Duration of High Speed Solar Wind Stream

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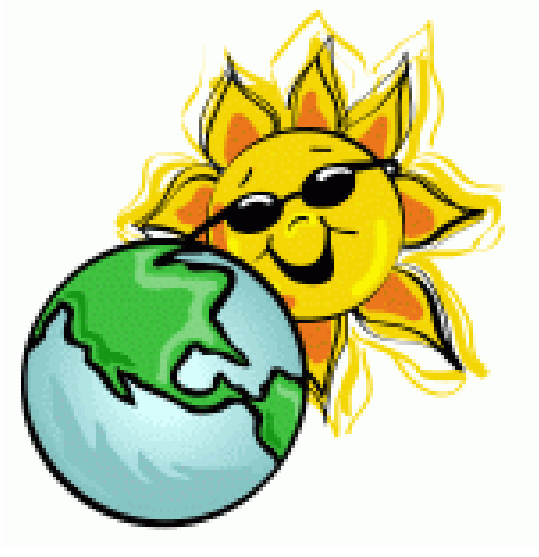


Main goals

Defining physical criteria for determination of an HSS duration - beginning and ending.

Applying this criteria to the available solar wind experimental data and creation of HSS catalogue.

Solar cycle variation

- Solar magnetic activity cycle is the nearly periodic 11-year change in the solar magnetic activity
- At solar minimum, solar magnetic field is closed to dipole nearly aligned with the rotation axis
- At solar maximum, solar magnetic field is much more complicated

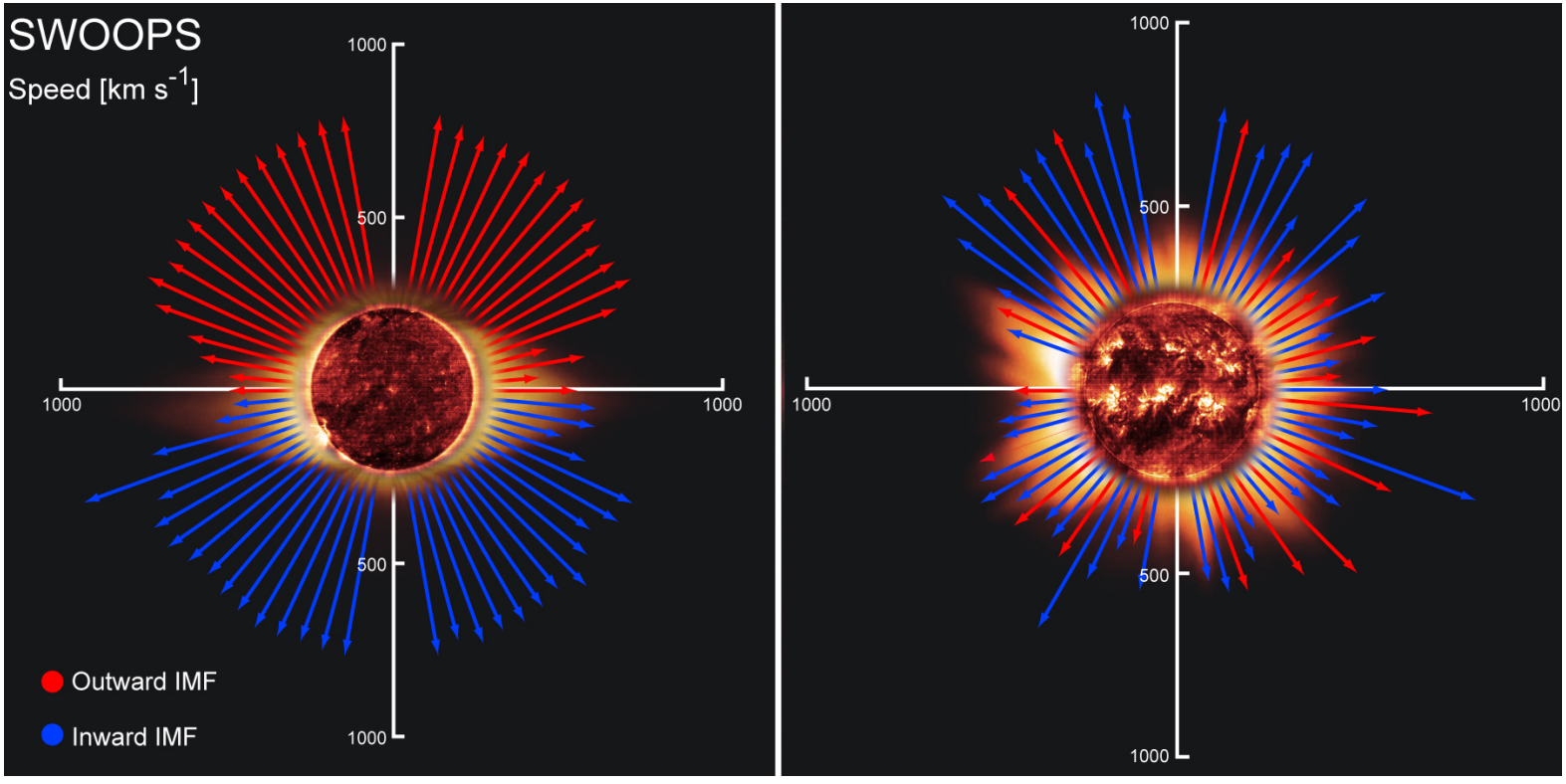


Figure 1: Solar wind speeds measured by Ulysses

Coronal holes and HSS

- "Dark" regions in the corona where the magnetic field is "open"
- Coronal holes can also appear at mid-to-low solar latitudes

