
ANAtOLIA : a high-performance mobile station for atmospheric characterization for Astronomical Observations and Optical Communications

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Abstract

ANAtOLIA (Atmospheric moNitoring to Assess the availability of Optical LInks through the Atmosphere) is a project funded by the European Space Agency (2M€) and aims to ground-sites selection and assess their availabilities for optical links through the atmosphere. Astronomical observations and space-to-ground optical communications are limited by clouds, aerosols and atmospheric turbulence. Therefore, we developed in the framework of the ANAtOLIA project, an innovative and efficient instrumentation and methods to accurately measure, analyze, characterize, and ultimately predict critical atmospheric parameters for the purposes of the selection of the astronomical and OGS (Optical Ground Station) sites and the evaluation of their availability. The main mission objectives of ANAtOLIA are to design, manufacture, procure and assembly a self-standing and autonomous ground support

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equipment, comprising cloud, aerosol and turbulence monitoring to deliver precise measurements of the atmosphere transmission. ANAtOLIA is a compact mobile station consisting of the GMT monitor (Generalized Monitor of Turbulence), Reunivatt Sky Insight camera and Cimel CE318-T photometer, which is operational 24h a day, 7 days a week in any site around the world with minimal infrastructure. After two years of instrumental specifications, design, development and on sky tests, we started recently installation of the ANAtOLIA station on selected ground sites in ESA member states to record continuously local clouds, aerosol information and atmospheric turbulence conditions during a 24 month campaign. The data collected with these ANAtOLIA monitors will be correlated with data available from other sources of cloud coverage and atmospheric conditions (e.g., MSG, MODIS, local meteorological sites). The main goal of these correlations is to improve knowledge of the optical link availability for selected OGS sites and to carry out a long-term validation of the optical link availability prediction methods.

Keywords: Atmospheric turbulence, Optical Turbulence, Site, Testing, Prediction, HRA techniques