



LIDAR MONITORING OF ANTHROPOGENIC POLLUTION AND NATURAL PHENOMENA

Luca Fiorani^{1*}, Francesco Colao¹, Antonio Palucci¹, Davod Poreh²

¹UTAPRAD-DIM, ENEA, Via Enrico Fermi 45, 00044 Frascati, Italy

²ENEA guest with ICTP fellowship, ENEA, Via Enrico Fermi 45, 00044 Frascati, Italy

Abstract

The atmospheric lidar ATLAS has been developed to monitor air changes due to human activities or natural events. In particular, it has been deployed in field campaigns in industrial areas and volcanic zones. In industrial areas, ATLAS measured the aerosol load and the concentration of water vapor, ethylene, ammonia and ozone. At Etna, the aerosol load inside the volcanic plume was retrieved, while at Stromboli, water vapor concentration in the cross sections of the plume and wind speed at the crater were measured. The aerosol load is measured in terms of extinction coefficient calculated with an inversion method of the lidar equation. Gas concentrations and wind speed are retrieved by differential absorption lidar and correlation technique, respectively. Lidar returns can be obtained up to a range of 5 km. The typical spatial and temporal resolutions are 15 m and 20 s, respectively. Thanks to measurements of gas concentrations and wind speed, gas fluxes can be inferred. This result was achieved for water vapor in the Stromboli plume.

Key words: atmospheric lidar, environmental monitoring, industrial areas, remote sensing, volcanic plumes

Received: November, 2010; Revised final: January, 2011; Accepted: January, 2011

* Author to whom all correspondence should be addressed: e-mail: luca.fiorani@enea.it; Phone: +39 0694005861; Fax: +39 0694005312