The Atmospheric and Terrestrial Mobile Laboratory (ATML)

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A new truck-mounted mobile laboratory for greenhouse gas (GHG) measurement and source attribution is under development in support of a three-laboratory (Los Alamos National Lab, Lawrence Livermore National Lab and Sandia National Labs) Department of Energy program. The ATML will provide measurement capabilities to aid in attribution of ambient carbon dioxide concentrations to their diverse source types, to quantify fluxes of CO_2, and to improve our ability to integrate ground- and satellite-based GHG measurements. Here we describe the suite of instruments on the ATML, including a proton transfer mass spectrometer and laser-based analyzers for field measurement of CO_2, CH_4 and water vapor isotopolog concentrations. The ATML is outfitted with a 10 m pneumatically-operated sampling mast, a balloon-supported air sampling system for sampling at higher elevations, flask samplers for collection of air samples for C14 analyses, an eddy correlation flux system, photoacoustic and trace element aerosol samplers and standard air quality and meteorological instrumentation, as well as a Vaisala ceilometer, a CIMEL Sunphotometer, and a Yankee total sky imager (the latter three instruments to aid in interpretation of satellite GHG data). A separate, transportable high resolution solar tracking Fourier Transform Spectrometer (FTS) that operates in the Ultraviolet-Visible and near Infrared is also being acquired for retrievals of columnar concentrations of CO_2, CH_4, N_2O, CO and other absorbing species. We plan to deploy the ATML and transportable FTS for three short field experiments in late FY10 focused on GHG measurement and attribution, emphasizing intercomparison and cross-validation of new analytical approaches. This project benefits from collaboration with several elements of the NOAA ESRL. It is anticipated that in FY11 and beyond, the ATML will be available for additional collaborative field experiments.

Figure 1. The existing mobile lab being outfitted as the ATML.

Figure 2. Note the fold-down railings deployed around the top, and the 10 m pneumatic mast.