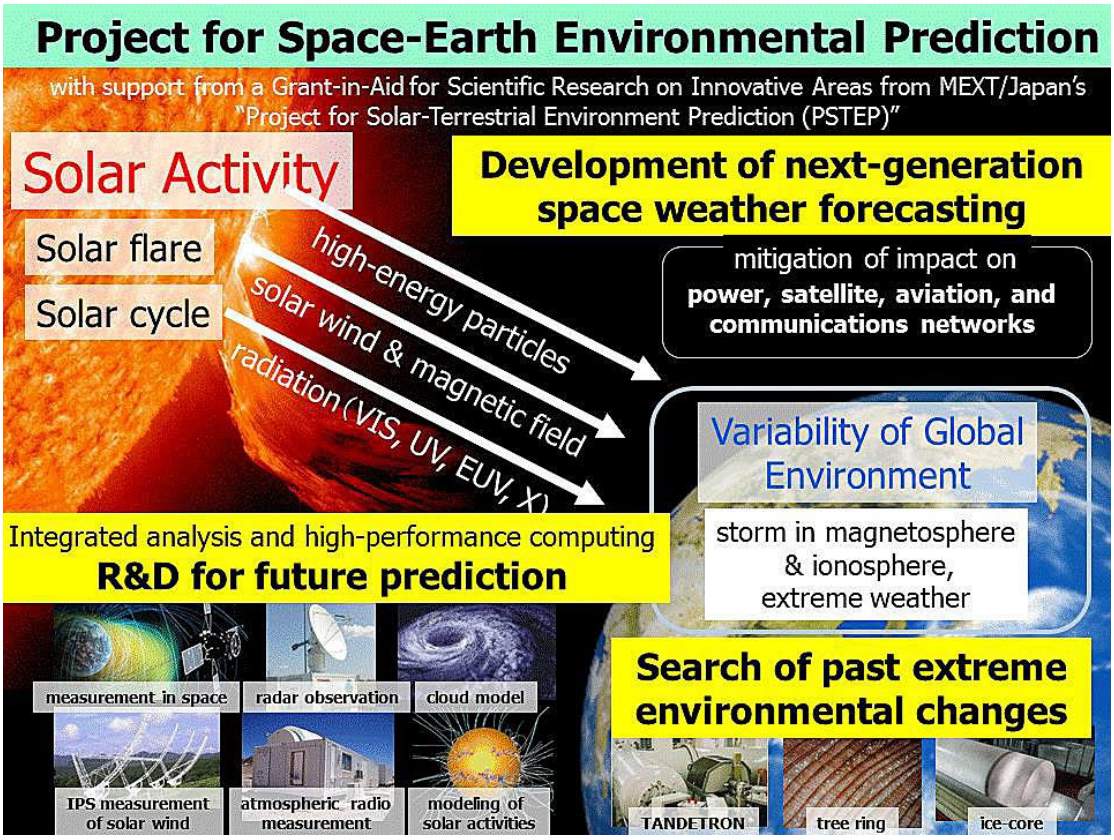
Project for the Space–Earth Envionmental Prediction

Over the past 50 years, space exploration has expanded rapidly and now gone past the edge of the heliosphere. Consequently, it is known that solar activity and the dynamics of the space environment can significantly impact human socio-economic systems as well as the global environment. For example, the giant solar flare observed by the British astronomer Richard Carrington in 1859 caused powerful magnetic storms, called the Carrington Event. If such an event occurred in the modern era, power, satellite, aviation, and communication networks could possibly be damaged on a global scale. Moreover, analyses of the latest stellar observations and of cosmogenic isotopes in tree rings suggest even larger solar flares. However, the mechanisms of the onset of solar flares and their subsequent processes have not yet been fully explained. Thus, modern society is at risk from severe space-weather disturbances, caused by such solar explosions, and understanding and predicting variations in the space–Earth environment is both an important scientific subject and a crucial issue for modern society. Furthermore, because the accurate prediction of complex phenomena is a common problem in science, the prediction is also a crucial subject for various scientific disciplines. The Project for Space–Earth Environmental Prediction is a new joint research project aimed at synergistically developing our predictive capability for the space–Earth environment through the cooperation and interaction of solar physics, geomagnetism, space sciences, meteorology, climatology, space engineering, and other related fields. This project addresses the various issues shown in the figure below, based on ISEE Collaborative Research Programs and the support of a Grant-in-Aid for Scientific Research on Innovative Areas from MEXT Japan's "Project for Solar-Terrestrial Environment Prediction (PSTEP)."



The objectives and subjects of the Project for Space–Earth Environmental Prediction.

Main Activities in FY2019

The 2nd ISEE Symposium, PSTEP-4: Toward the Solar–Terrestrial Environmental Prediction as Science and Social Infrastructure

The 2nd ISEE symposium was held as the 4th international symposium “PSTEP-4: Toward the Solar–Terrestrial Environmental Prediction as Science and Social Infrastructure” from January 28 to January 30 at the Sakata and Hirata Halls of Nagoya University. This was the final international symposium of the PSTEP, which is a nation-wide project on space weather and space climate in Japan (https://www.pstep.jp/). More than 100 researchers from Japan, the US, the UK, Germany, Italy, Canada, Belgium, Mexico, India, and Peru attended the symposium to discuss four topics: forecasting systems, solar storms, geomagnetic fluctuations, and solar cycle activity. In the oral session, 48 presentations were made by invited speakers from abroad and domestic researchers, and 59 presentations were made in the poster session. Please refer to the PSTEP WEB page http://www.pstep.jp/news/20200127.html for the agenda of the symposium.

This project has been aimed at overcoming the gap, called “death valley,” between the basic science of space and Earth environment prediction, and forecast operation. At this symposium, discussions focused on this point were developed for predictive studies of solar flares, coronal mass emission, radiation belts in the geo-magnetosphere, ionospheric disturbance, geomagnetically induced current, solar radiation exposure, satellite charging, radio wave propagation, and the next solar cycle and its influence on climate. The contribution of these studies was highly valued.

The participants of the 2nd ISEE Symposium.

Korea-Japan Space Weather Workshop 2019

We organized the Korea-Japan Space Weather Workshop 2019 with the Korean Astronomical Research Institute (KASI) in Daejeon, South Korea on November 28–29, 2019. This workshop is held every two years, alternately by ISEE and KASI, to develop international joint research on space weather prediction through cooperation between Japan and South Korea. We were able to exchange opinions on the latest research achievements in both countries and actively discuss plans for future international joint research.

The participants of the Korea-Japan Space Weather Workshop 2019.