

ABSTRACT:

As part of the Solar Terrestrial Observations and Modeling Service (STORMS), an important development axis is the production of heliospheric magnetohydrodynamic (MHD) simulations for monitoring and studying solar activity in the heliosphere and the near-Earth environment. Starting from observations on the photosphere, 1D MHD model Multi-VP and 3D MHD model Heliocast give a physical and consistent description of the solar wind. The creation of synthetic imagery make it possible to compare the results with observations like coronagraph. A part of these simulations are available through the VSWMC Virtual Space Weather Modelling Center and can be coupled with other models (EUHFORIA). A « run on request » mode for users can help user in studying a particular event.



Figure 1: the welcome page of the STORMS website @ <http://storms-service.irap.omp.eu/>

SWIFT pipeline

- **Magnetograms**
 - Adapt/Gong : every hour
 - Nso/Gong : every hour
 - Wso : irregular
- **Simulations**
 - Multi-Vp/PFSS launched daily to obtain continuous timeseries of density, velocity, magnetic field of solar wind at the sub-Earth point at $R = 21 R_{sun}$.
 - Multi-Vp/PFSS launched weekly on a grid covering the entire sphere. 2D Map containing density, velocity, magnetic field of solar wind are build on the outer surface at $R = 21 R_{sun}$.

