



The MATS Satellite Mission - Gravity Waves Studies by Mesospheric Airglow/Aerosol Tomography and Spectroscopy

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Global three-dimensional data are a key to understanding gravity wave interactions in the mesosphere and lower thermosphere. MATS (Mesospheric Airglow/Aerosol Tomography and Spectroscopy) is a new Swedish satellite mission that addresses this need. It applies space-borne limb imaging in combination with tomographic and spectroscopic analysis to obtain gravity wave data on relevant spatial scales. Primary measurement targets are O₂ Atmospheric Band dayglow and nightglow in the near infrared, and sunlight scattered from noctilucent clouds in the ultraviolet. While tomography provides horizontally and vertically resolved data, spectroscopy allows analysis in terms of mesospheric temperature, composition, and cloud properties. Based on these dynamical tracers, MATS will produce a climatology on wave spectra during a 2-year mission. Major scientific objectives concern a characterization of gravity waves and their interactions in the mesosphere and lower thermosphere, as well as their relationship to dynamical conditions in the lower and upper atmosphere. MATS is currently being prepared for launch in late 2019. This paper provides an updated overview over scientific goals, measurement concepts, and analysis ideas.