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Oral
The PUNCH mission is uniquely designed to deliver systematic solar wind flow maps all around the Sun from 6 to 80 solar radii every few hours. Our flow-tracking pipeline is developed and maintained by PUNCH Science Working Group 1A in collaboration with the PUNCH Science Operations Center (SOC). It systematically delivers comprehensive radial flow maps tailored to address key questions about how the solar wind evolves as it transitions from the corona into the heliosphere and interplanetary space. Our flow maps cover the full [-90 deg, +90 deg] latitudinal range around the Sun; they can be computed over 1-Rs-wide annuli with an angular resolution of at least 1 deg over the latitude axis. We also present a more advanced, openly accessible module that provides bi-dimensional flow vectors with the radial and latitudinal components of the solar wind speed based on the Balltracking paradigm. It is effective in tracking not only the ambient slow solar wind, but also a wide variety of transient events of various sizes such as jets, jetlets, and Coronal Mass Ejections, thereby broadening the scope of applications for our data products to a broad range of Heliospheric investigations. Additionally, by improving the accuracy of Sun-to-Earth plasma travel times for both background and transient solar wind flows, these maps will support more reliable analysis for space weather predictions, paving the way to new practical downstream applications with high impact to the space industry and to our space-reliant society.
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