Introduction

For more than 25 years, the Environmental Protection Agency’s (EPA) Clean Air Status and Trends Network (CASTNET) has collected ambient measurements of nitric acid, nitrate, and ammonium concentrations using a filter pack. However, key contributors to the nitrogen budget have been missing from CASTNET. Two of these components are ammonia (NH$_3$) and total reactive nitrogen (NO$_y$). Missing NH$_3$ measurements have been addressed by CASTNET’s NO$_y$ Monitoring Network started in 2007. To develop a data set of NO$_y$ measurements, EPA has established an NO$_y$ monitoring network stretching from the east coast to the mountain west, which now features six EPA-sponsored CASTNET sites. In addition, NPS, a primary sponsor of CASTNET, features NO$_y$ measurements at two of their CASTNET sites.

Results

EPA-Sponsored NO$_y$ Sites

Filter Pack Comparisons
HNO$_3$ and particulate nitrate are measured on CASTNET filter packs, and the sum is called total NO$_y$. Because NO$_y$ is composed of HNO$_3$, particulate nitrate, and other gases and particles, a simple evaluation of the measurements is to compare the NO$_y$ concentrations with total NO$_y$ concentrations. The figures below show comparisons of weekly average continuous NO$_y$ measurements with weekly filter pack total NO$_y$ concentrations collected at BVL130, IL. The NO$_y$ concentrations were consistently higher than the total NO$_y$ concentrations, as expected. The weekly total NO$_y$ concentrations, the average weekly NO$_y$ levels, and their ratios are listed for all six sites in the table below. These were calculated as the average of all valid weekly filter pack concentrations and the average of mean NO$_y$ values matching run time of the weekly filter packs. Ratios of NO$_y$ to total NO$_y$ varied from 4.1 at BVL130 to 9.7 at BEL116, MD.

Operational Issues

Dealing with Analyzer Drift
Another operational issue that AMEC has dealt with is the drift in NO$_y$, NO, and NPN QC check results seen at several of the NO$_y$ sites. AMEC is finding that remote calibrations and adjustments are required in between the scheduled semi-annual site visits. AMEC monitors performances of the analyzer and initiates a remote calibration when responses approach the 10% criterion for span and precision checks. The graph to the right shows an example of the NO Level 4 check.

Summary

NO$_y$ data are used as part of the NCore program and provide information to atmospheric modelers, policy makers, and scientists studying environmental impacts. CASTNET now includes an eight site NO$_y$ network representing an excellent range of locations from pristine to rural to suburban. Concentrations from ROM206, CO provide information to atmospheric modelers, policy makers, and scientists studying environmental impacts. CASTNET now includes an eight site NO$_y$ network representing an excellent range of locations from pristine to rural to suburban. Concentrations from ROM206, CO provide information to atmospheric modelers, policy makers, and scientists studying environmental impacts. CASTNET now includes an eight site NO$_y$ network representing an excellent range of locations from pristine to rural to suburban. Concentrations from ROM206, CO provide information to atmospheric modelers, policy makers, and scientists studying environmental impacts. CASTNET now includes an eight site NO$_y$ network representing an excellent range of locations from pristine to rural to suburban. Concentrations from ROM206, CO provide information to atmospheric modelers, policy makers, and scientists studying environmental impacts. CASTNET now includes an eight site NO$_y$ network representing an excellent range of locations from pristine to rural to suburban. Concentrations from ROM206, CO provide information to atmospheric modelers, policy makers, and scientists studying environmental impacts. CASTNET now includes an eight site NO$_y$ network representing an excellent range of locations from pristine to rural to suburban. Concentrations from ROM206, CO provide information to atmospheric modelers, policy makers, and scientists studying environmental impacts. CASTNET now includes an eight site NO$_y$ network representing an excellent range of locations from pristine to rural to suburban. Concentrations from ROM206, CO provide information to atmospheric modelers, policy makers, and scientists studying environmental impacts. CASTNET now includes an eight site NO$_y$ network representing an excellent range of locations from pristine to rural to suburban. Concentrations from ROM206, CO provide information to atmospheric modelers, policy makers, and scientists studying environmental impacts. CASTNET now includes an eight site NO$_y$ network representing an excellent range of locations from pristine to rural to suburban. Concentrations from ROM206, CO provide information to atmospheric modelers, policy makers, and scientists studying environmental impacts. CASTNET now includes an eight site NO$_y$ network representing an excellent range of locations from pristine to rural to suburban. Concentrations from ROM206, CO provide information to atmospheric modelers, policy makers, and scientists studying environmental impacts. CASTNET now includes an eight site NO$_y$ network representing an excellent range of locations from pristine to rural to suburban. Concentrations from ROM206, CO provide information to atmospheric modelers, policy makers, and scientists studying environmental impacts. CASTNET now includes an eight site NO$_y$ network representing an excellent range of locations from pristine to rural to suburban. Concentrations from ROM206, CO provide information to atmospheric modelers, policy makers, and scientists studying environmental impacts. CASTNET now includes an eight site NO$_y$ network representing an excellent range of locations from pristine to rural to suburban. Concentrations from ROM206, CO provide information to atmospheric modelers, policy makers, and scientists studying environmental impacts. CASTNET now includes an eight site NO$_y$ network representing an excellent range of locations from pristine to rural to suburban. Concentrations from ROM206, CO provide information to atmospheric modelers, policy makers, and scientists studying environmental impacts.