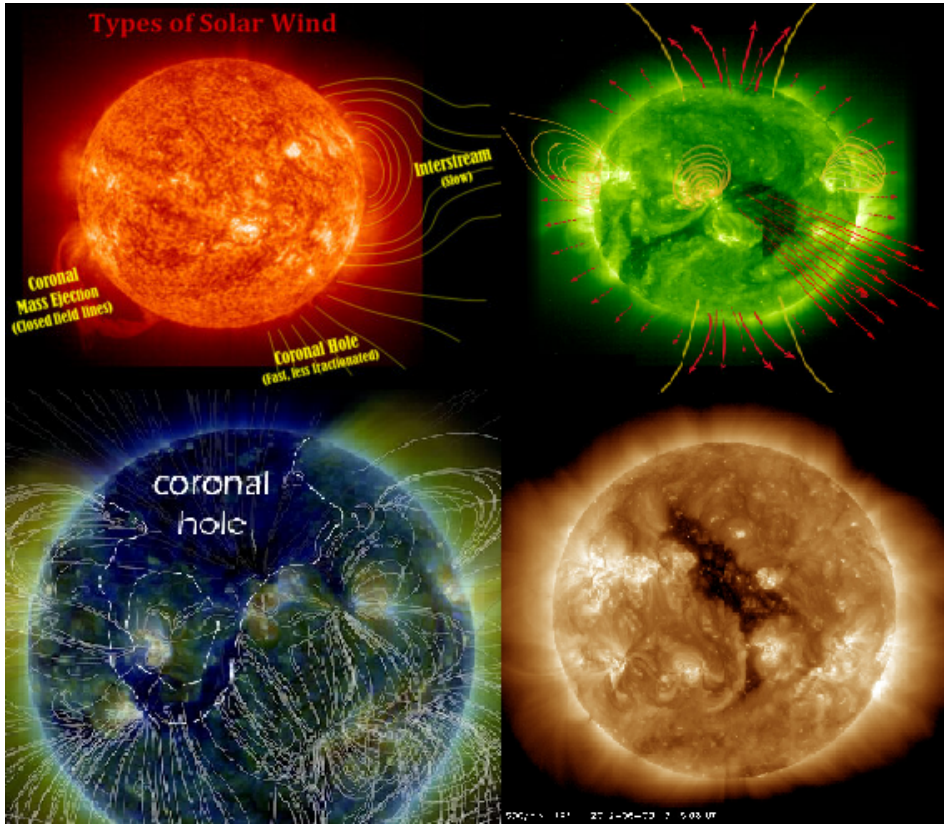


Figure 2: Coronal holes

Solar activity and HSS

- Active regions, sunspots, coronal holes
- Prominences, solar flares, CME, **HSS**, etc.

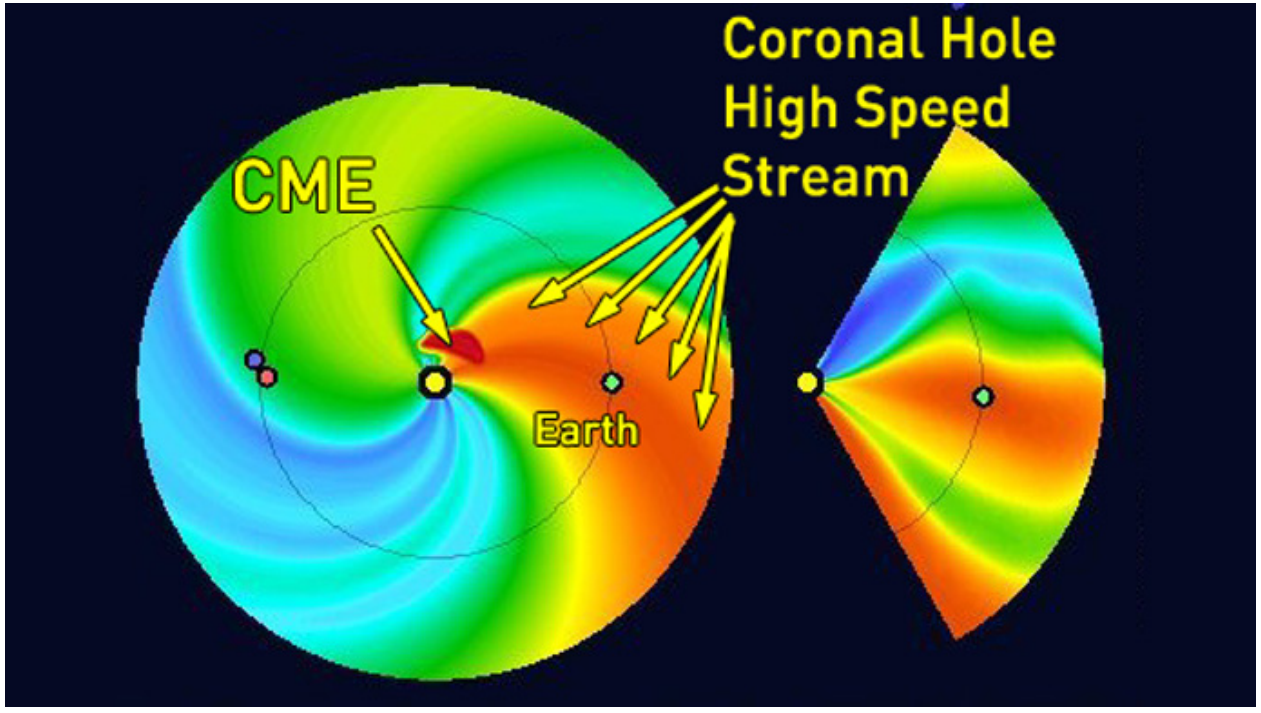
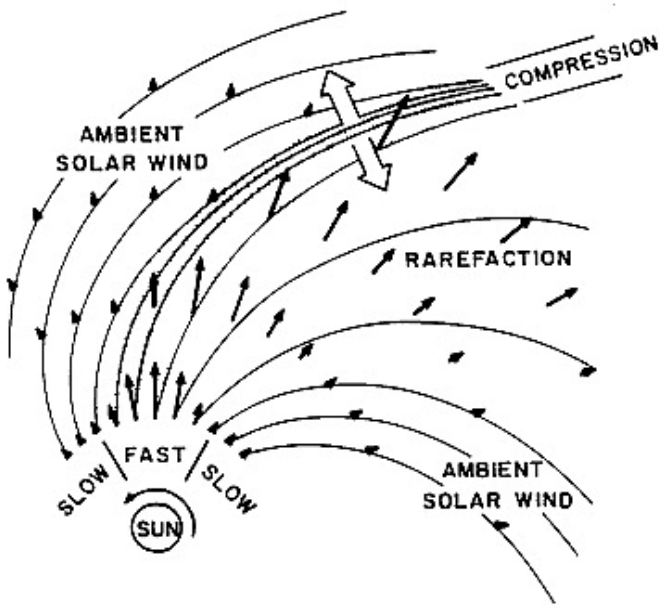


