SUMMER SCHOOL ALPBACH 2013

PRESENTATIONS AT ESWW 2013

CARETAKER

Coronal Analysis Reporting to Earth To Allow Keeping Everything Running

The Earth's magnetosphere is formed as a consequence of interaction between the planet's magnetic field and the solar wind, a continuous but varying plasma stream originating from the Sun. A number of different phenomena in the solar wind have been studied over the past forty years. The CARETAKER mission aims at launching a cluster of 6 satellites on an orbit around the Sun at 0.72 AU in order to study the large scale structures coming from the Sun (particularly CMEs). For in-situ measurements, the spacecraft will contain Solar Wind Analyser and Fluxgate magnetometers. For remote-sensing, externally occulted coronagraphs will observe the corona and the interplanetary environment. Communication with the six satellites will be provided by two ground stations through the CARETAKER Network 24/7. The data from the sensors will be transmitted to the Data Processing Centre where raw data is transformed into information for the scientific community and other end users. Caretaker represents a new reference for space weather event warning as well as for premium scientific content.

Team Blue Representatives:

Arjan Meskers (The Netherlands), Oscar Miles (UK)

PAC2MAN

Photospheric And Chromospheric and Coronal Magnetic field ANalyser

The main goal of the PAC²MAN mission is to understand and predict the initiation and development of potentially hazardous CMEs and flares. In addition, PAC²MAN will determine the speed and direction of CMEs in order to forecast in near real-time solar wind conditions near the Earth. The two spacecraft of the mission each carry a payload carefully designed to fulfill both objectives over a nominal lifetime of 6 years.

The first spacecraft (SCE) will be located at the Lagrange Point 1 of the Sun-Earth system and the second (SC80) at a heliocentric orbit trailing the Earth by 80°. Together they will measure the magnetic field vector at different layers of the solar atmosphere. The mission will also monitor the interplanetary space from the photosphere to the Earth. Solar wind properties are measured in situ by SCE.

A good understanding of the magnetic energy build up and release is essential to determine how and when solar flares and Coronal Mass Ejections (CMEs) occur. Advanced models based on PAC²MAN's observations will lead to a substantial improvement in the quality of the forecast of space weather events. The stereoscopic observations of the solar atmosphere up to 30 R⊙ and the monitoring of the interplanetary space up to 1 AU will allow forecast of the arrival time of space weather events to Earth.

PAC2MAN

Photospheric And Chromospheric and Coronal Magnetic field ANalyser

Team Green Representatives:

Markus Scheucher (Austria), Sophie Musset (France)

ADONIS

Atmospheric Drag, Occultation ‘N’ Ionospheric Scintillation

The Atmospheric Drag, Occultation 'N' Ionospheric Scintillation mission (ADONIS) is a space weather mission that studies the dynamics of the terrestrial thermosphere and ionosphere over a full solar cycle in Low Earth Orbit (LEO). The objectives are to investigate satellite drag with in-situ measurements, and the ionospheric electron density profiles with radio occultation and scintillation measurements. With a constellation of two spacecraft it is possible to provide near real-time data (NRT) about ionospheric conditions over the northern polar region where current measurements are currently insufficient. The mission shall also provide global high-resolution data to improve ionospheric models. The low-cost constellation can be launched using a single Vega rocket and most of the instruments are already space-proven which allows rapid development and reliability.

Team Orange Representatives:
Nikolaos Perakis (Germany), Melinda Dosa (Hungary)

OSCAR

Observatories of Solar Corona and Active Regions

Coronal Mass Ejections (CMEs) and Corotating Interaction Regions (CIRs) are major sources of magnetic storms at Earth and therefore they are of great importance for space weather. The Observatories of Solar Corona and Active Regions (OSCAR) is a mission proposed to identify 3D structure of coronal loops, study the trigger mechanism of CME in the Active Regions (ARs) and their evolution and propagation processes in the inner heliosphere. It will also provide monitoring and forecasting of the geo-effective CMEs and the CIRs at 1 AU. Thus, OSCAR shall contribute in the advancement in the field of solar physics, improve the current CME prediction models and provide data for space weather forecasting. This will be achieved by utilising two spacecraft, with identical remote-sensing as well as in-situ instrumentation, located at the Earth orbit. The spacecraft will be separated with an angle of about 68° to provide optimum stereoscopic view of the solar corona.

The spacecraft are planned for launch in 2022-2025 for a nominal mission duration of 5 years.

Team Red Representatives:

Emil Kraaikamp (Belgium), Christoffer Stausland (Norway), Bernhard Seifert (Austria)