2nd URSI AT-RASC, Gran Canaria, 28 May – 1 June 2018

Ground-Based Radio Astronomy and Space Weather Applications

Nicole Vilmer[1,2]

(1) LESIA, Observatoire de Paris, 5 Place Janssen 92195 Meudon, France, nicole.vilmer@obspm.fr

(2) Station de Radioastronomie de Nançay, Observatoire de Paris, 18330, Nançay, France

Radio and X/ EUV electromagnetic emissions from solar flares are among the first signatures of space-weather relevant disturbances originating from the solar atmosphere. These emissions may be shortly followed by the arrival of the first relativistic flare-accelerated particles (around 20 minutes after) and later by the arrival of CME-shock accelerated particles and ultimately by the CME shock itself. Electromagnetic radiation from the Sun as well as energetic particles associated with flares or CMEs can affect the terrestrial environment (e.g. radio black outs, radiation damage) on short timescales (8 minutes to a few hours). The solar wind and its perturbations (shocks, coronal mass ejections) affect the Earth's environment on a longer time scale (2 to 4 days). The continuous survey of the sun and of its activity in view of space weather applications is nowadays in a phase of full development. In this talk, I will present results from recent studies of radio observations of flares at decametric/metric wavelengths on the relation between escaping electrons that generate type III emissions in the corona and in the interplanetary medium and electrons confined to the lower atmosphere of the Sun that produce HXRs. I will also present the results of a recent study based on the observations of an unusually large source of gyro-synchrotron radiation associated with a CME on 2014-September-01 and show how these observations allow to diagnose the magnetic field in the core of a coronal mass ejection, a crucial quantity for the understanding of the driving of coronal mass ejections from the low corona to the interplanetary medium. I will finally discuss the input of radio observations to help predicting the occurrence and importance of a flare associated solar energetic particle event as well as the arrival time of associated CMEs.