Figure 3: CME and HSS

HSS and CIR

- Active regions, sunspots, coronal holes
- Prominences, solar flares, CME, **HSS**, etc.



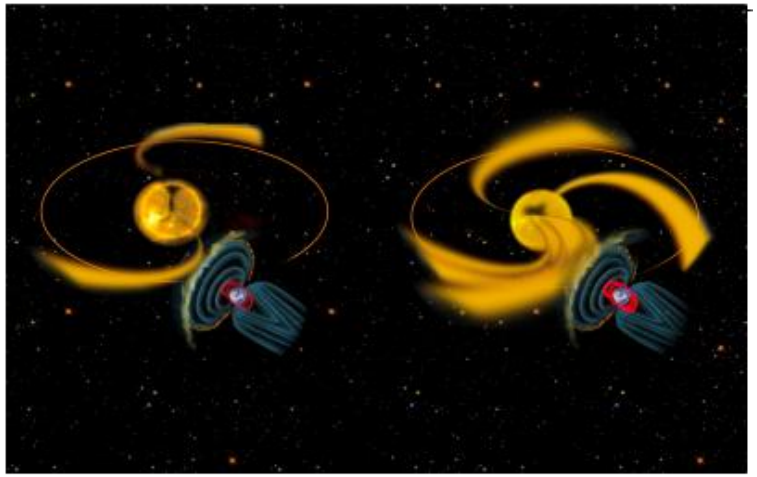


Figure 4: Co-rotating interaction region

HSS and CIR at 1AU

- The solar wind speed increases from "slow" to "fast" and remains elevated for several days
- Both the magnetic field strength (B) and the ion density (N) maximize before the increase in speed

