

The Monitor

CASTNET

Clean Air Status and Trends Network

Fall 2009

The Newsletter for Air Quality Station Operators



National Park Service (NPS)
Gaseous Pollutant Monitoring Program
(GPMP)



Environmental Protection Agency (EPA)
Clean Air Status and Trends Network
(CASTNET) program

NETWORK NEWS

MACTEC retained as contractor for EPA CASTNET network

The EPA recently awarded MACTEC's Gainesville, Florida office its fourth consecutive 5-year contract to operate the Clean Air Status and Trends Network (CASTNET). The Gainesville project team has been operating CASTNET and CASTNET's predecessor, the National Dry Deposition Network (NDDN), since 1987. MACTEC's CASTNET team is delighted and is looking forward to another five years of working with EPA.

The CASTNET program provides a long-term data record with more than 35 sites in operation since the late 1980s, making it the nation's primary source of data on the dry deposition of sulfur and nitrogen species across the United States. CASTNET data are used to define the geographic distribution of rural pollutants and to estimate dry deposition of pollutants. Over the past 15 months or so, MACTEC worked with EPA to upgrade the sites with state-of-the-art equipment to allow for near real-time monitoring of ozone and meteorological parameters. July 2009 marked the completion of the network upgrade allowing for hourly averages of parameters from CASTNET sites, such as ozone, temperature, wind speed, wind direction, and sigma theta, to be reported to AIRNow, a Web site (<http://www.airnow.gov>) designed to allow the public to view air quality data for a specific area in "real time."

CASTNET workshop focuses on future

Many scientists, researchers, and other stakeholders who routinely use CASTNET data as well as EPA and NPS representatives attended a workshop focusing on how to maximize the value of CASTNET measurements and how to utilize the CASTNET infrastructure to meet future requirements for the network and data users. Over 60 people attended the workshop, which was held at the Research Triangle Park EPA offices in Durham, North Carolina, on August 20-21, 2009.

During the two-day workshop, representatives from the EPA and NPS gave presentations on the current uses of the data, future needs for program assessment, and model development. Poster presentations also provided information on new monitoring techniques and measurements of new pollutants. Workshop participants also held group discussions on how to meet the needs of the data users.

Several consensus recommendations emerged from the workshop. One was to complement the existing weekly filter pack measurement with equipment capable of making hourly measurements of the current and/or additional pollutants. These data, when used with the filter pack measurements, would lead to improvements in numerical models that can estimate air quality. A second recommendation was to consider adding another filter to the current 3-stage filter pack system to measure an additional chemical form of nitrogen [total reduced nitrogen (NH_x)]. Currently, most nitrogen measured at CASTNET is oxidized, in the form of nitric acid (HNO_3) and particulate nitrate (NO_3^-). Measuring ammonia (NH_3) + ammonium (NH_4^+) and (NH_x) would significantly improve the completeness of the total budget of nitrogen measured at CASTNET sites. Considerable research and development will be needed before any changes are made to CASTNET.

NETWORK NEWS continued on page 2....

NETWORK NEWS continued from page 1....

What do you want to read?

As an air quality station operator receiving this newsletter, what is it that you want to read? What do you want to be informed about? Do you have any specific questions? What can the CASTNET program managers tell you to make your job servicing the instrumentation better and easier?

We want to know what you're thinking. This newsletter was designed to provide you, the 180+ operators throughout the country who collect CASTNET data, with relevant network news, a bit about how you're doing and a look at who other operators are, as well as some technical insight into the program. Also included in each issue is a Shop Talk section that discusses what the laboratories do for the program, and a Toolbox section designed specifically to help operators with specific on-site tasks or needs.

Now we want to know what you're thinking. What do you want to see, and what would help you in your role as CASTNET station operator? What is of interest to you? What do you want to read more of? Please telephone or e-mail your monitoring contractor with your comments, ask a question, or just get to know them:

NPS CASTNET Sites

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EPA CASTNET Sites

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The Monitor goes green via e-mail

Since its inception in 1997, *The Monitor* newsletter has been printed on recycled paper, and since the Spring 2008 issue it has been printed on FSC paper. FSC, or the Forest Stewardship Council, is an organization that ensures forestry is practiced in an environmentally responsible, socially beneficial, and economically viable way. The newsletter is now going one step further down the green path, by being available via e-mail. Enough demand has grown for the e-mail option to make it viable.

