

Mesospheric Airglow/Aerosol Tomography and Spectroscopy (MATS): a satellite mission on 3D structures and waves

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Space-borne limb imaging in combination with tomographic retrieval opens exciting new ways of probing horizontal and vertical structures in the atmosphere. The proposed MATS satellite mission aims at mapping wave activity in the upper mesosphere over a wide range of spatial scales. Measurements are based on optical emissions from the O₂ Atmospheric Band and ultraviolet scattering by mesospheric clouds. MATS retrievals combine tomographic and spectroscopic analysis to infer atmospheric temperature and microphysical cloud properties. Based on the MATS global wave climatology, a broad range of scientific questions can be addressed. This includes studies of fundamental wave interaction, coupling mechanisms to the lower and upper atmosphere, and the lifecycle of mesospheric ice. This presentation summarises basic ideas behind the MATS measurement, instrument, and analysis concepts.