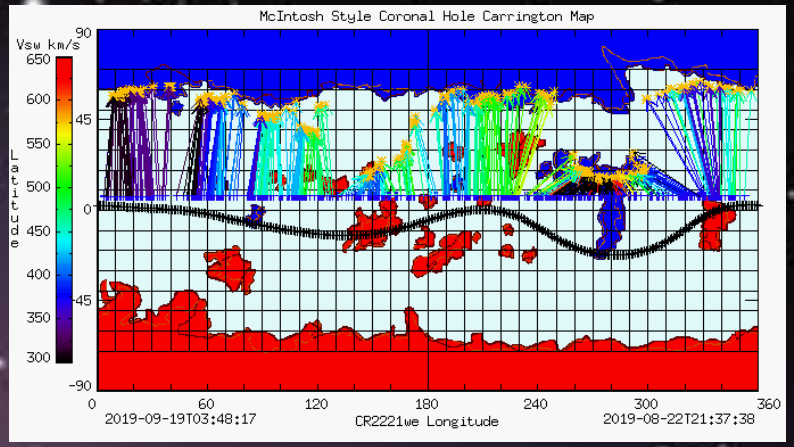
Omni solar wind data, back mapped, adds more information to the mosaic of the heliosphere, telling us how this solar wind interacted with the earth's atmosphere.

VSW

Bz,|B|

Dst, ap





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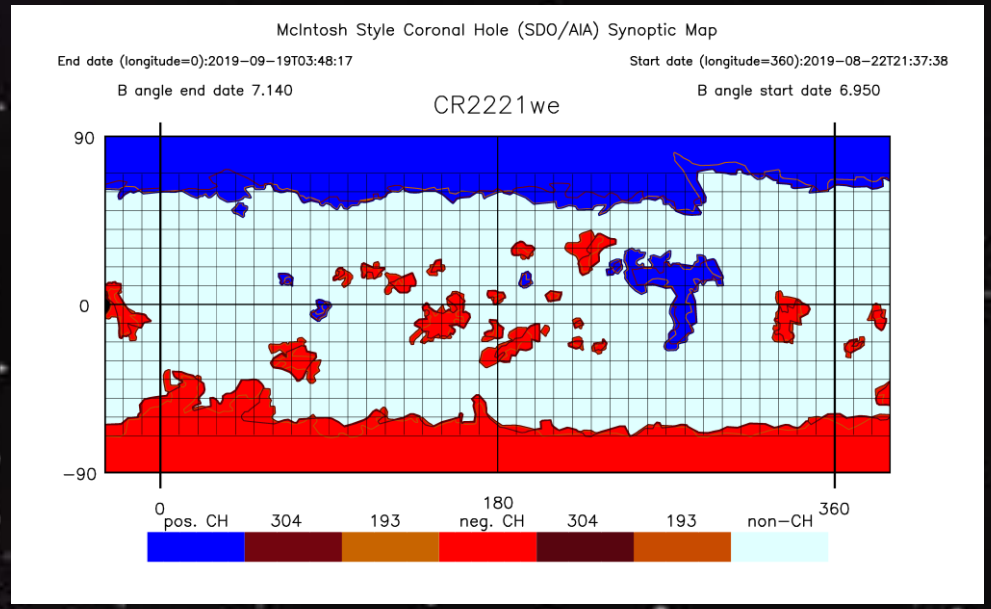

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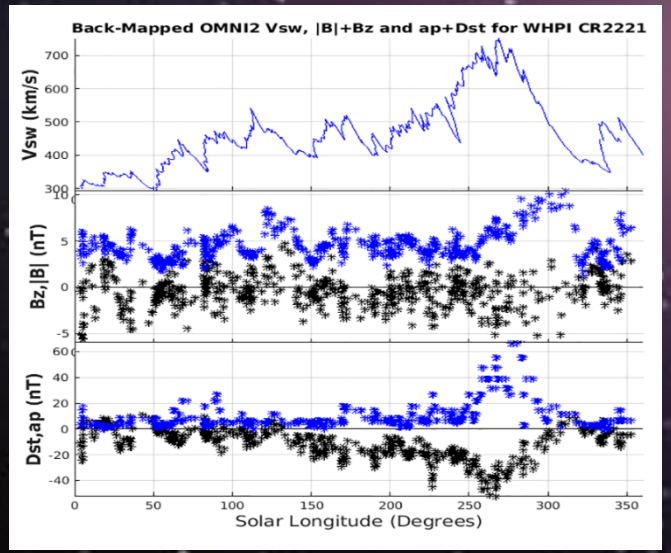

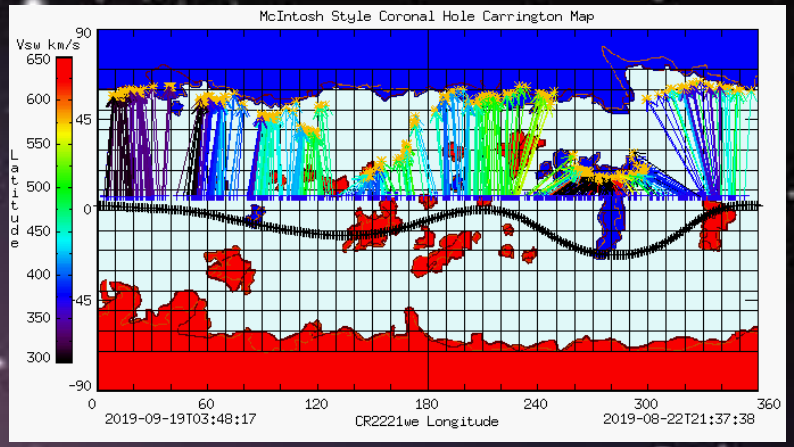

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More results will be presented by Barbara Emery in her HSS presentation.

What do we mean by a WHPI mosaic? Making connections across space (sun to solar wind to planets) and also time. We can make these connections with all the Carrington rotations shown. But this is just the beginning!