You will continue receiving a hardcopy of this twice-annual newsletter unless you specify otherwise. It is also available on the Internet, at <http://www.nature.nps.gov/air/Pubs/theMonitor.cfm>. If you want to receive The Monitor via e-mail (.pdf format) from now on, please e-mail Gmercer@air-resource.com.

A word about CASTNET annual reports

As discussed in the Spring 2009 issue of *The Monitor*, data for each calendar year are collected, validated, analyzed for trends, and reported in an annual report. Final verification ("validation") of the data for the previous year is completed for all CASTNET sites by early July. NPS- and EPA-sponsored sites have different validation schedules. NPS validates data collected by all of its sites each month and EPA validates data collected for six months for a specific group of about 11 sites (calibration groups). By the beginning of July, all data for the previous calendar year have been validated and are ready for use in the Multi-Layer Model (MLM), the model used to estimate the dry deposition of pollutants. At that time, preparation of an annual report to summarize the results of measured pollutant concentrations and estimated dry deposition for the year begins.

Evaluating CASTNET data on an annual level smooths out some of the variances caused by weather and unusual events (e.g., forest fires) to provide a "big picture" of the nation's air quality. While weather and a bad fire year can still be detectable at the annual level, the effects are not as amplified as they would be if data were compared on a weekly or monthly basis. Each CASTNET annual report documents the results collected for that calendar year. It also compares data across many years to create a picture of the changes in the status and trends in air quality. The four most recent annual reports are available to the public on EPA's CASTNET Web page (<http://www.epa.gov/castnet/docs.html>). The report for any calendar year is generally available on the Web site approximately 12 months later. MACTEC submitted the first draft of the 2008 annual report to EPA in mid-August. MACTEC and EPA will work together to refine the report, and the final version will likely be available by January 2010.

Since station operators are on the forefront of the process – data collection – they often do not see the end result. If you get a minute, check out the reports on EPA's Web site. Remember, your dedication and consistent care of your site are important contributions to this report. We couldn't do it without you. Thank you again for your continued support.

NETWORK NEWS continued on page 7....

Monitoring Site Assistance:

NPS CASTNET sites: contact Air Resource Specialists
telephone: 1-800/344-5423 (Mountain Time)

EPA CASTNET sites: contact MACTEC
telephone: 1-888/224-5663 ext. 6629 and/or 6620
(Eastern Time)

STATION OPERATOR FOCUS

Dare to do different -- monitoring included

Fred Emstrom, EPA CASTNET operator of the Perkinstown, WI, monitoring site (PRK134) likes to do different things. Being an air quality station operator is one of those things.

To begin Fred's story we have to back up a bit. The Perkinstown station has quite a history. It began in the 1980s as an air quality station operated by the USDA-Forest Service. Fred's father, also Fred, was employed with the Forest Service for 38 years, and operated the station since the early 1980s. When he retired, no one else knew how to run the station, so at Fred's request, the station was moved onto his property, and he continued to run it into his retirement. When the station became a National Dry Deposition Network site in 1988 (now a CASTNET and National Atmospheric Deposition Program site, Fred and his wife Clara were still its operators.

Clara ran the station herself after her husband died in 2002. Fred (the son) took over in 2005 while Clara assisted until she passed on this past August. "The station and what it represents is too important to let it just go," said Fred. "It is important to the state and our citizens, and being its caretaker is an opportunity not everyone has. Being an air quality operator is kind of neat and different." Adjacent to

the CASTNET shelter is an air quality station run by the Wisconsin Department of Natural Resources. Fred maintains this as well, and changes its particulate filters weekly.

The Perkinstown site is near Medford, a northern Wisconsin town of about 5,000 people in an area largely known for its recreation opportunities. Fred and Kelly, his wife of nearly 20 years, raise their two children there, Kendra, 15, and Brady, 11. Fred has been an auto mechanic in town for 20 years, and has several, different but related recreational interests, including hunting, trapping, fishing, 4-wheeling, snowmobiling, and camping. All these different activities keep Fred busy and he considers himself lucky to be able to do them, and help nature out at the same time.