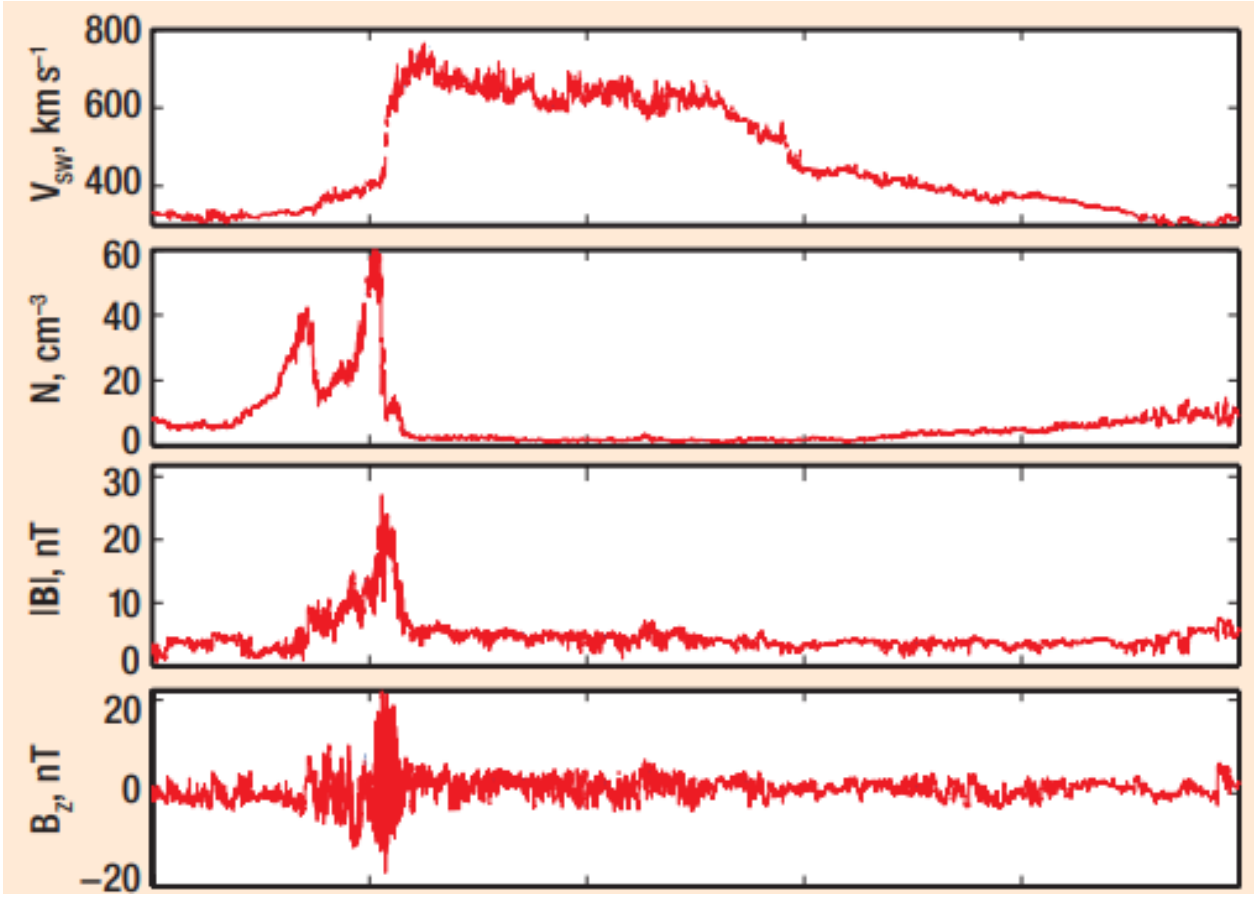


Figure 5: Solar wind parameters at 1AU during an HSS flow

Variety of HSS

- Significance difference between solar wind parameters at different events

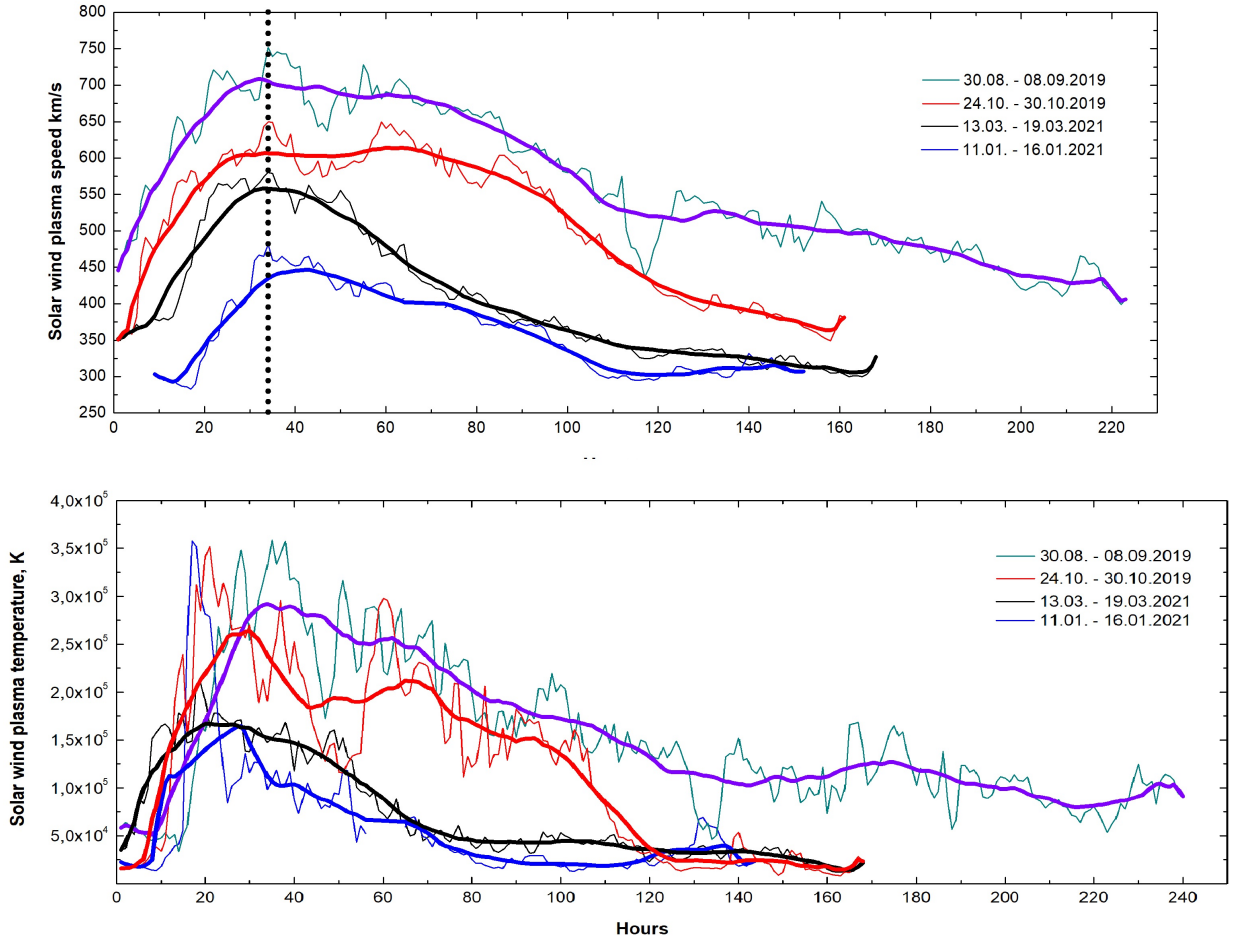


