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PATHFINDER FOR SOLAR FLARE MONITORING EXPLORER (SAME-PATHFINDER)

Abstract

The sun is the main energy source for the people on the Earth. Besides the material demand, the sun has important impacts on the culture. The high-time-spatial resolution multi-band monitoring of the solar burst events has extremely important scientific merits of scientific studies and the application merits. For the same goal, can human beings develop an ambitious mission for stereoscopic monitoring the sun with the efforts of all nations? Here I would like to introduce a prospective plan for the solar mission around 2050s, the Solar flAre Monitoring Explorer (SAME) mission. The SAME mission is a solar panoramic stereoscopic monitoring flagship mission at the 3 Lagrangian points between the Sun and earth. It has three spacecrafts carrying various scientific instruments for the sun and interstellar environment, which can be made by the Asia, Europe and America, collaboratively. It can also be a flyby mission for remote sensing observations of the Venus and Mercury, and its L3 spacecraft could also be an astrophysical satellite for observations of the exotic celestial objects behind the sun. Before the formal SAME mission, a small science mission, the SAME-Pathfinder, will be made to verify some key technologies. The SAME-Pathfinder satellite is designed to fly in a high-altitude dawn-to-dusk orbit. It carries three scientific instruments (payloads): a soft X−ray imager, a H_α photon sieve imager and an ultraviolet (UV) imager, which will be briefly introduced as follows. (1) The soft X−ray imager uses a Wolter-I mirror with a diameter of 200 mm. Its designed spatial resolution is 2 arcseconds. (2) The H_α photon sieve imager has a membrane mirror with very low weight and a high-resolution diffraction-limited imaging. It has a FOV of 40 arcminutes and spectral bandwidth of 0.02 nm. (3) The UV imager is a single spectral channel instrument, which has two observation modes with a continuous zoom technology, one observation mode is low spatial resolution with a full-disk imaging and the other mode is a high spatial resolution imaging with a small FOV (5 arcminutes). All the 3 payloads can image the sun simultaneously, once either the UV imager (with the full-disk observation mode) or X-ray imager catches a flare event autonomously in the orbit, then the UV imager quickly points to the flare region and monitor the flare in a high-resolution imaging mode. All the 3 payloads require high-quality image stability systems to obtain clear images of the sun.