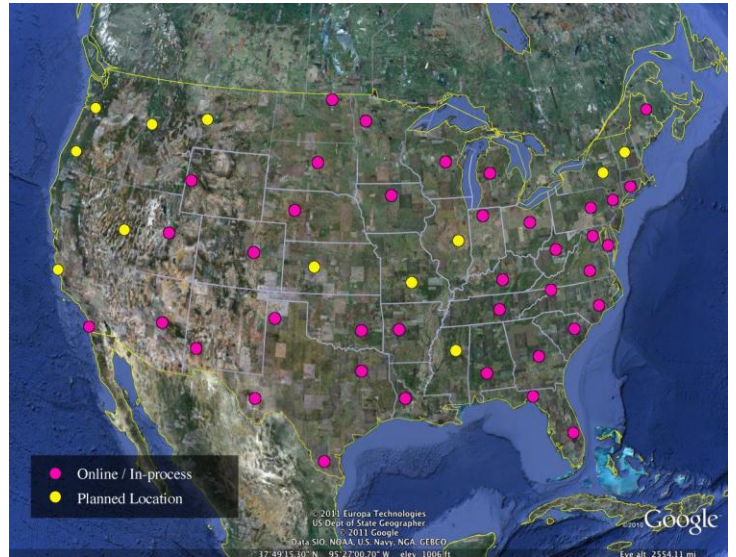# Greenhouse Gas (GHG) Observation Network Site and Data Services

Earth Networks is deploying what will become the largest high density network of environmental measurement instruments to precisely measure atmospheric carbon, methane and other greenhouse gas emissions. Earth Networks is collaborating with renowned scientists and organizations in developing robust data reliability standards and methodologies to ensure precise measurement standards including:

- Scripps Institution of Oceanography
- National Oceanic and Atmospheric Administration (NOAA)
- National Institute of Standards and Technology (NIST)
- Integrated Carbon Observation System (ICOS)

The Earth Networks GHG Observation Network will comprise state-of-the-art detection equipment on tall towers operating under WMO calibration standards and procedures. Sensors at these locations will provide continuous in-situ measurements of atmospheric GHG mixing ratios at multiple heights (50 to 300 meters). This continuous measurement provides real-time gap-filling data for improved measurement, reporting and verification (MRV) and other global model output.

The GHG Observation Network also provides for Integration of data from other GHG sensors and networks enabling organizations with increased data density to provide a further return on their capital investment.

Earth Networks Greenhouse Gas (GHG) Observation Network global deployment will include 100 GHG measuring instruments by mid-2012 in the following increments: 50 in the US; 25 in Europe; 25 in other worldwide locations.

Solving the Measurement Dispute with a Top-Down Approach

The GHG Observation Network provides precise, high density measurements enabling the ability to quantify changes in atmospheric gases on regional scales across the globe. Until recently, a bottom-up approach of assessing emissions from individual sources has been used to calculate carbon emissions estimates for reporting purposes. Researchers are now questioning the accuracy of these figures and are suggesting that the true measurement can only be obtained within air samples where a more complete picture can be obtained for a region. These air samples have shown greenhouse gas levels to be higher than those of the bottom-up estimates reported.

Earth Networks will use a top-down approach to accurately measure atmospheric greenhouse gases, filling the gaps in bottom-up estimates to enable more accurate quantification of emissions that are not directly measured. The data collected by the GHG Observation Network will be combined with weather information from the Earth Networks Global Weather Network to determine how these gases travel utilizing inverse modeling.

Tracing the Source with Inverse Modeling
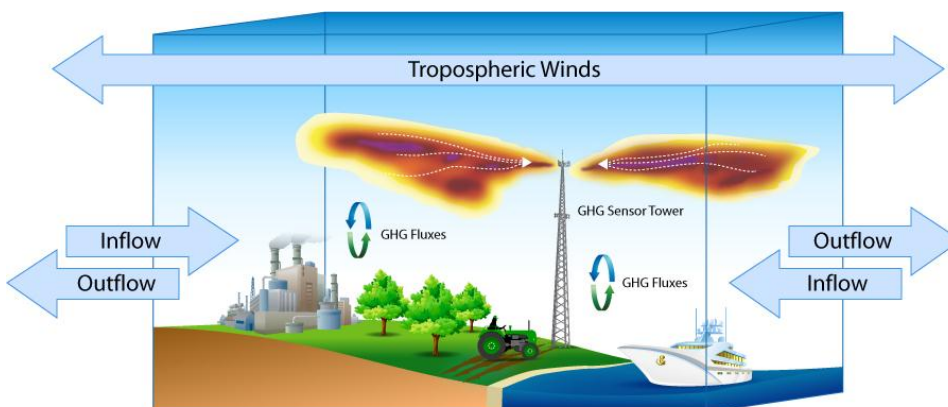
Earth Networks combines continuous atmospheric measurements, and where necessary, utilizes inversions at a coarser scale along with bottom-up GHG estimates from static or dynamic inventories of emissions.