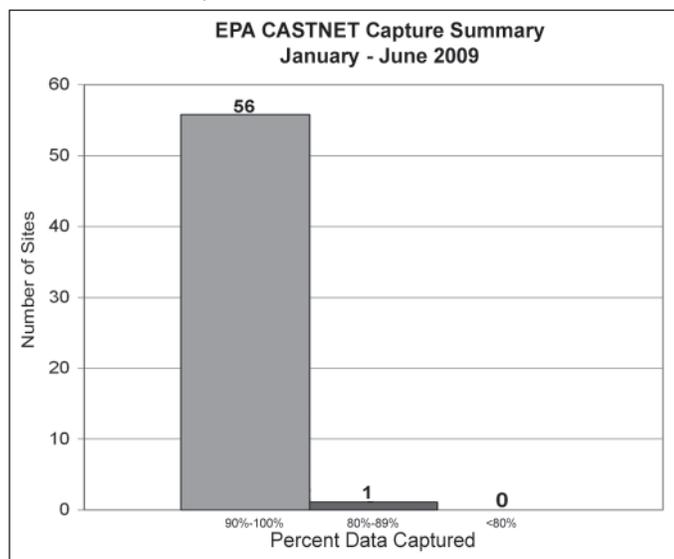


Station operator Fred Emstrom maintains several instruments for CASTNET and the state on his property in northern Wisconsin.

DATA COLLECTION SUMMARY

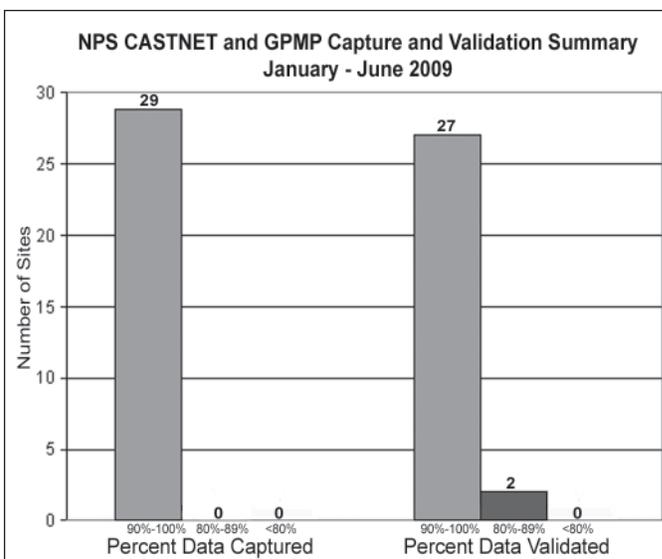
EPA site data capture summary

Ozone data capture for the EPA CASTNET sites for January through June 2009 is summarized in the graph below. The network achieved an average 99% collection for the period. Data validation statistics for the period will not be available until mid-January 2010.



NPS data capture and validation summary

Ozone data capture for the NPS CASTNET and GPMP sites for January through June 2009 achieved an average of 98% collection as illustrated in the graph below. Data validation for the same sites and period are also shown. The network achieved an average 97% final validation for the period.



FEATURE ARTICLE

Accessing CASTNET data is simple and quick

Both EPA and NPS CASTNET data can be accessed from several Web sites on the Internet as either raw data or final validated data. How and what you choose to download or view is up to you. Obtaining data from any of these Web sites is simple, quick, and provides you many options to choose from.

EPA Clean Air Markets Web Site

EPA supports the Clean Air Markets Web site, which houses all CASTNET data (see Figure 1). Visit this public Web site at <http://camddataandmaps.epa.gov/gdm/>. To download data, select “Data Sets and Published Reports,” then “Deposition Data Prepackaged Datasets” under the section titled “Air Quality and Deposition.”

Here you will find a comprehensive list of all data collected throughout the CASTNET program. Files are available by year and by data type. All hourly ozone, gaseous, and

meteorological data are available here as well as total deposition and model outputs. Information regarding foliage coverage and types that are used in the MLM model are also available at this site. At a glance, you can see when the data file was last updated, its size, and number of records in the file.

Hourly data available on this site are appended daily using raw data. Once the data are final, the data within each file are replaced with the final validated data set. Each data point has an associated quality assurance (QA) code that identifies the highest level of validation that the data have been through. A QA code of 1 indicates raw data and a QA code of 3 indicates that the data are final validated.

To download a data file, simply select the file that you’re interested in. You’ll then be given the option to either save or download a .zip file. This .zip file contains several .csv files containing the data and information related to the data file.

