The ALIMA "all atmosphere" lidar

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This presentation gives an overview of the lower-, middle- and upper atmosphere lidar projects at the German Aersospace Center (DLR). A new middle atmosphere group was started 18 months ago at DLR's Institute of Atmospheric Physics in Oberpfaffenhofen. In the meantime, a novel sodium/Rayleigh/Brillouin-Lidar was designed, built and tested. This mobile lidar system, housed in an 8-foot container, is capable of fully autonomous operation. Making use of extensive self-monitoring algorithms, no human intervention is needed to initiate start-up of the lidar, monitoring of system parameters, or shutdown of the lidar. These capabilities make the lidar the first instrument of a new class of truly automatic mesospheric lidar systems. We show first measurements acquired during the recent DEEPWAVE campaign in New Zealand highlighting operational aspects as well as first results.

The lidar mentioned above serves as prototype and testing bed for the more advanced Airborne Lidar for Studying the Middle Atmosphere (ALIMA) which is currently in development at DLR. ALIMA combines several technologies (spectral imaging lidar, high spectral resolution lidar, iron Doppler lidar, Rayleigh lidar) to measure temperature, vertical wind, momentum flux and aerosols with unprecedented temporal (30 sec) and vertical resolution (10 m to 1 km, depending on altitude) from flight level to the lower thermosphere. The laser system is based on the optical parametric oscillator/ optical parametric amplifier (OPO/OPA) technology which provides a powerful and tunable narrow-band light source in the UV, visible and IR spectrum. In ground-based configuration, more OPO/OPA stages can be added to the ALIMA system to probe the atmosphere at different wavelengths, e.g. resonance lines of atomic oxygen or helium. This opens the window well into the thermosphere, thus making ALIMA the first "all atmosphere" lidar.