For this analysis, atmospheric trajectories are simulated, based on the Weather Research and Forecasting (WRF) model at high spatial resolution, and surface footprints, which are computed using coupled Stochastic Time-Inverted Lagrangian Transport (STILT model).

Advanced Data Models and Carbon Forecasts

Controlling carbon emissions begins with accurate high density measurement for MRV (measurement, reporting and verification). Earth Networks combines continuous GHG measurements with real-time weather data from the Earth Networks weather network to create a near real-time weather and carbon data collection system providing both ground floor data and data on local factors for improved carbon forecasts, as well as in support of advanced data models.

Earth Networks Global Weather Information Network combines real-time information from 8,000 surface observation stations with multi-source weather observation data.
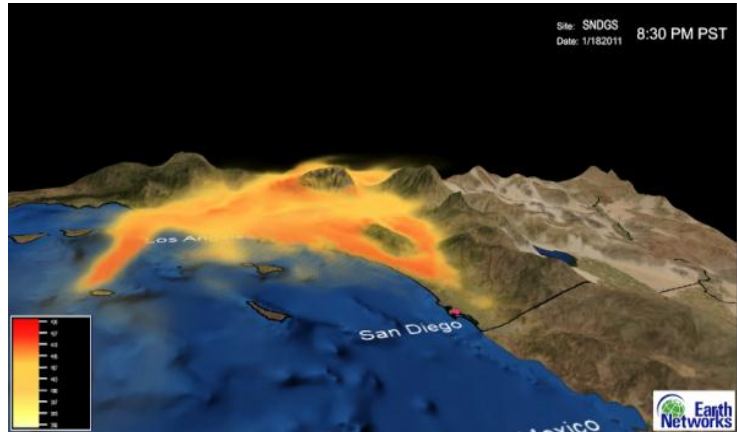
Carbon forecasts are delivered in 2D and 3D animations on the Earth Networks GHG network portal. Data collected from Earth Networks sensors model carbon dioxide concentration levels and its motion over California.

## Earth Networks Greenhouse Gas Observation Solutions Benefits

- Continuous measurement providing near real-time gap filling data for carbon tracker and other global models
- High quality calibration tanks from the National Oceanic and Atmospheric Administration (NOAA) meeting WMO standards
- MRV foundations at national, regional and local sales supporting climate and GHG reduction policies and regulations, as well as emerging carbon trading programs
- Education of the public on climate changes and the role of GHGs

Earth Networks GHG Observation Network Site and Data Services

Earth Networks provides cost effective solutions that ensure accurate continuous measurement which meet WMO standards. Earth Networks offers a complete turnkey solution as well as flexible options to complement existing sensor installations.

Network site and data services include:

- Site Planning and Consultation
- Instrument Installation
- Earth Networks Calibration System
- Site Maintenance
- Weather Station
- Data Management Services
- GHG Data display on the Earth Networks GHG Network Portal
- Carbon Footprint Reports
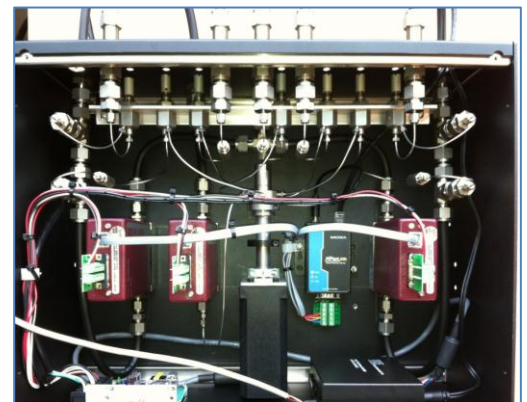
Earth Networks and Scripps Institution developed a system for calibrating gas analyzers and function monitoring. The system includes a calibration box and two air tanks.