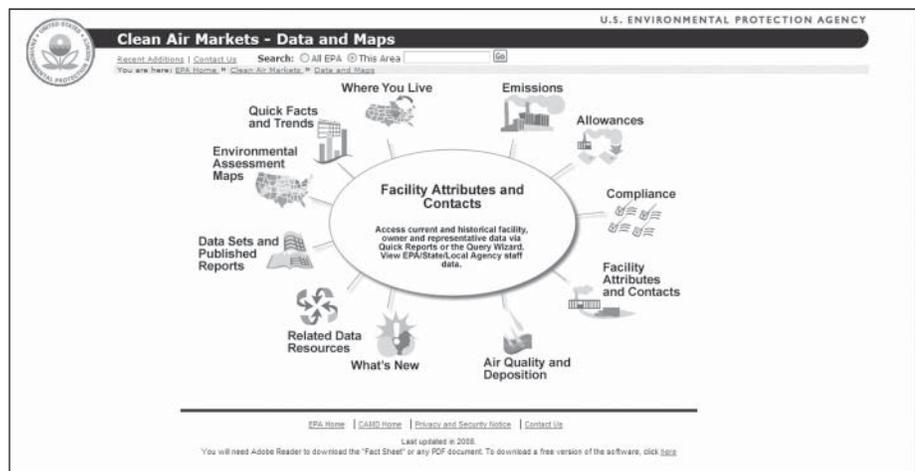


Figure 1. EPA's Clean Air Markets Web site.

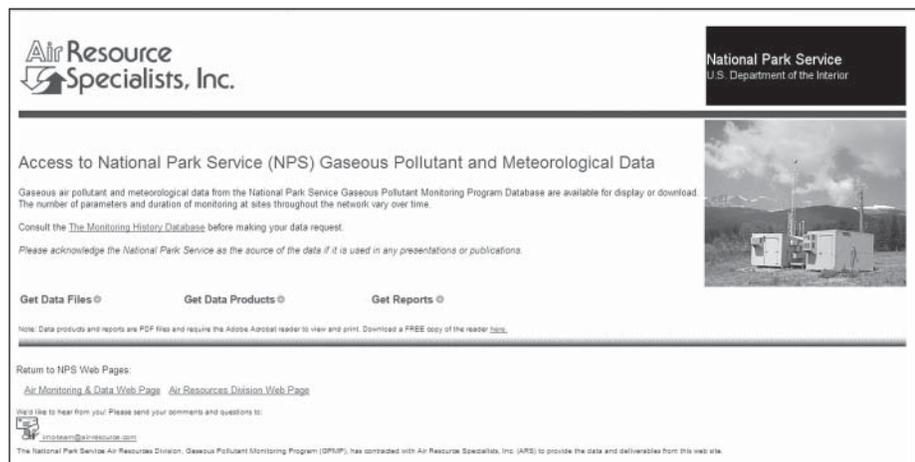


Figure 2. NPS' Data Request Web site.

NPS Data Request Web Site

The NPS also supports a public data request Web site, where validated data from the NPS-supported CASTNET sites can be retrieved (see Figure 2). Data are generally available on this site within 30 days of a month's completion. Various data summaries can be exported from this site. Visit <http://ard-request.air-resource.com/> to obtain data or information. You'll be presented with the option to either download data files or reports, or create custom data products.

To download data files click “Get Data Files.” From here you can select the dates, site(s), and parameter(s) you need. Click the “Continue” button to receive an estimate of the amount of time it will take to create your file and its estimated file size. You will also see a list of your selections. If your selection is not correct, simply select the “Back” button to correct your selection before proceeding. If you are satisfied with your selection, click “Generate Data File.” A .csv file will then be generated, and you will have the option to either save the file or open it for on-screen viewing.

