

A Call for Meteor Detectors in Venus and/or Mars Orbit

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The Terrestrial Planets collide with extraterrestrial material from various Solar System sources. Historically, all our information on these “meteoroids” is derived from the rather limited studies of “meteors” entering our own planet’s atmosphere. With the growing number of exploration missions to other planets, notably Venus and Mars, it now seems possible to systematically sample meteoroids in other parts of the Solar System and thus to obtain a more comprehensive model of the entire population. Here, we propose to use a Venus and/or Mars orbiter to carry out a meteor watch over the nighttime hemisphere of the respective planets. The explicit goals of such observing posts are to (1) determine meteor encounter rates and magnitude/frequency relationships, (2) study variations of encounter rates for modelling of meteor orbital distribution, (3) identify meteor showers and discuss their relationships to terrestrial meteor showers and to possible parent bodies. In addition, the meteor observations can be used to probe the Venus and/or Mars atmospheres. We will therefore also (4) study meteor light curves and dynamic properties – and how they compare with those in the Earth’s atmosphere. For this challenging observational task, we have developed the SPOSH camera breadboard (Smart Panoramic Optical Sensor Head), which is equipped with a highly sensitive 1024 x 1024 CCD chip and a custom-made wide angle (120°) optical system. The camera has a sophisticated processing unit for automatic event detection, with which images can be processed at rates up to 2 per sec. To reduce data volume, only those images (or relevant portions) are returned to the user, which contain meteors. Algorithms to detect other night time phenomena, as aurorae, electric discharges, etc. may also be implemented in the processing unit. In real-sky tests during prominent meteor showers we have captured large numbers of events, which demonstrated that the camera and its software are working reliably. The SPOSH development was sponsored by an ESA/ESTEC contract.