**Jeudi 6 octobre 2022 à 11h (IAS, bâtiment 121, salle 1-2-3)**

**Space weather and the Sun-Earth connection through numerical simulations**

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For our modern societies, the Sun can be seen as a threat because of its impulsive events, such as Coronal Mass Ejections (CMEs) that can trigger geomagnetic storms and cause huge damages to our technology and health. As the maximum of activity of the current solar cycle is approaching, it becomes more and more crucial to be able to anticipate these phenomena. One way to do it is to use numerical simulations to produce forecasts based on the latest solar observations. However, a lot can happen in the 150 million kilometers that separate the Sun and the Earth. This is why a major element of space weather is the modeling of the inner heliosphere, to better constrain the medium in which the CMEs travel. I will first present our recent coronal model COCONUT, a fast MHD implicit code that allowed us to study the influence of the solar surface observations on our space weather forecasts for the wind only. Then I will present results with CMEs using the code EUHFORIA, quantifying the impact of the solar cycle on the transient propagation. Finally, I will show some extension to other star-planet systems with a time-dependent code coupling the inner dynamo and the atmosphere, as a way to study long-term evolution of the cycle and dynamical space weather events.