40th COSPAR Scientific Assembly 2014

Space Plasmas in the Solar System, including Planetary Magnetospheres (D)
Challenges in Heliophysics and Space Weather: What Instrumentation for the Future? (D2.3)
Consider for oral presentation.

HEMISE (HELIO-MAGNETISM INVESTIGATION FROM THE SUN TO EARTH): A TWIN SPACECRAFT MISSION AT THE SUN-EARTH LAGRANGIAN POINTS L4 AND L5

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The Sun-Earth environment is a much more dynamic and eventful system than the common-life experience of looking at the sky can suggest and severe disturbances on the Earth magnetic field called geomagnetic storms often occur. These sudden disturbances can adversely affect the health of humans in space and in high altitude commercial flights. Further advancing in our forecasting capabilities of these storms will necessary requires a much deeper understanding of the origin on the Sun and propagation in the interplanetary medium of these disturbances. This means that we need a better understanding of how magnetic fields are generated in the solar interior, how their emergence through the photosphere, their storage and release in the lower corona, and the final connection with our planet: a mission specifically dedicated to this objective is needed. So far measurements of the solar magnetic field are mostly restricted to the low layers of the solar atmosphere. Extrapolation techniques underlying numerous assumptions are used to estimate the magnetic field in the transition region from the chromospheres to the corona and in the corona itself. More recently, ground-based spectropolarimetry has proven to be very useful to provide information of the coronal magnetic fields on the plane of the sky, but there are no spacecraft providing at the same time measurement of photospheric fields responsible for the coronal configuration. The solution will be offered by a multi-spacecraft mission designed to study at the same time photospheric and coronal magnetic fields and the interplanetary evolution of generated solar transients propagating along the Sun-Earth line. The

HeMISE mission will investigate the emission and its polarization from the extreme ultraviolet to the white light wavelengths regimes. This will be done by 2 twin spacecraft, carrying remote sensing and in situ instruments, located in stable orbits around L4 and L5 Lagrangian points. Twin spacecraft with photospheric and coronal magnetometers will open the possibility for stereoscopic global helioseismology and will allow for the first time to combine photospheric fields measured by one spacecraft with coronal fields measured by the second spacrecraft in quasi-quadrature, thus providing for the first time a continuous coverage of solar magnetic fields through the solar atmosphere. The main concepts of this mission will be illustrated here.