Other options at this site are to download reports or to create data products. The data products window is an interactive window that allows the user to select the product of interest for a selected site and period of time. Products available include but are not limited to the following:

- Stackplot - a time series plot of all the parameters collected at a given site
- Episodes with 8-Hour Ozone >75ppb – provides a list of 8-hour ozone values that exceeded the current ozone standard
- Summary of the Highest Daily Max. Ozone 8-hour Avgs. – provides a list of the highest 8-hour average ozone concentrations for the selected site
- 10 Highest Daily 1-hour Avg. Max Concentrations – provides a list of the highest hourly concentrations for the time period selected
- Summary of Selected Met Data – a list of minimum, maximum, and mean values for selected meteorological parameters

Near Real-Time Data

Near real-time raw data from both EPA- and NPS-supported CASTNET sites are available at <http://www.airnowtech.org> (see Figure 3). To use the site you must request a logon and password. This can be done by clicking “Log in” in the upper right-hand corner of the screen and then selecting “Request an AIRNOW-Tech Account.” Once you are logged in, data can be accessed under the “Data” option. Hourly data for all parameters submitted to the site can be accessed under the “Hourly Data” option. Select a site(s), parameter, and date range. You can either download a file or view the data graphically. You can also view time-series data in AIRNow. Under the Data tab, choose to plot the data for a site for one or a few days. The plot is produced from hourly data submitted to AIRNow. AIRNow provides many tools for viewing data and air quality events. For more information on using this tool refer to the feature article in the Spring 2008 issue of *The Monitor*.

Near real-time raw data from NPS-supported CASTNET sites can also be accessed and viewed graphically at <http://www.nature.nps.gov/air/data/current/index.cfm> (see Figure 4). The most recent hourly ozone concentration is listed by site in a table. To see the most recent data reported for all parameters at a given site simply click the site of interest. Ozone and meteorological data can be viewed in graphical format by clicking the Data Timelines icon. Links to validated data from both EPA- and NPS-sponsored CASTNET sites can be accessed here by clicking “Get Ozone Data.”

By visiting these Web sites, you can get just about anything you want and need. Even if you don’t need to view your or other station’s data, visiting the sites and maneuvering through their options is a fun learning experience, just to see what you can get by a few clicks of your computer mouse.

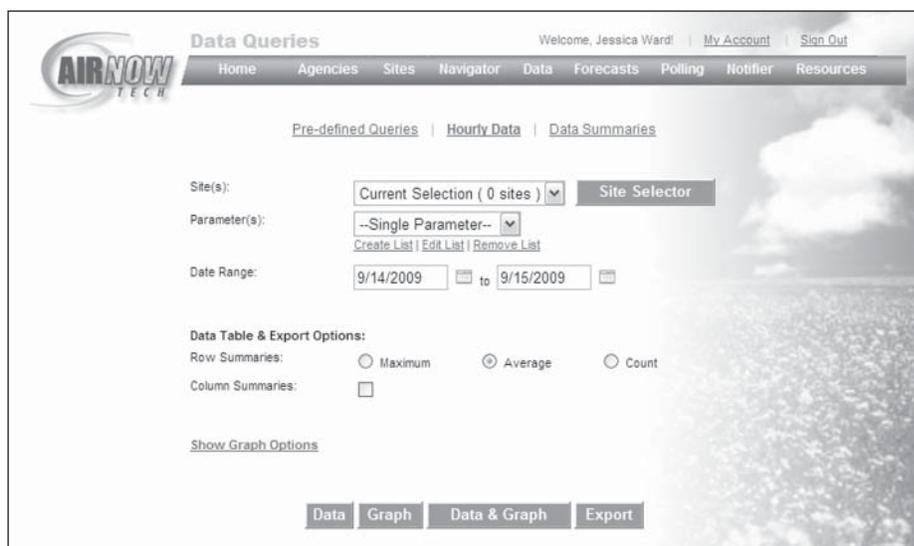


Figure 3. AIRNow Web site.