Figure 6: Solar wind speed and temperature during four HSS events

Variety of HSS

- Different geomagnetic response

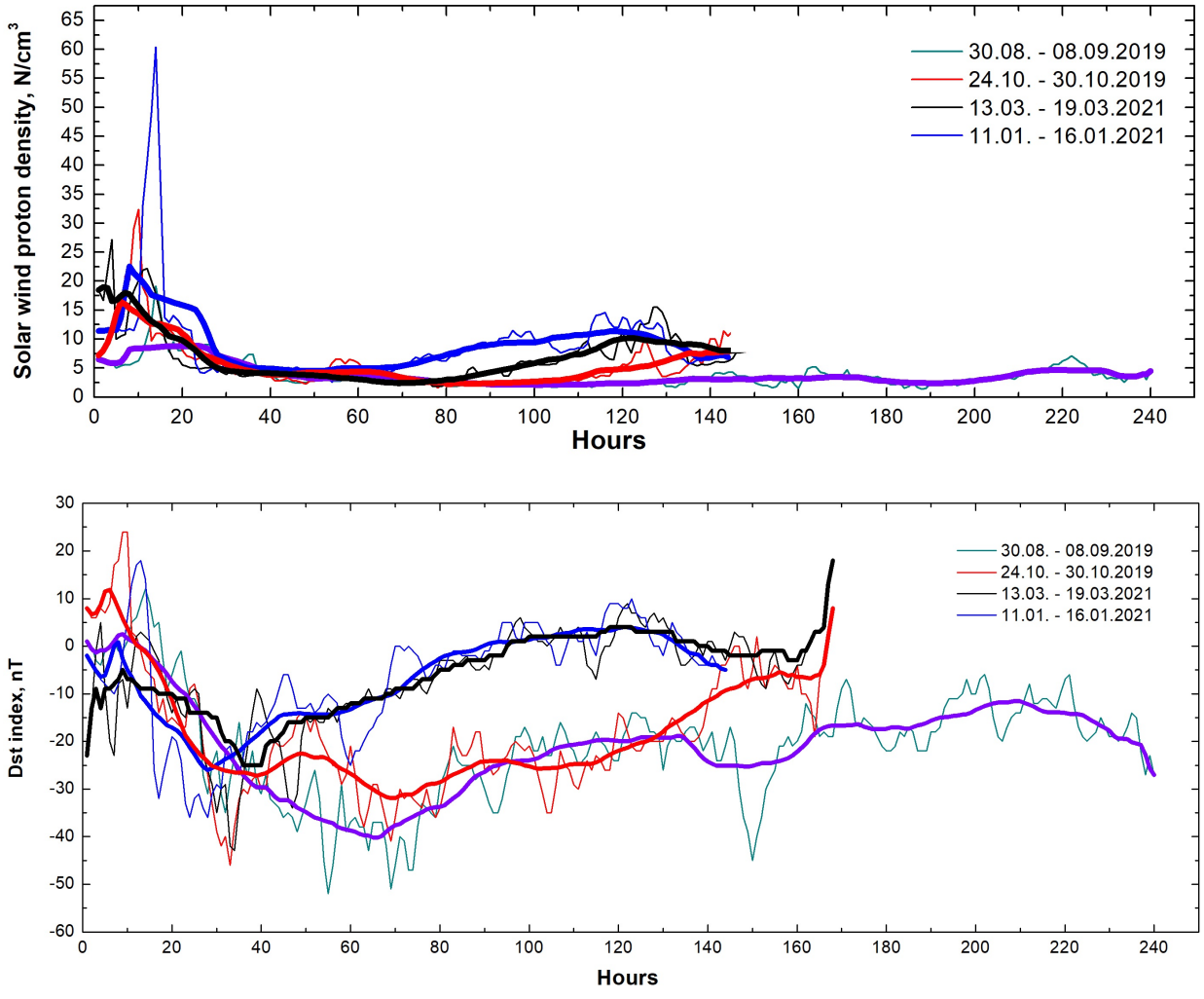
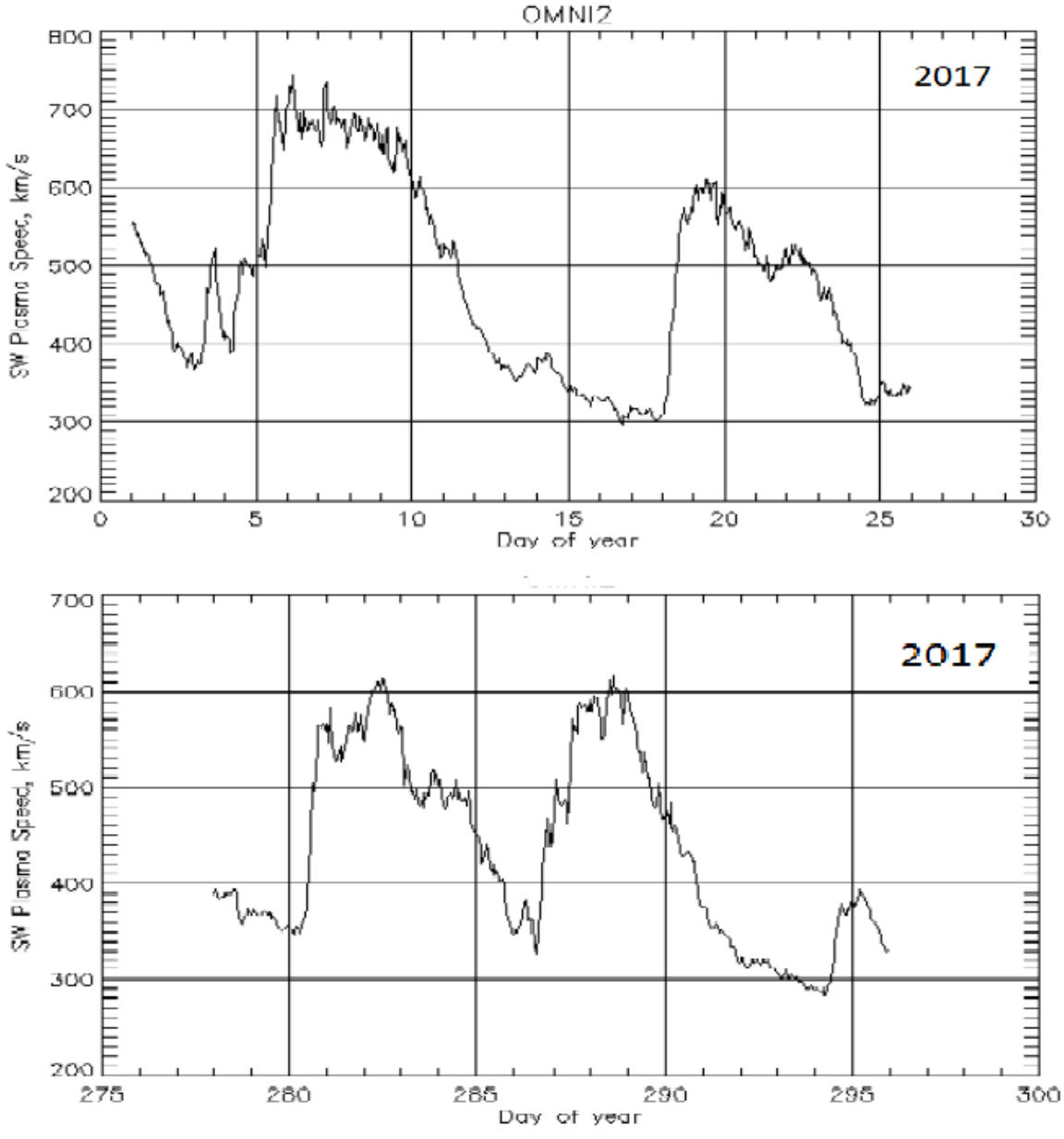


