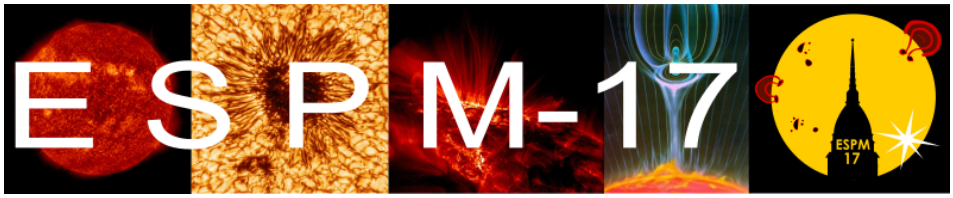

Contribution ID: **298** Type: **Invited**

From multi-decadal to real-time solar wind modelling, connectivity and plasma signatures on and off the ecliptic plane

Friday 13 September 2024 12:00 (25 minutes)

The solar wind streams from compact sources at or near the Sun, accelerates across the low solar corona, and expands into the whole interplanetary space. The physical properties of any wind streams thus reflect the characteristics of their source regions and those of the extended zones of the corona they cross, and are affected by the time-varying strength and geometry of the global background magnetic field. I will discuss the spatial distribution of solar wind sources and relate them to the properties of the interplanetary wind by means of an extended time series of data-driven 3D simulations that cover more than two solar activity cycles. Similarly, I will relate magnetic connectivity jumps with solar wind plasma signatures, and discuss their occurrence frequency and amplitudes at different epochs of the solar cycle, on and off the ecliptic plane. The same model constitutes the core of a forecasting tool (SWiFT-FORECAST, ESA SWESNET and Virtual Space Weather Modelling Centre), new aided by machine learning methods. Several validation and calibration schemes were introduced to select optimal subsets of the ensemble and to correct for model biases. I will address some of the main challenges related to the implementation and validation of such tools, as well as the pernicious issues that stem from the lack of observables between the two boundaries of the Sun–Earth system, and from the dependence of "point" forecasts on the global properties of the solar atmosphere.

Primary author: PINTO, Rui (IRAP & InforMarty)

Presenter: PINTO, Rui (IRAP & InforMarty)

Session Classification: Space weather and the solar-heliospheric connections

Track Classification: Diagnostic tools and numerical methods in solar physics