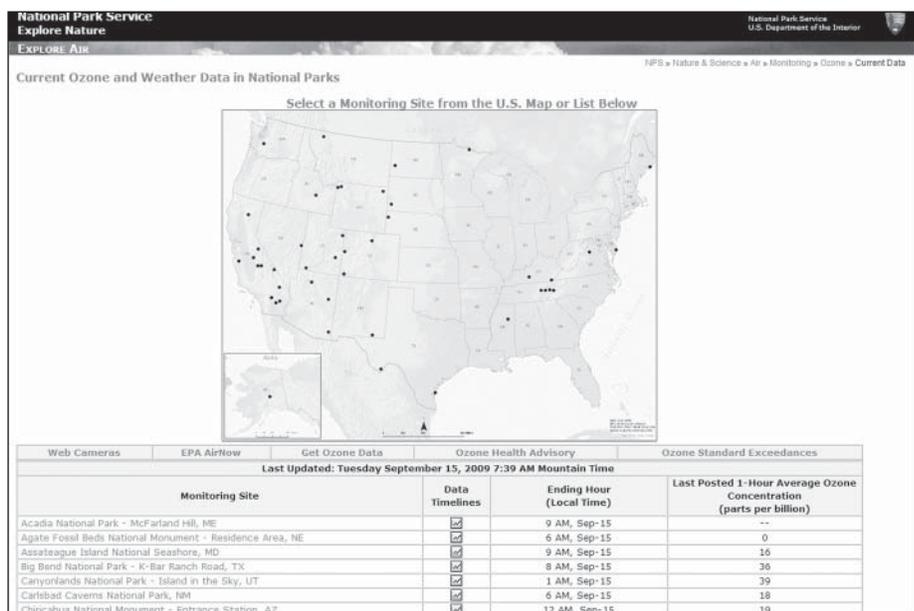


Figure 4. NPS' Current Data Web site.

SHOP TALK

Reviewing your ozone data



The ozone measurement at CASTNET sites requires a significant investment in funding, measurement equipment, technical support, data validation, and operator's time. Your support contractors review the data daily, but it only makes sense for operators to give these data critical attention too. A review of the data since your last station visit is not difficult and will give you a greater understanding of what is typical at your station.

Ozone is a "photochemical smog" and requires the precursors oxides of nitrogen (NO_x) and volatile organic compounds (VOCs) in the presence of intense sunlight for its formation. Summer months with stagnant air will have the greatest potential for high ozone values, reaching .080 ppm or higher. The 8-hour averages at these stations may even exceed the national 8-hour average standard of .075 ppm. Ozone concentrations fluctuate during the day and sites with airsheds impacted by urban areas will have the greatest diurnal variation. These sites will typically have their highest ozone values in the late afternoon and early evening and lowest values in the morning. Stations in remote areas or those not subjected to ozone precursors may not show much diurnal variation, and will report moderate levels (.030 to .060 ppm ozone) year-round. Winter months typically have the lowest ozone values. After a period of time, you will become familiar with the values that are measured at your CASTNET station. If values don't look typical from what you are used to seeing, it

could be a natural variation, or could indicate a malfunction or plumbing problem with the analyzer.

Zero, span, and precision data should also be reviewed. Results of these automated checks of the analyzer have acceptable limits; the results should be consistent from day to day and within the assigned limits. Bring anything unusual to the attention of your support contractor. They may be aware of it but if not, you may prevent the loss of more data.

Instrumentation and site configurations of the EPA and NPS factions of CASTNET are not identical, hence procedures are not always identical. NPS station operators can review their ambient data on-site in a variety of ways. While at the station, the current value is displayed on the front panel of the instrument and on the data logger display. Recently collected data can also be viewed from ESC loggers (Report Averages Menu). NPS sites all have DataView software that will provide a continuous plot of hourly average data from the last 8 or 15 days with just a few mouse clicks (select Data Plots, StkPlt). See Figure 1 below for an example 8-day stackplot. DataView can also display continuous one-minute data stripcharts of operator-selected parameters. This is particularly helpful for observing dynamic events or watching instrument responses during calibrations or troubleshooting. While away from the station, ambient data from NPS sites are available at <http://www.nature.nps.gov/air/data/current/index.cfm>.

EPA station operators have new Campbell CR3000 loggers, which are paired at every site with a laptop that can be

