

LIDAR - Messtechnik (LIDAR)

Messgrößen

- Aerosole
- Wind
- Spurengase (H₂O, O₃, CH₄, CO₂)

Prinzip

Complementary to Radar, Lidar (Light Detection and Ranging) instruments operate in the optical spectral range where light pulses from intense laser sources can interact even with the small particles and molecules of the atmosphere. This offers the possibility of collecting detailed information about the state of the atmosphere by active remote sensing under clear sky conditions not achievable by microwave observations.

Intense laser pulses are sent into the atmosphere. The light that is scattered back from distant particles or molecules is collected and analysed as function of time. The distance between lidar system and sensing volume is given by the speed of light.

Differential absorption lidar (DIAL) systems are used for the measurement of atmospheric trace gases such as water vapor, ozone, methane or carbon dioxide.

The fact that the Doppler effect slightly shifts the frequency of the Lidar return signal can be used for remote detection and measurement of wind fields.

In the Lidar group of the DLR Institute for Atmospheric Physics, such Lidar systems are developed and operated on aircraft during international meteorological field campaigns.

Anwendung

The current Lidar instruments developed and operated at IPA are:

the OLEX system which comprises a four wavelength backscatter Lidar with polarisation capability for stratospheric ozone profiling, aerosol detection and the characterisation of the microphysics of particles;
the H₂O-DIAL for water vapour profiling and particle measurements in troposphere and lower stratosphere;
the WIND system, a 10- μ m scanning Doppler wind Lidar for the measurement of wind profiles in the troposphere;
a 10- μ m Doppler wind Lidar for wake vortex studies;
a 2- μ m Doppler wind Lidar for wake vortex studies and wind measurements in the troposphere

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