Ten Years of Interdisciplinary Lidar Applications at SCNU, Guangzhou

J.B.Chi[(1)], Z.Duan[(1)], J.W.Huang[(1)], Y.Li[(1)], Y.Y.Li[(1)], M.Lian[1)], J.C.Lu[(1)], Y.T.Sun[(1)], J.L.Wang[(1)], X.Wang[(1)], Y.Yuan[(1)], Q.Zhang[(1)], G.Y.Zhao[(1)] S.M.Zhu[(1)], S.Svanberg[(1,2)]

[(1)]South China Academy of Advanced Optoelectronics, South China Normal University, Guangzhou, CN

[(2)] Department of Physics, Lund University, Sweden, E-mail: sune.svanberg@fysik.lth.se

A diversified and interdisciplinary lidar research program has during the last 10 years been pursued at South China Normal University in Guangzhou, China. The activities include time-of-flight (TOF) lidar applications with pulsed lasers, and the use of CW systems for fixed-range laser-induced fluorescence (LIF) and laser-induced break-down spectroscopy (LIBS) studies, or range-resolved (bi-static) measurements based on Scheimpflug arrangements. Mobile-, drone-based, and hand-held systems have been developed for long-range (km) to short-range (m) remote-sensing applications. Monitoring is directed towards air pollutants, vegetation and crops, flying insects (agricultural pests and disease vectors), and water pollutants.

A mobile TOF lidar system was developed as a multi-purpose platform for field work[1]. A special adaption of the system is range-resolved monitoring of atomic mercury (absorbing around 254 nm) using the differential absorption lidar (DIAL) approach. A high-light was the mapping of mercury fumes from the underground burial chamber of the "Terracotta Army Emperor" Qin´s mausoleum in Xi´an[2]. Further, mercury in major cities as well as in a mining areas was studied[3]. Remote LIF studies included corn and rice fields, and concerned species characterization and fertilizer levels[4]. Remote LIBS studies on metal samples were also demonstrated[5].

Two different compact LIF systems carried by a drone were developed for vegetation[6] and water pollution[7] studies, with typical flying heights of 20 m. The vegetation probing system as well as an underwater LIF monitoring system[8] provide range-resolution combined with full spectral recordings. Such systems could be complemented with compact hand-held instrumentation[9,10].

Scheimpflug CW lidar systems are powerful in monitoring flying insects. Characteristic information on relectance, depolarization and wing-beat frequencies can readily be obtained[11-13].

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