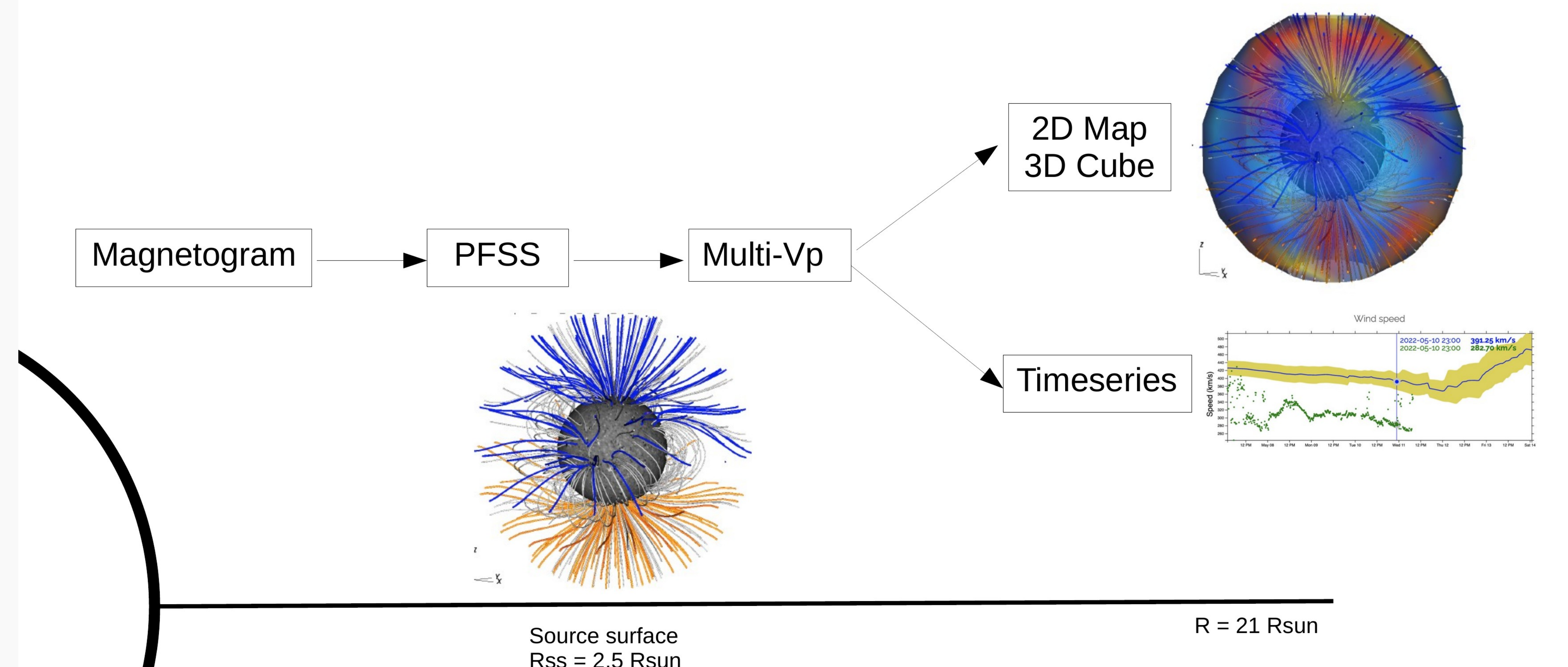
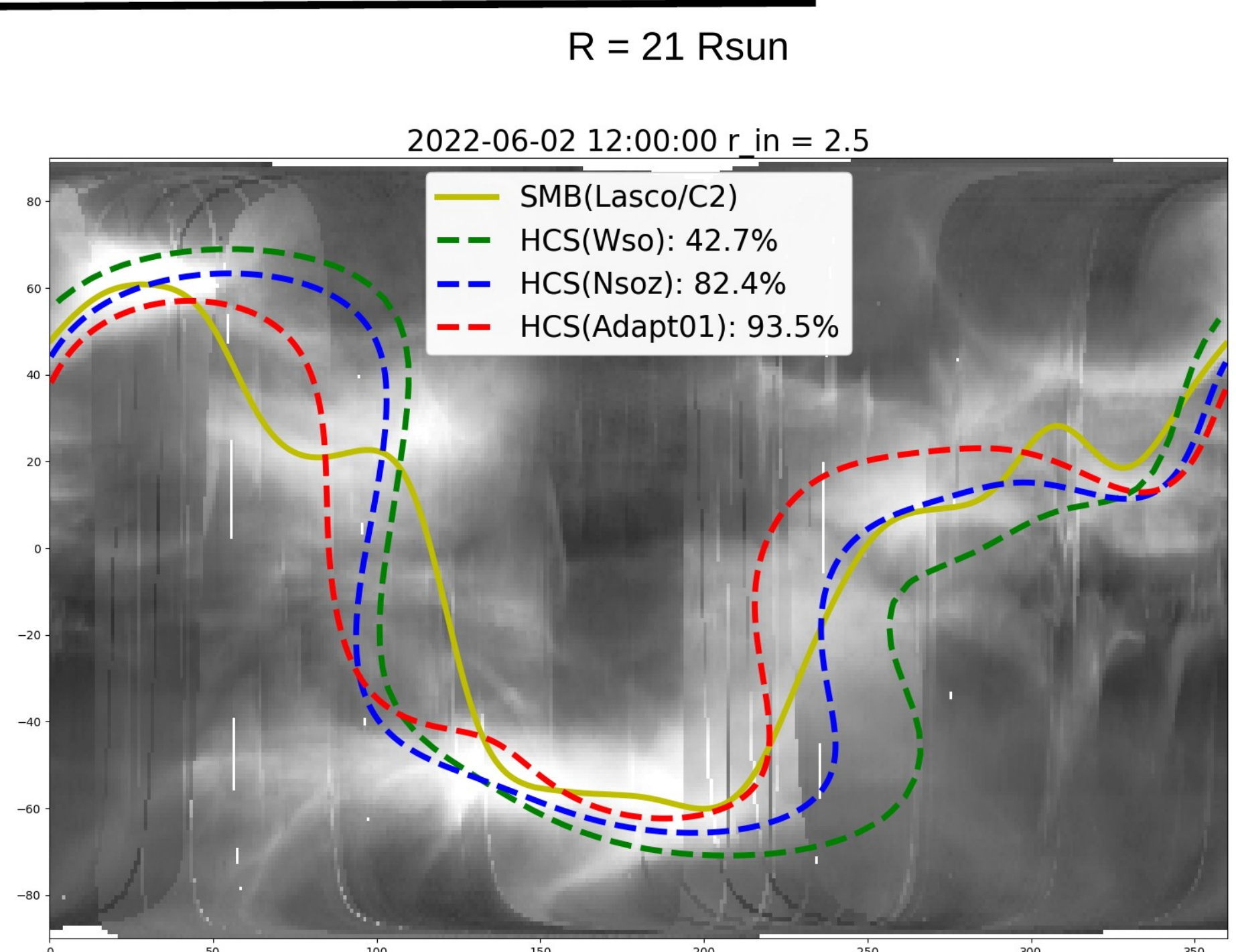


Figure 2: SWIFT pipeline

- **Source surface and Adapt-realization optimisation**
Source surface height (rss) as well as 12 Adapt-realizations are optimized such that the corresponding Heliospheric Current Sheet (HCS) fits the White Light Streamer (SMB)



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- VSWMC users can request a simulation in our database. If this simulation does not exist, a simulation is launched on our infrastructure.
- **IRAP servers** : FORECAST 1/2/3/4 (680 threads), storage racks (METEO B1/B2 and FORECAST B1/B2).

