PPS04-P01 Room:Convention Hall Time:May 27 18:15-19:30

Activities of SCOSTEP (Scientific Committee on Solar-Terrestrial Physics)

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[1] NIPR

The Scientific Committee on Solar Terrestrial Physics (SCOSTEP) is an interdisciplinary body of the International Council for Science (ICSU). The main task of the committee is to organize and conduct international program on solar-terrestrial physics (STP) of finite duration in cooperation with other ICSU bodies. The committee was founded in 1966, and has carried out various international programs such as International Magnetospheric Study (IMS: 1976-79); Solar Maximum Year (SMY: 1979-81); Middle Atmosphere Program (MAP: 1982-85); and Solar-Terrestrial Energy Program (STEP: 1990-97). Four Post-STEP programmes over the period 1998-2002 include: STEP-Results, Applications, and Modeling Phase (SRAMP); International Solar Cycle Study (ISCS); Planetary Scale Mesopause Observing System (PSMOS); and Equatorial Processes Including Coupling (EPIC). After that, Climate and Weather of the Sun-Earth System (CAWSES: 2004-2008) and CAWSES-II(2009-2013) were carried out. Detail of the current program, VarSITI (Variability of the Sun and Its Terrestrial Impact) will be presented by another talk, but this paper will introduces the history, the structure and the activities of SCOSTEP, and relations with other international bodies.

Keywords: Sun, Earth, SCOSTEP, Earth and planets

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COSPAR (The COmmittee on SPace Research)

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The COmmittee on SPAce Research (COSPAR), frequently consdiered as "International Union of Space Sciences", was established by the International Council of Scientific Unions (ICSU) in October 1958 to continue the cooperative programmes of rocket and satellite research successfully undertaken during the International Geophysical Year of 1957-58. The ICSU resolution creating COSPAR stated that the primary purpose of COSPAR was to provide the world scientific community with the means whereby it may exploit the possibilities of satellites and space probes of all kinds for scientific purposes, and exchange the resulting data on a cooperative basis. Therefore, COSPAR is an interdisciplinary scientific organization concerned with progress on an international scale of all kinds of scientific investigations carried out with space vehicles, rockets and balloons.COSPAR's objectives are carried out by the international community of scientists working through ICSU and its adhering national academies and international scientific unions. Under the rules of ICSU, COSPAR ignores political considerations and considers all questions solely from the scientific viewpoint.

COSPAR has 8 scientific commisions and several panels:
Commission A Space Studies of the Earth's Surface, Meteorology and Climate
Commission B Space Studies of the Earth-Moon System, Planets, and Small Bodies of the Solar System
Commission C Space Studies of the Upper Atmospheres of the Earth and Planets Including Reference Atmospheres
Commission D Space Plasmas in the Solar System, Including Planetary Magnetospheres
Commission E Research in Astrophysics from Space
Commission F Life Sciences as Related to Space
Commission G Materials Sciences in Space
Commission H Fundamental Physics in Space

The main event of COSPAR is biannual scientific assembly, where usually more than 2000 scientists gather from all over the world. In Japan, COSPAR activity is supported by Science Council of Japan.

Keywords: space sciences, international collaboration, scientific satellites, balloon experiments, solar system explorations, microgravity experiments

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Introduction to MAGDAS of ICSWSE and to International Capacity Building of ISWI

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ISWI stands for International Space Weather Initiative. It is a global scientific effort to advance space weather research by involving developing nations. Space weather research requires data from ground-based observation from all over the world. This requires the cooperation of developing nations. To enable this, developed nations must support education efforts in developing nations – this is International Capacity Building. ISWI makes use of existing ground-based arrays. One such array is MAGDAS, which has 72 magnetometers installed all over the world. The MAGDAS Project is managed by ICSWSE of Kyushu University. The contributions of MAGDAS to ISWI are outlined in this talk. It is the hope of ICSWSE that the members of AOSWA and other researchers of Asia will join the International Space Weather Initiative, which was initially established by the United Nations.

Keywords: ISWI, Capacity Building, Asia and Africa, MAGDAS

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Science objectives and implementation of Software-type Wave-Particle Interaction Analyzer (SWPIA) by RPWI for JUICE

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We present science objectives of Software-type Wave-Particle Interaction Analyzer (SWPIA), which will be realized as a software function of Langmuir probes (LP) running on the DPU of RPWI (Radio and Plasma Waves Investigation; PI: J.-E. Wahlund, IRF-Uppsala, Sweden) for the ESA JUICE mission. SWPIA conducts onboard computations of physical quantities indicating the energy exchange between plasma waves and energetic ions. SWPIA cannot be achieved without onboard inter-instruments communications, which will be realized by efforts of RPWI, PEP (Particle Environment Package; PI: Stas Barabash, IR-Kiruna, Sweden) and J-MAG (JUICE Magnetometer; PI: M. Dougherty, ICL, UK). By providing the direct evidence of ion energization processes by plasma waves around Jovian satellites, SWPIA contributes scientific output of JUICE as much as possible with keeping its impact on the telemetry data size to a minimum.

