

Development of the Microwave Radiometer Technology Acceleration (MiRaTA) CubeSat for all-weather atmospheric sounding

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The Microwave Radiometer Technology Acceleration (MiRaTA) is a 3U CubeSat mission sponsored by the NASA Earth Science Technology Office (ESTO). The science payload on MiRaTA consists of a tri-band microwave radiometer and GPS radio occultation (GPSRO) experiment. The microwave radiometer takes measurements of allweather temperature (V-band, 52-58 GHz), water vapor, and cloud ice (G-band, 175-191 & 207 GHz) to provide key contributions toward improved weather forecasting. The GPSRO experiment, called the Compact TEC (Total Electron Count)/Atmosphere GPS Sensor (CTAGS) measures profiles of temperature and pressure in the upper neutral atmosphere and electron density in the ionosphere. The MiRaTA mission will validate new technologies in both passive microwave radiometry and GPS radio occultation: (1) new ultra-compact and low-power technology for multi-channel and multi-band passive microwave radiometers, and (2) new GPS receiver and patch antenna array technology for both neutral atmosphere and ionospheric GPS radio occultation retrieval on a nanosatellite. In addition, MiRaTA will test (3) a new approach to spaceborne microwave radiometer calibration using adjacent GPSRO measurements.