

Spatial and temporal turbulence evolution as inferred from the WADIS sounding rocket project

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The WADIS project (Wave propagation and dissipation in the middle atmosphere: energy budget and distribution of trace constituents) aimed at studying waves, their dissipation, and effects on trace constituents. The project comprised two sounding rocket campaigns conducted at the Andøya Space Center (69 °N, 16 °E). One sounding rocket was launched in summer 2013 and one in winter 2015.

The WADIS-1 sounding rocket was launched on 27 of June 2013 into Polar Mesosphere Summer Echo (PMSE). Ground based PMSE observations were conducted using the MAARSY VHF- and the EISCAT-Tromsø radars. IAP RMR-lidar observed NLC collocated with PMSE. The WADIS-2 sounding rocket was launched on 5 of March of 2015 and had the same instrumentation on board. ALOMAR RMR- and IAP Fe-lidars and SAURA-MF radar measured mesospheric temperatures and winds throughout the launch window.

In-situ measurements delivered high resolution altitude-profiles of neutral and plasma densities, neutral air temperature and turbulence. Extensive turbulence measurements were conducted employing different techniques. In-situ measurements were done on both upleg and downleg, implying that two profiles of each quantity were near simultaneously measured with high altitude resolution at ~30 km horizontal distance. The measurements with MAARSY cover both up- and downleg parts of the rocket trajectory and the EISCAT-Tromsø radar is located 100 km away of the launch site.

We discuss these turbulence measurements and its spatial and time evolution.