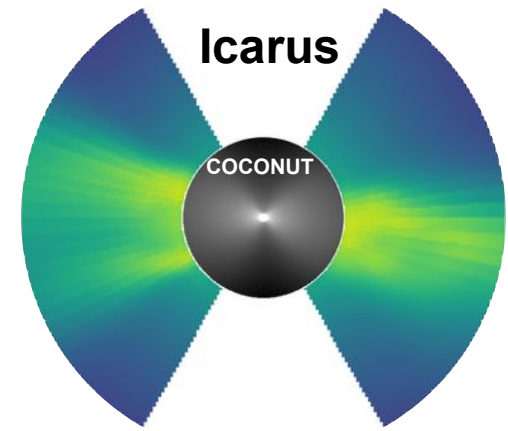
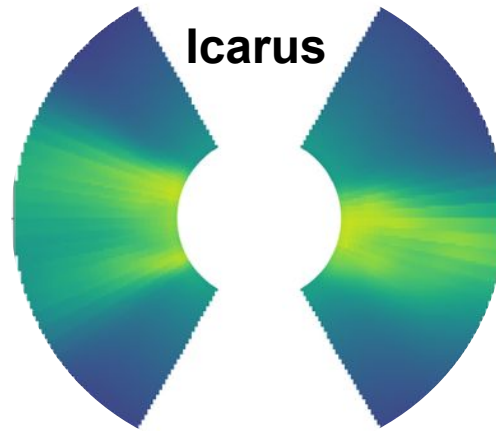
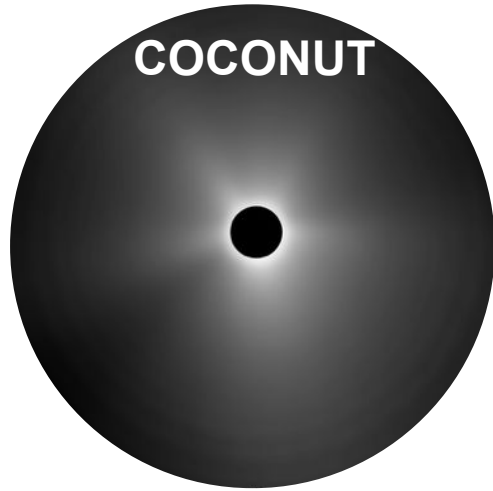


Sun to Earth environment with the MHD models: **COCONUT**, **Icarus**, **EUHFORIA**



Tinatin Baratashvili¹, Stefaan Poedts^{1,2}

¹ KU Leuven, Centre for Mathematical Plasma Astrophysics, Leuven,

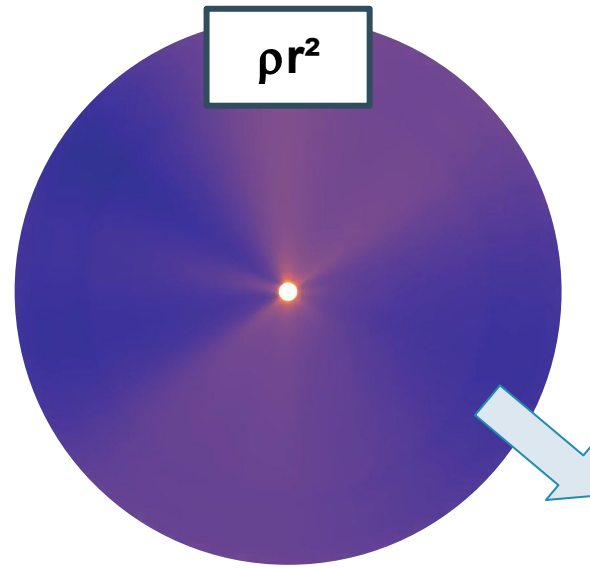
² Institute of Physics, University of Maria Curie-Skłodowska, Lublin, Poland.

