Monitoring Patterns and Anomalies Using the Dense GHG Network in the Northeastern U.S.

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Last year Earth Networks began the five year deployment of 100 cavity ring-down spectrometers for continuously measuring CO_2 and CH_4. It is planned to place sensors at 50 tall towers in the United States, 25 in Europe, and 25 around the world. Data from this network will be used for monitoring and verification, and for inverse modeling to estimate natural and anthropogenic sources and sinks of greenhouse gases (GHGs). Instruments are calibrated daily using a standard gas mixture from NOAA. Sampling rate of the raw data from spectrometers is at the sub-minute range and higher than in flask networks previously used for regional inversions. Currently, 20 instruments are already deployed in the U.S., and most of the sites are in the northeast. Using these real-time continuous *in situ* GHG observations, patterns and anomalies in the data are analyzed to relate GHG measurements at towers to specific sources. To compute footprints and to carry out the inversions, a coupled system of the Weather Research and Forecasting and the Stochastic Time-Inverted Lagrangian Transport models is used. Observations from numerous surface weather stations are also utilized in this study. High sampling rate and the density of the sites in the region, which have diverse GHG sources, terrain and coastal line complexity, and dynamic weather patterns, are important for gaining a scientific insight into multi-scale processes both at the surface and in the atmosphere. Dense coverage of the sites in the region allows analyzing the data both for site-to-site comparison and for area-averaged estimates of GHG levels. In this talk, we provide several examples of the features revealed through the observations in the recently deployed network in the northeastern U.S. network, as well as our preliminary findings.
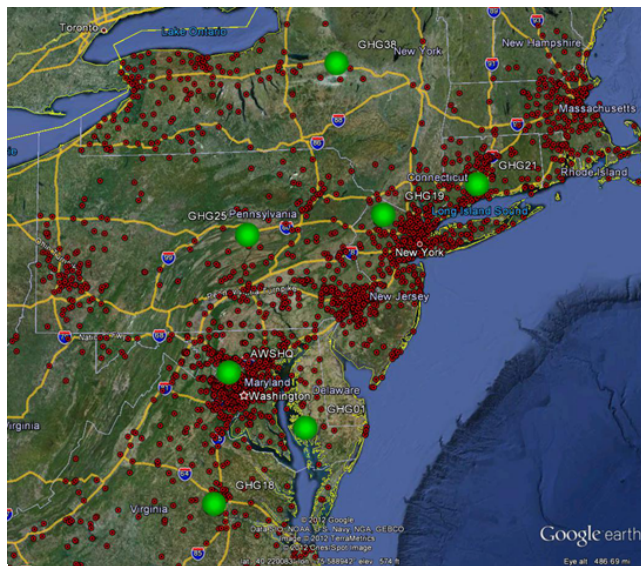

Figure 1. Earth Networks' sites in the Northeastern U.S. (green markers = GHG sites, dark red = weather stations).
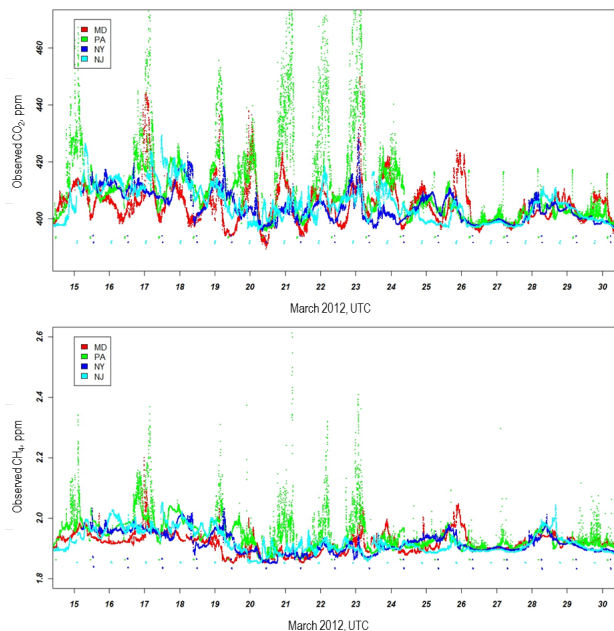

Figure 2. Observations of CO_2 (top) and CH_4 (bottom) at Earth Networks' site in the second half of March 2012.