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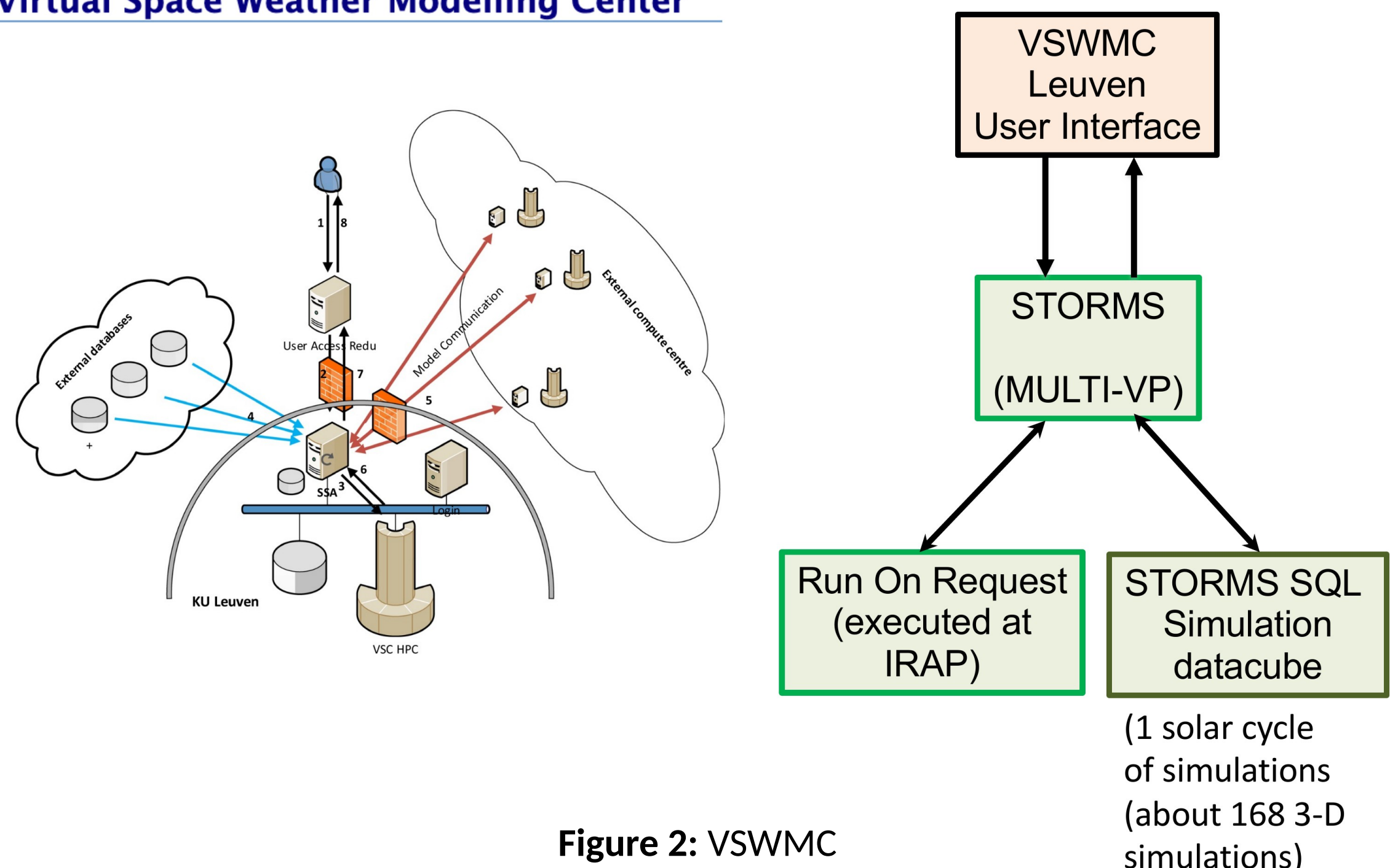
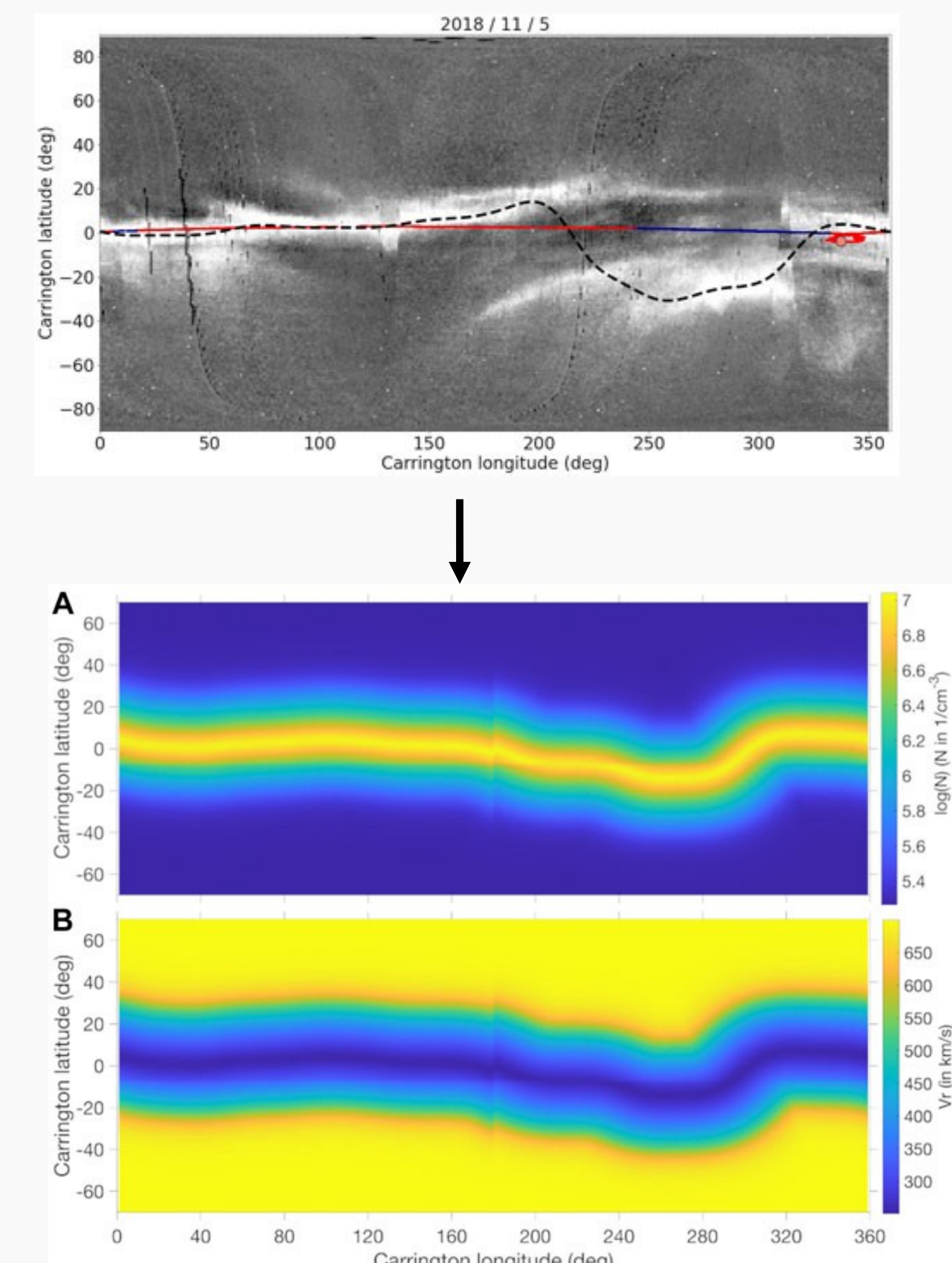


Figure 2: VSWMC

HELIOCAST

Assimilation of remote-sensing observations:



References:

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- [4] Ruffolo et al. 2020, AJ, Volume 902, Issue 2, id.94, 20 pp.
- [5] Squire, J., Chandran, B. D. G., & Meyrand, R. 2020, ApJL, 891, L2, doi:10.3847/2041-8213/ab74e1
- [6] Mignone et al. 2007, ApJS
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Conclusions:

- ✓ More couplings are coming (Swift/Adapt, Heliocast/Best magnetogram)
- ✓ Continuous integration and more storage
- ✓ New server (GPU)