COCONUT

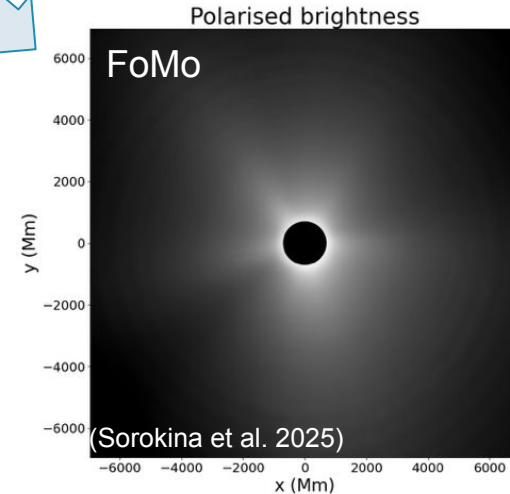
COCONUT (**CO**olfluid **CO**ro**Na**
Unstructured) is a COOLFluid
data-driven coronal model

- **Unstructured grid**
- Spherical shell domain
- Consists of triangular elements
- **Implicit Solver**
 - Backward-Euler scheme for time-discretization

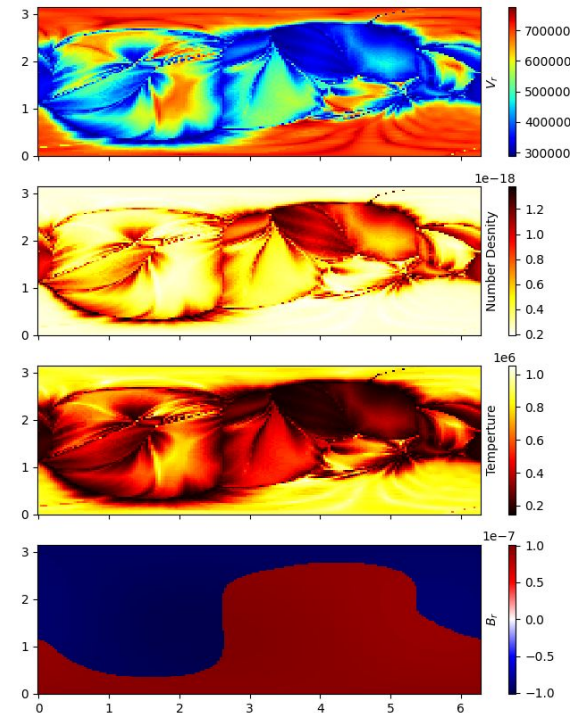
In steady cases $\Rightarrow$ CFL
can go up to 10,000



Earth
viewing angle



Input at 0.1 AU

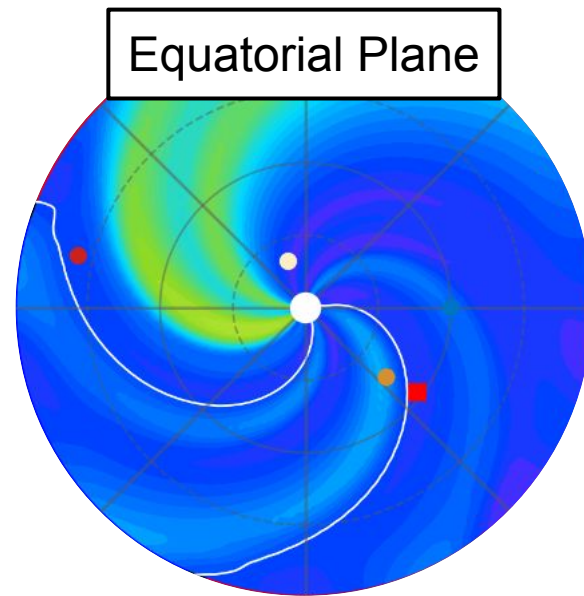


Domain

- Radial domain: $21.5 R_{\odot} \Rightarrow 432 R_{\odot}$
- $120^{\circ} (-60^{\circ}, 60^{\circ})$ in latitudinal direction
- 360° in longitudinal direction