Figure 7: Solar wind density and Dst geomagnetic index

Variety of HSS appearance



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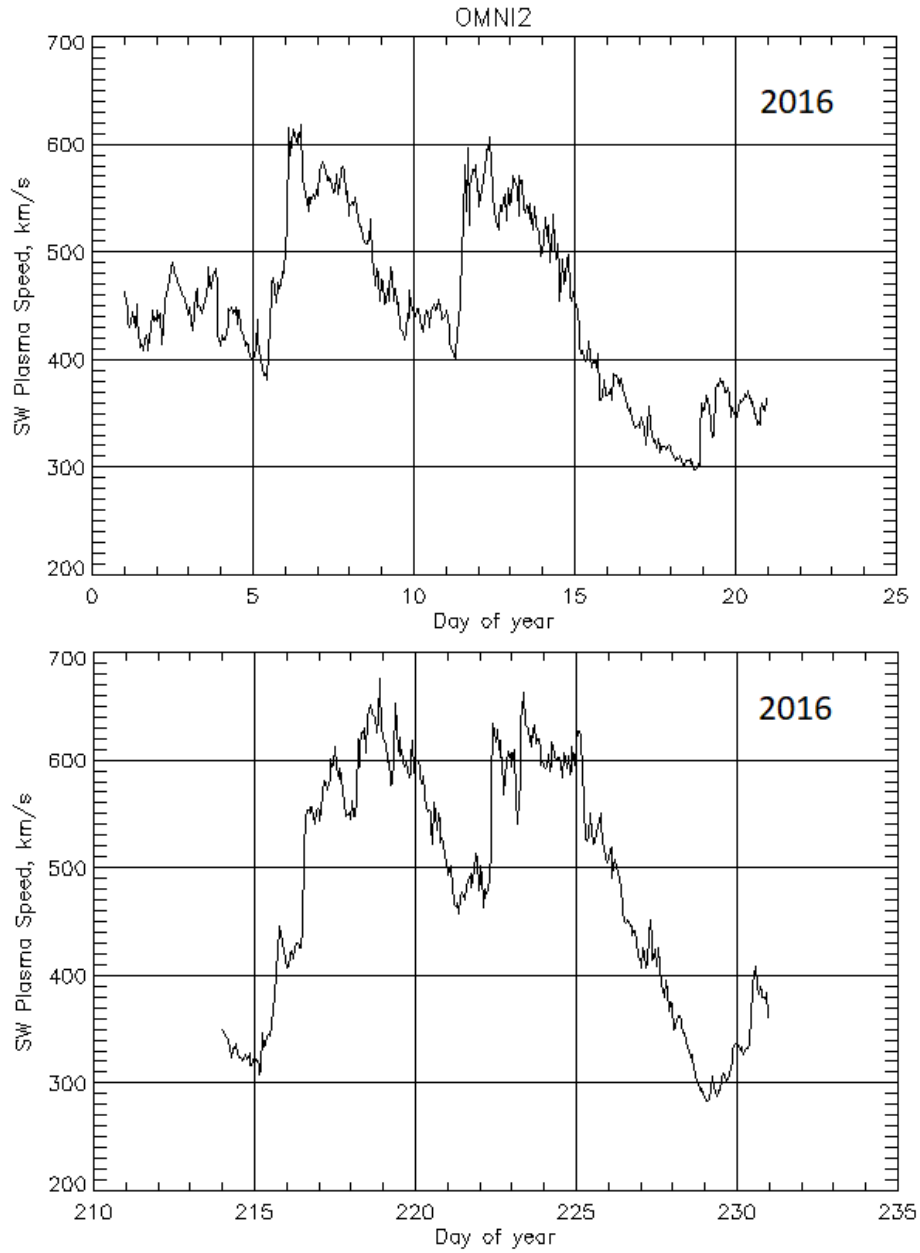


