

New fiber laser and coherent lidar developments at ONERA.

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ABSTRACT

Onera has been developing lidars, for military, environmental and aeronautical applications for more than 30 years. The main instrumental developments deal with wind / wake vortex lidar for airport and environmental applications, lidar vibrometer for identification purpose or seismology applications, dial and supercontinuum lidars for gas detection and identification, airborne lidar for navigation sensors.

In parallel, the team has a strong implication in fiber laser technology in order to develop the laser sources required for lidar applications. The main objective is the power scaling of fiber laser sources so as to increase lidar range, measurements accuracy and/or measurement rate. This implies the development of new active fibers, new technologies to overcome the stimulated Brillouin scattering threshold or architectures involving coherent combining of amplifiers. Other developments deal with new wavelengths fiber lasers or supercontinuum sources to address particular gas species detection.

In this paper, we focus on innovative fiber laser developments and their integration in lidar systems for wind or gas monitoring. We also present new developments for two lidar applications: lidar vibrometer for structural damage assessment, and supercontinuum lidar for remote spectroscopy. Two other topics (Wake vortex detection and Wind sensing using coherent combining), are presented in dedicated papers.