Output

- 3D global heliosphere with the chosen cadence
- Time-series at various satellites/planets in the heliosphere



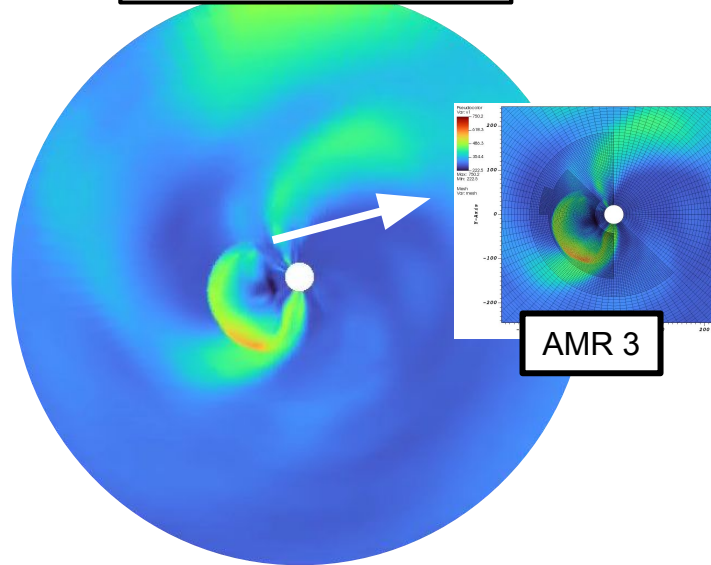
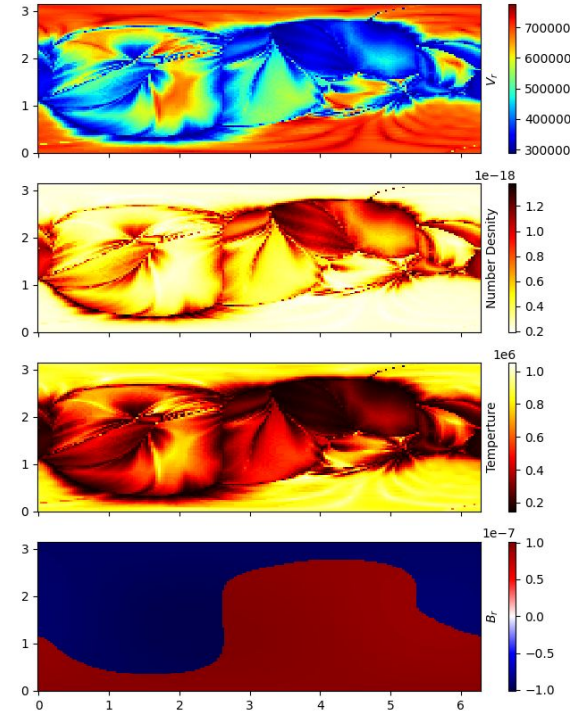
- Uniform grid
- Steady inner BC driving
- CME models: Cone, spheromak, FRI3D
- HEEQ frame

Icarus

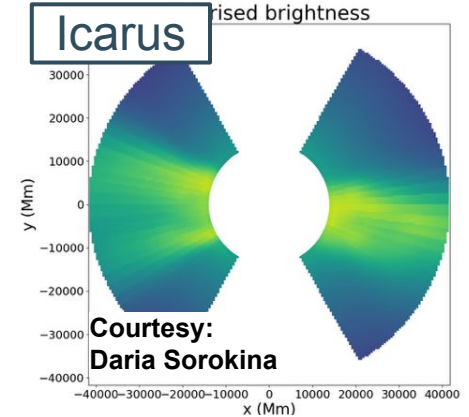
Equatorial Plane

Meridional Plane

Input at 0.1 AU



- Radial Grid Stretching
- Adaptive Mesh Refinement
- Steady and dynamic inner BC driving
- CME models: Cone, spheromak
- Inertial frame



Courtesy:
Daria Sorokina