Superposed epoch analysis

- Superposed epoch analysis summarizing 3 days before and 10 days after the maximum of the solar wind speed of 34 HSS events in the 24 Solar cycle

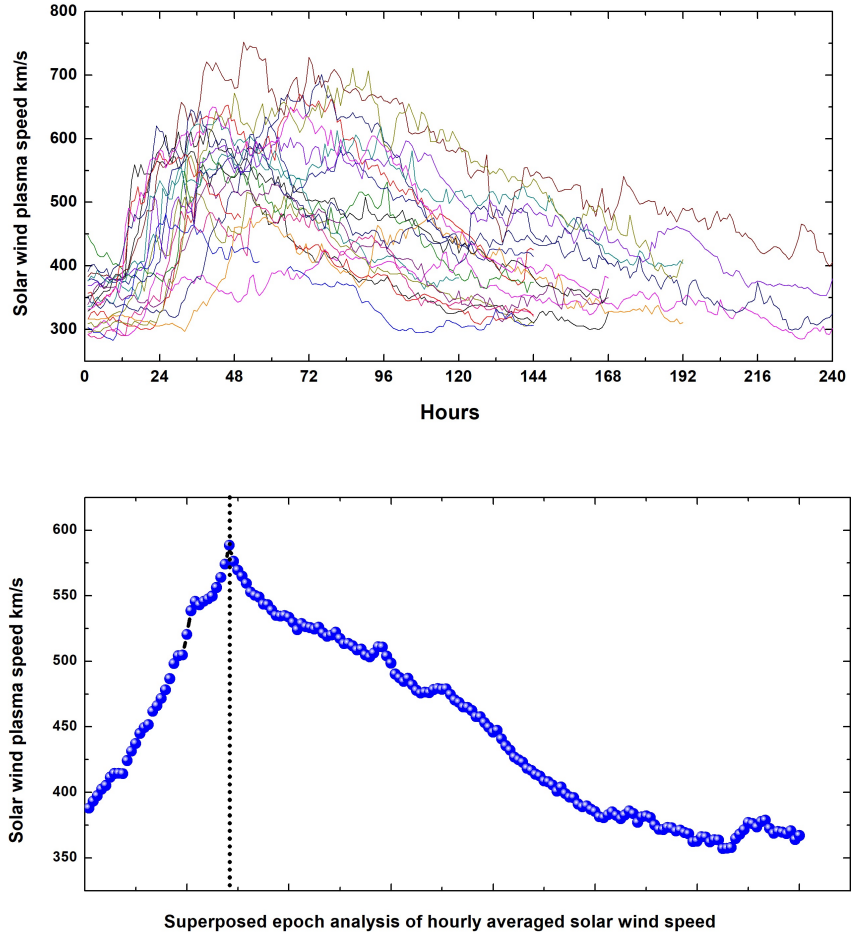
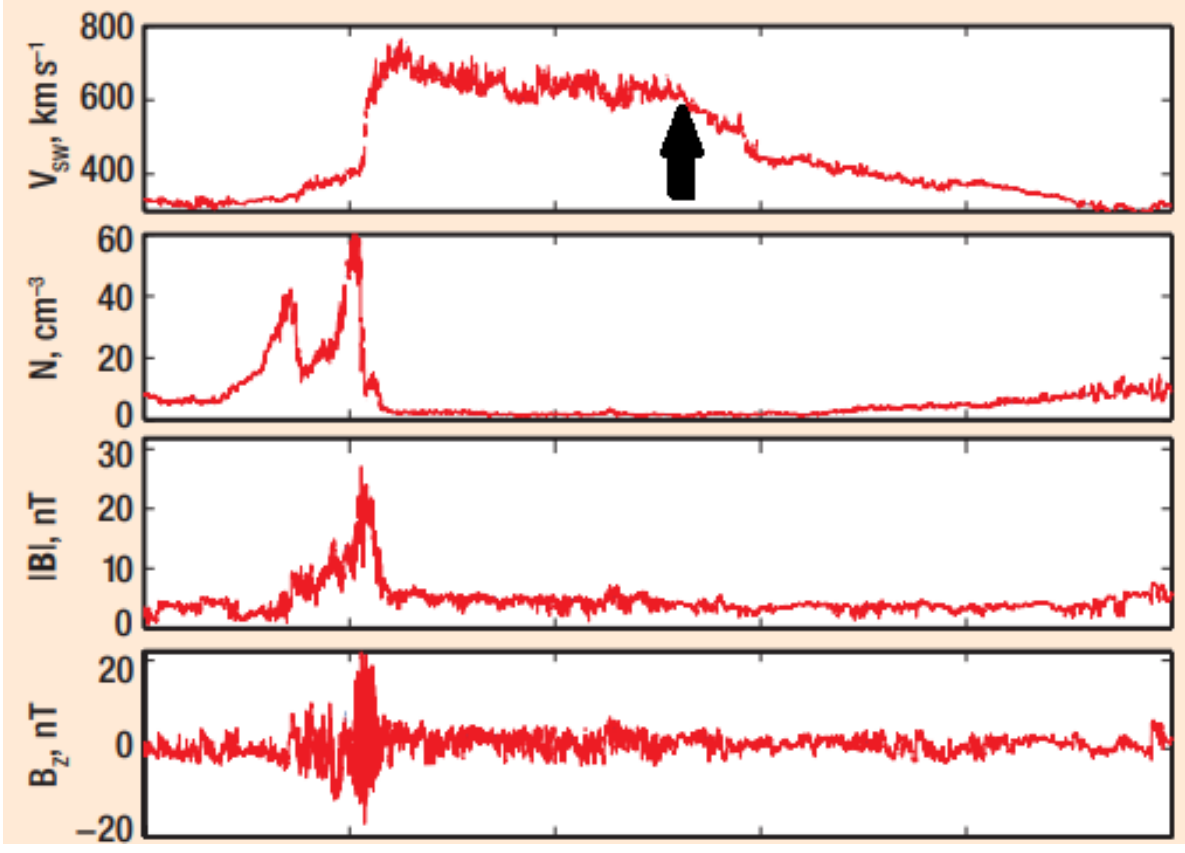


