Powerful new tool to track carbon dioxide by source

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Scientists from NOAA's Earth System Research Laboratory (ESRL) announced today a new tool to monitor changes in atmospheric carbon dioxide and other greenhouse gases by region and source. The tool, called CarbonTracker, will enable its users to evaluate the effectiveness of their efforts to reduce or store carbon emissions.

The online data framework distinguishes between changes in the natural carbon cycle and those occurring in human-produced fossil fuel emissions. It also provides verification for scientists using computer models to project future climate change. Potential users include corporations, cities, states and nations assessing their efforts to reduce or store fossil fuel emissions around the world.

"NOAA encourages science that adds benefit to society and the environment. CarbonTracker does both," said retired Navy Vice Admiral Conrad Lautenbacher, Ph.D., undersecretary of commerce for oceans and atmosphere and NOAA administrator. "Increasingly, observations of the Earth are demonstrating a remarkable impact on our understanding of human and natural systems. We are transitioning this understanding gained from intensive research into operations that benefit the environment and the economy."

CarbonTracker distills an accurate assessment of greenhouse-gas increases or decreases. The resolution will increase to observe differences in concentration on finer geographical scales over time as data become available. Using the limited data that currently exist, the

model can characterize emissions each month among U.S. regions, such as the West or the Southeast. As the observation network becomes denser, however, policymakers will be able to check the CarbonTracker Web site to compare emissions from urban centers. For instance, the resolution will be fine enough to determine the difference in net emissions from Sacramento as compared to San Francisco.

CarbonTracker's initial applications are primarily for scientists, and to attract new partners in NOAA's efforts to expand greenhouse gas observations in the United States and globally. NOAA and its partners are encouraging the addition of new monitoring sites around the United States and around the world to increase the resolution of point sources. Ultimately the site will provide easy-to-use information on local scales for policymakers, business leaders, teachers, and the public.

"CarbonTracker's potential is enormous," said Pieter Tans, head of NOAA/ESRL's Carbon Cycle Greenhouse Gases group, who developed the tool. "We are moving into an era where emissions could have a price tag. If carbon trading, emissions reduction and sequestration schemes become more common around the globe, society will need the ability to compare their relative value.
Accurate and objective information on changing atmospheric concentrations will be essential for both research and impact assessments."

Until now, scientists have relied on limited direct records of atmospheric carbon dioxide, mainly from remote locations. Also, previously available computer models could not maximize the utility of the information derived. Only analyses of very broad global patterns of carbon dioxide emissions and uptake were possible. Estimates of local carbon emissions have used proxy data, such as reported point-source inventories, gasoline sales records, and other tallies from energy organizations and nations monitoring greenhouse gases, but there has been no way to verify what

was actually released into the atmosphere.

CarbonTracker uses many more continuous observations than previously taken. The largest concentration of observations for now is from within North America. The data are fed into a sophisticated computer model with 135 ecosystems and 11 ocean basins worldwide. The model calculates carbon release or uptake by oceans, wildfires, fossil fuel combustion, and the biosphere and transforms the data into a color-coded map of sources and storage "sinks." One of the system's most powerful assets is its ability to detect natural variations in carbon uptake and release by oceans and vegetation, which could either aid or counteract societies' efforts to curb fossil fuel emissions on a seasonal basis.

"Only the atmosphere itself can give us the real answer on all sources and sinks," said Wouter Peters, who led the development of CarbonTracker at NOAA/ESRL and also is affiliated with the Cooperative Institute for Research in the Environmental Sciences (CIRES). "This information will be critical. How atmospheric concentrations of greenhouse gases change in the future is one of the key uncertainties in the global climate models and the biggest driver behind climate change."

NOAA collaborates with partners in France, Australia, Brazil and other nations to measure greenhouse gases globally. Through a longstanding collaboration, Environment Canada has provided a quarter of the data for North America. However, the global network is still sparse. Using today's data, the system can distinguish surface emissions on a broad scale, but plans are underway to refine observations and modeling of carbon sources on much smaller scales.

NOAA's Earth System Research Lab is the only institution measuring atmospheric greenhouse gases globally and provides more than half of

the world's data. The network includes individuals gathering air samples in flasks that are then shipped to the Boulder lab for analysis, aircraft carrying automated samplers to grab air from higher altitudes, and sensors atop tall towers transmitting data via telephone.

Source: NOAA Research