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Planning for LOTOS: A New Lower Troposphere Observing System

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The National Center for Atmospheric Research Earth Observing Laboratory (EOL) proposes to develop the Lower Troposphere Observing System (LOTOS), a new integrated sensor network that offers the potential for transformative understanding of the lower atmosphere and its coupling to the Earth's surface.

The LOTOS sensor network is designed to allow simultaneous and coordinated sampling both vertically, through the atmospheric planetary boundary layer, and horizontally, across the surrounding landscape, focusing on the land-atmosphere interface and its coupling with the overlying free troposphere. The core of LOTOS will be a portable integrated network of up to five nodes, each consisting of a profiling suite of instruments surrounded by up to fifteen flux measuring towers. LOTOS will provide an integrated set of measurements needed to address outstanding scientific challenges related to processes within the atmospheric surface layer, boundary layer, and lower troposphere. LOTOS will also enable novel quantification of exchanges of biogeochemical and climate-relevant gases from microscale up to regional scale.

LOTOS' uniqueness lies in its ability to simultaneously sample both horizontally and vertically as an integrated system, but also in its flexibility to be easily relocated as a portable field-deployable system suitable for addressing a wide range of research needs. LOTOS will provide real-time data quality control, combine measurements from a variety of sensors into integrated data products, and provide real-time data displays. It is envisioned that LOTOS will become part of the deployable NSF Lower Atmosphere Observing Facilities (LAOF) and thus be available to a broad base of NSF users from both observational and modeling communities. LOTOS offers the potential for transformative understanding of the Earth and its atmosphere as a coupled system. This presentation will describe the background, motivation, plan, and timeline for the LOTOS' proposed development.