Jean-Baptiste
DAKEYO
Space Science Laboratory (SSL)
Pascal Démoulin (LIRA), Rouillard (IRAP), Samuel Badman (CFA), Milan Maksimovic (LIRA), Aliche Chapiron(IRAP), Stuart Bale (SSL)
Poster
One of the fundamental models in heliophysics is the Parker solution, which describes the hydrodynamic equilibrium of the solar corona, producing an outwardly propagating solar wind (Parker, 1958, 1960). One of the recent refinements of Parker's equations, the two-thermal regime Isopoly model embedding an isothermal until the radius Riso, followed by a polytropic evolution (Dakeyo, 2022, 2024), provides a simple modeling consistent with the observed bulk velocity while accounting for in-situ temperature observations (i.e., interplanetary heating). The later refinement of the Bipoly model generalizing the isothermal first regime to a polytropic one, allows to also fit coronal temperature (Tp and Te) from charge state ratios. Although Isopoly underlying physics and equations are well described and already used by the space weather community, Bipoly constitutes a new step in solar wind low complexity modeling, especially regarding its abilitiy to fit coronal and interplanetary observations. Here is the purpose of BipolySolarWind, an open source Python code that provides a simple solver for 1D bipoly solar wind solutions with plotting capabilities. This code follow a series of open source codes such as ParkerSolarWind (https://github.com/STBadman/ParkerSolarWind) and IsopolySolarWind (https://github.com/jbdakeyo/Isopoly) , developed in the same thought of providing to community Parker’s like wind solution (Isothermal, Polytropic and Isopoly). BipolySolarWind open code have been built to be used easily, with very low numerical cost, making it ideal for short time computation, wind evolution properties numerical exploration or solar wind background for wind interaction purpose. We present the different types of solar wind solution profiles that can be obtained. The BipolySolarWind significantly enhances the capabilities of low complexity wind modeling.
Poster category
Solar and Interplanetary Research and Applications
Meeting homepage
Space Weather Workshop 2025
Download to PDF