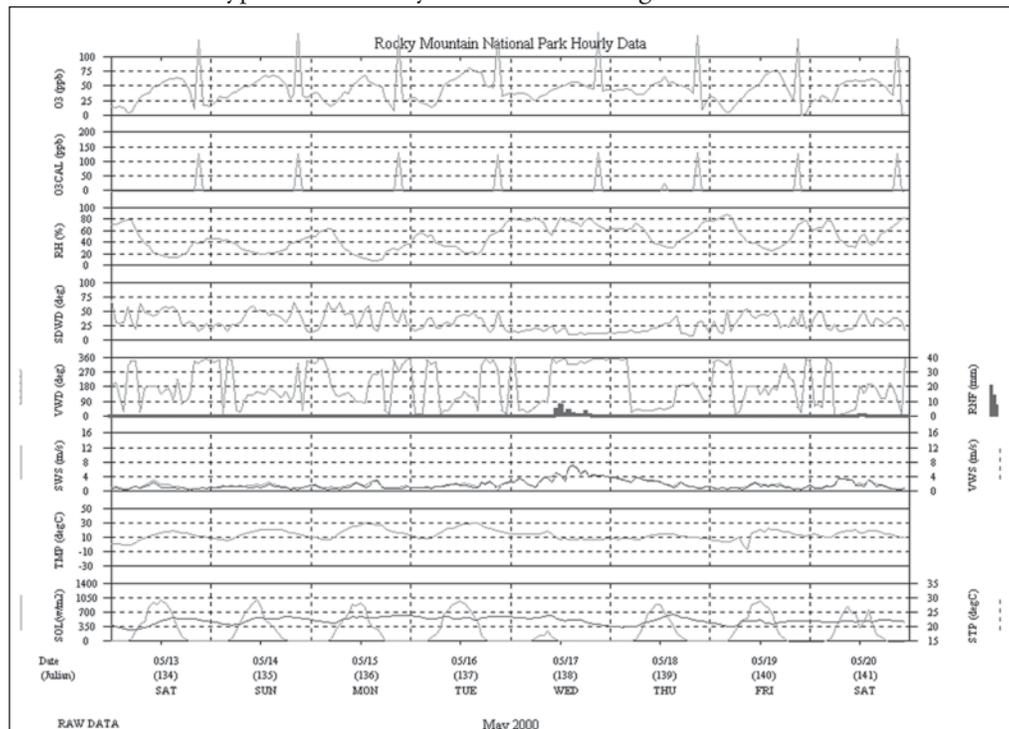


Figure 1. DataView's Stackplot window provides a graphic view of many parameters and is available at all NPS CASTNET stations.

used to review data. Operators use an interface on the laptop developed using Campbell's PC200 software. It features the ability to review real-time ozone concentrations and shelter temperature values along with the most recent results from the automated zero, span, and precision checks (z/s/p). EPA operators call in the z/s/p values to MACTEC on Tuesdays, which provides an opportunity to discuss any operational questions or issues that may have come up from the previous week. Using PC200, data can also be displayed as a graphical time series for visual review. Data from EPA CASTNET sites are available on the Internet at <http://www.epa.gov/castnet/data.html#ozone>.

NETWORK NEWS continued from page 2....

NPS GPMP 2008 data summary available

The NPS Gaseous Pollutant Monitoring Program (GPMP) annual data report summary for 2008 is now available. This year, no hardcopy reports will be prepared or distributed. Instead, a concise report, containing data summary tables and figures, will be available on the Internet at:

<http://www.nature.nps.gov/air/Monitoring/ads/ADSReport.cfm>, and

<http://www.nature.nps.gov/air/Monitoring/network.cfm#results>.

The new format was chosen this year due to its simplicity and ease of downloading an as-small-as-possible file for greater viewership.

OPERATOR'S TOOLBOX

How to operate/maintain the new CR3000 data loggers



As of July 2009, all EPA-sponsored CASTNET sites were outfitted with Campbell Scientific, Inc. CR3000 Micrologger® data loggers. This logger replaced the Odessa logger at EPA sites. The CR3000 data loggers permit enhanced communication with the site's instruments allowing for more frequent polling and remote troubleshooting by MACTEC's field operations technicians.

The weekly system check of the site's instruments is performed using the site's laptop computer and the "PC200" software application to access the data recorded by the data logger. When arriving at the site, turn on the computer. The PC200

Lance McCluney joins EPA and CASTNET

Lance O. McCluney has joined EPA's CASTNET team in Washington, DC and provides assistance with data analysis for both the branch and the division. His favorite analysis tool for CASTNET data is SAS. Lance joined the Assessment Communications Branch (ACB) on May 11, 2009 after spending more than five years working for EPA's Office of Air Quality Planning and Standards (OAQPS) in Research Triangle Park (RTP), NC.

The majority of his time at RTP was spent performing ozone analyses for National Ambient Air Quality Standards (NAAQS) reviews and national trends analyses. Prior to joining EPA, he taught eighth grade math for four years. Lance's educational background is in the field of mathematics with a concentration in statistics.

application starts automatically. To obtain the information needed to complete the weekly Site Status Report Form (SSRF), double-click the "1 Site Operator" icon. The "monitor data" tab displays real-time data, channel status, 5-minute averages, the last ozone auto-calibration results, and ozone diagnostic parameters (see figure). MACTEC created a detailed, step-by-step guide for site operators to use during the weekly system check. This guide, "CASTNET Technical Note [019-08]: Site Operator Weekly System Check using the CR3000 Data Logger," is available at each site. If one is not at your site, please tell the MACTEC field technician when you call in on Tuesday so a guide can be sent to you.