Figure 10: Superposed epoch analysis

Superposed epoch analysis

- Superposed epoch analysis summarizing 2 days before and 6 days after the point from where stable decreasing trend appear of solar wind speed of 34 HSS events in the 24 Solar cycle



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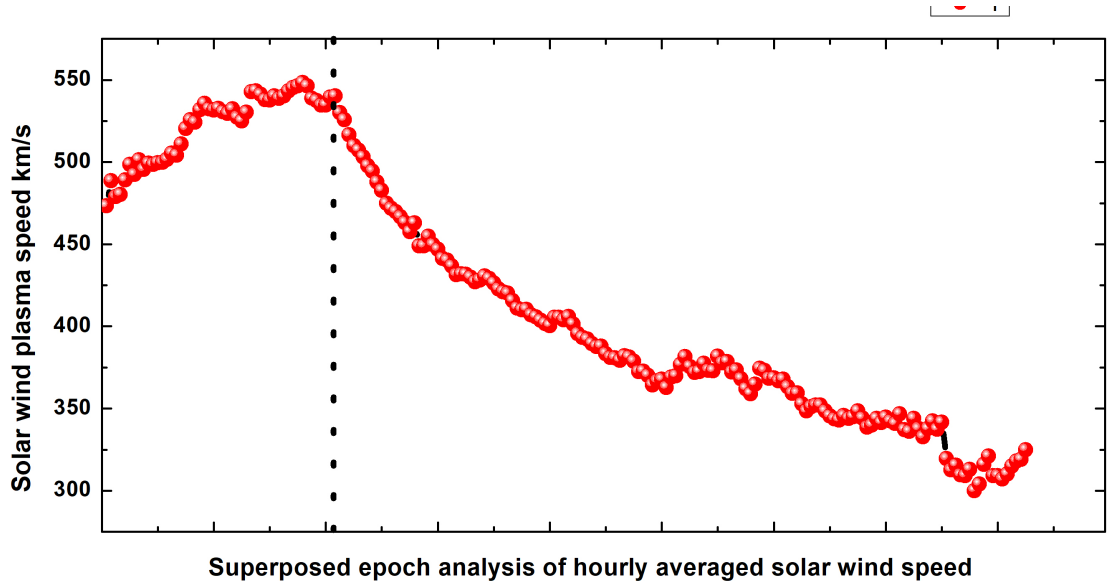

Acknowledgments

This work was supported by the National Science Fund under Competition for financial support of basic research projects – 2020, grant No KP-06-44/2 from 27.11.2020 "Space weather over a period of the century solar activity descending".

Thank you for your attention

TO BE CONTINUED…

June 2022, Primorsko, Bulgaria