SWPIA measures the energy transfer process between energetic particles and electromagnetic plasma waves [Fukuhara et al., EPS 2009; Katoh et al., AnGeo 2013]. SWPIA will be firstly realized in the ERG satellite mission in the Earth's inner magnetosphere to measure interactions between energetic electrons and whistler-mode chorus. We will apply SWPIA to ion-scale wave-particle interactions occurring in the Jovian magnetosphere. SWPIA clarifies where/when/how heavy ions are energized by waves in the region close to Ganymede and other Jovian satellites. In SWPIA of RPWI for JUICE, we focus on the interactions between energetic ions (a few to tens of keV) and ion cyclotron waves (typically less than 1 Hz). SWPIA uses wave electromagnetic field and ion velocity vectors provided by RPWI sensors and PEP, respectively, with referring three-components of the background magnetic field detected by J-MAG. SWPIA measures a relative phase angle between the velocity vector v_i of i-th particle of charge q_i and the wave electric field vector at the timing of particle's detection ($E(t_i)$) and computes an inner product of $W(t_i) = q_i E(t_i) \cdot v_i$, where $W(t_i)$ corresponds to the variation of the kinetic energy of the i-th energetic particle. We accumulate W for detected particles to obtain $W_{int} = \sum_i W(t_i)$, and we expect statistically significant values of W_{int} for the case of the measurement at the site of efficient wave-particle interactions. In this presentation, we discuss details of the implementation of SWPIA of RPWI and inter-instruments communications among RPWI-PEP-J-MAG of JUICE.

Keywords: Jovian magnetosphere, Jovian satellite, wave-particle interactions

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THE ATMOSPHERIC CHARACTERIZATION FOR EXPLORATION AND SCIENCE (ACES) INSTRUMENT SUITE FOR MARS.

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The Atmospheric Characterization for Exploration and Science (ACES) instrument suite is designed to address the highest priority, lower atmosphere goals and investigations identified by MEPAG[1] and to address both exploration technology Strategic Knowledge Gaps (SKGs)[2]. The ACES instrument suite measures atmospheric dust properties, fundamental atmospheric parameters, and the energy inputs that drive the atmosphere in ways that far exceed previous landed experiments.

The data to be returned by ACES is the compre-hensive and necessary type of information that has been sought after by the atmospheric, aeolian, and Entry, Descent, and Landing (EDL) communities since the Viking Landers provided the first in situ glimpse of Martian meteorology. The intervening experiments since Viking have only marginally increased the knowledge necessary to address Mars Exploration Program and Human Exploration and Operations Mission Directorate (HEOMD) goals; continuing to repeat these meteorological experiments is an exercise in diminishing returns.

In addition to temperature, pressure, and relative humidity, ACES measures for the first time airborne particle concentration and size distribution, 3D wind components, and infrared and visible radiative fluxes. By combining the unique capabilities of ACES to de-termine turbulent eddy momentum fluxes and dust characteristics, ACES also measures the wind stress that lifts sand and dust.

The ACES instrument sensors may be accomodat-ed on a rover (Figure 1) or an a stationary lander. A boom for wind and temperature and in some cases vis and IR radiation flux minimizes potential thermal, mechanical and radiative contamination by the space-craft.

ACES is strengthened by internationally contribut-ed sensors and electronics from the U.S.A., Finland, Denmark, Canada, and Belgium. The ACES science team is comprised of exceptional scientists and engi-neers from each of these countries.

Details on the capabilities and response of each in-strument, power requirements, accommodation, ob-servation strategy, and data products and volume will be detailed in the talk.

References

[1] MEPAG (2008), Mars Scientific Goals, Objectives, Investigations, and Priorities: 2008, J.R. Johnson, ed. [2] Precursor Strategy Analysis Group (P-SAG) (2012) Report.

Keywords: Mars, Meteorology, Atmosphere, Instrumentation, Mars Mission

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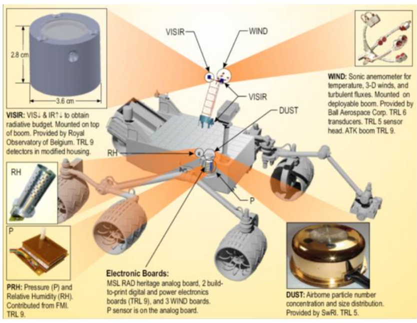

Figure 1. ACES Instrument sensors, electronics and notional accommodation on the 2020 Rover.

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International collaboration in planetary and space sciences: Past, present, and future

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International collaborations are becoming an important aspect of successful planetary and space science projects. In today's research environment, scientists and engineers from all over the world must work increasingly together in a variety of research projects, including ground-based observations, laboratory experiments, data analyses, archival studies, and numerical experiments. For future advancements in planetary and space sciences, it is important to consider the role of international collaboration, and facilitate interactions among researchers at all career levels from countries all over the world. However, international collaboration comes with its own set of challenges.

Here in this session, we discuss recent recent achievements and current status of various international projects and also we confirm roles of international organizations which are mostly scientifically-oriented.

Keywords: planetary and space sciences, international collaborationo