The most important step for maintaining the CR3000 data logger in optimal data collection mode is to verify that all instrument channels are "up" prior to leaving the site. To perform operational checks of some of the site instruments and to change out the filter pack each week, it is necessary

to "down" the related channel on the data logger. After performing the necessary checks each week, verify that all channels are up, so data can be recorded by the data logger. A channel status of "false" indicates that the channel is up and data are being recorded. Also, please remember to turn off the computer before you leave the site.

PC200W 3.3 Datalogger Support Software - 1 Site Operator (CR3000)									
Clock/Program Monitor Data Collect Data									
Decimal Places: 2 Update Interval: 00 m 01 s									
Julian_Date	36			Temp1_Blower_Bad	false	Sample_Freq_A	103990.00		
Time	16:31			Temp2_Blower_Bad	false	Sample_Freq_B	88251.00		
		Five Minute Average:	N/A	Down_All_Channels	false	Cell_Pressure	740.80		
wind_direction	325.10	wind_direction	313.86	wind_direction_down	false	Cell_Temperature	53.80		
windspeed	5.24	windspeed_scalar	4.11	windspeed_down	false	Sample_Flow_A	0.759		
temperature	24.25	temperature_Avg	24.51	temperature_down	false	Sample_Flow_B	0.769		
temperature2	24.05	temperature2_Avg	24.38	temperature2_down	false	O3_Background	0.06		
relative_humidity	72.12	relative_humidity_Avg	71.90	relative_humidity_down	false	O3_Coefficient	1.017		
solar_radiation	350.94	solar_radiation_Avg	353.00	solar_radiation_down	false				
precipitation	0.00	precipitation_Tot	0.00	precipitation_down	false	Precip_Check	0.00		
wetness	0.07	wetness_Avg	0.07	wetness_down	false	Wetness_Check	0.00		
ozone	34.12	ozone_Avg	33.78	ozone_down	false	Ozone_Date	1-15-2008		
flow_rate	1.50	flow_rate_Avg	1.50	flow_rate_down	false	Ozone_Zero	-0.52		
shelter_temperature	25.80					Ozone_Precision	91.24		
						Ozone_Span	396.77		

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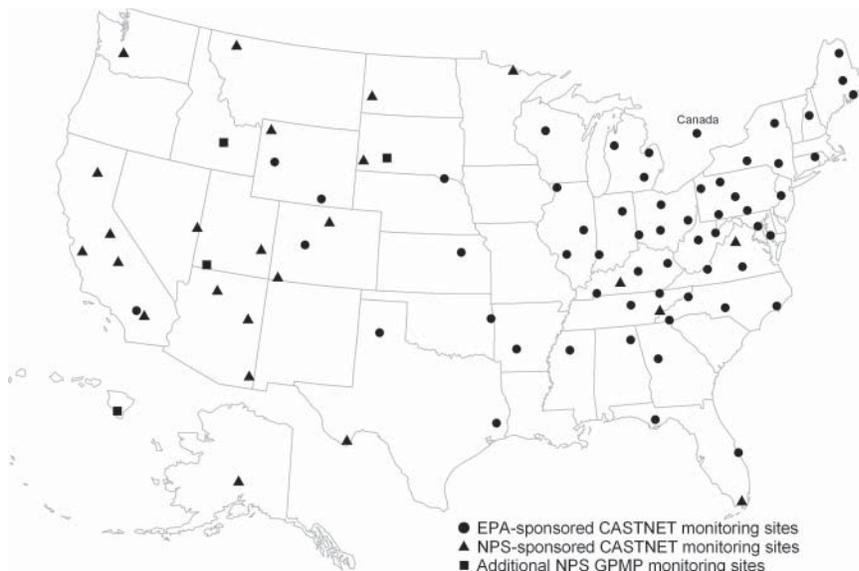
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CASTNET Monitoring Program Locations



EPA Clean Air Status and Trends Network
(<http://www.epa.gov/castnet>)

NPS Gaseous Pollutant Monitoring Program Network
(<http://www.nature.nps.gov/air/monitoring/index.cfm>)