Project Details

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Project Title:
Oxygen Profiling Infrared Experiment (OPIE)

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Summary:
The Oxygen Profiling Imaging Experiment (OPIE) would combine a specially designed telescope with recently developed detector and cooler technologies to create a far-infrared detector to study the atomic oxygen altitude profile of the Earth. A spectral line of O~I at 63~\micron\ is the target of OPIE. The planned gallium-doped germanium (Ge:Ga) detector is small and may require cooling by liquid helium. Temperatures of the telescope and other parts of the satellite viewed by the detector would be reduced by passive radiative coolers. OPIE would address a problem that underlies many of the goals of the Living With a Star Program: The response of the Earth's atmosphere to variations in the solar EUV radiation and changes in magnetospheric conditions. By providing near-continuous observations of the atomic oxygen altitude profile in the lower thermosphere, the state of the terrestrial thermosphere will be determined. By measuring thermal radiation, OPIE can also see the diurnal variations. Once a regular series of data is available, assimilated data sets can be created to provide a global picture of the lower thermosphere. This proposal would support the optical design of the dual-function telescope, the thermal design, power restrictions, and orbital sampling of OPIE. Light from the desired altitude region must be spectrally filtered into a narrow spectral region and focused onto the detector surface, something that has had limited success in the past. Thermal control is a critical aspect of OPIE as we would like to fly it close to the Earth.

Publication References:

Summary: ''

Reference: Pesnell, William Nomad Research Inc - Oxygen Profiling Infrared Experiment (OPIE)