BlueSky Gateway: Providing Access to Products from the BlueSky Smoke Modeling Program

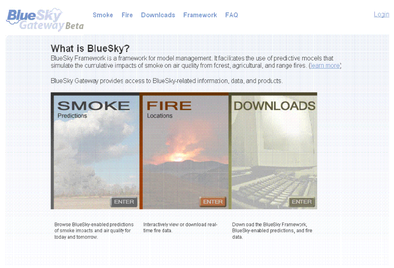
Kenneth J. Craig[1], Neil J. M. Wheeler[1], Sean M. Raffuse[1], Dana C. Sullivan[1], Stephen B. Reid[1], Robert Solomon[2], Tara Strand[2], Sim Larkin[2]
[1] Sonoma Technology, Inc., Petaluma, California
[2] U.S. Forest Service Pacific Northwest Research Station, Seattle, Washington

Sonoma Technology, Inc.
Air Quality Research and Innovative Solutions

AIRFIRE

INTRODUCTION

Smoke from biomass burning events contributes to air quality problems such as particulate matter, ozone, and air toxics. Experimental real-time smoke predictions, facilitated by the U.S. Forest Service (USFS) BlueSky Framework, are available across the lower 48 states via the BlueSky Gateway Modeling System. Graphical products are distributed through the BlueSky Gateway web portal. The BlueSky Gateway provides access to a variety of BlueSky-related information, data, and products. The web portal also features access to SMARTFIRE data through web services technology and an interactive GIS-based fire location viewer, where the user can view current and historical fire locations and burn footprints, and generate and view HYSPLIT trajectories.



COMPONENTS OF THE REAL-TIME BLUESKY GATEWAY MODELING SYSTEM

SMARTFIRE	BlueSky Framework	SMOKE	MM5	CMAQ
• **S**atellite **M**apping **A**utomated **R**eanalysis **T**ool for **F**ire **I**ncident **R**econciliation. • Combines satellite fire data from the NOAA Hazard Mapping System and ground-based reports into a unified GIS database. • Compiles a database of fire location information for use in retrospective analyses. • Provides fire location input to the BlueSky Framework.	• BlueSky Framework version 3.0 "modeling framework" enables use of state-of-the-science models to simulate smoke impact, air quality, and emissions from fires. • Developed by the USFS Air Fire Team and re-engineered by STI and the Air Fire Team. • Real-time fire emissions estimates produced using FCCS fuel loading, CONSUME 3.0 consumption, and FEPS emissions.	• **S**parse **M**atrix **O**perator **K**ernel **E**missions Modeling System v2.3. • Merges fire emissions from the BlueSky Framework with non-fire emissions. • Non-fire emissions derived from the 2002 NEI version 3 projected to the current year using EGAS version 4.0. • MM5 temperature predictions are used in on-road (MOBILE6) and biogenic (BEIS v3.09) emissions.	• Pennsylvania State University/ NCAR Mesoscale Model (MM5) Version 3.7. • National domain with 36-km horizontal grid spacing and 29 vertical layers. • Initial and boundary conditions from NAM 40-km forecasts. • MCIP version 3.1 used to prepare MM5 data for CMAQ, and to map MM5 vertical layers onto a 17-layer CMAQ vertical grid.	• The Community Multiscale Air Quality (CMAQ) model version 4.5.1 is used to predict the fate of airborne chemical species. • Full gas-phase chemistry (CB-IV) and secondary aerosol formation (AERO3). • Simulations are initialized with carryover smoke from the previous day's prediction. • Several fire types are tracked for future use.

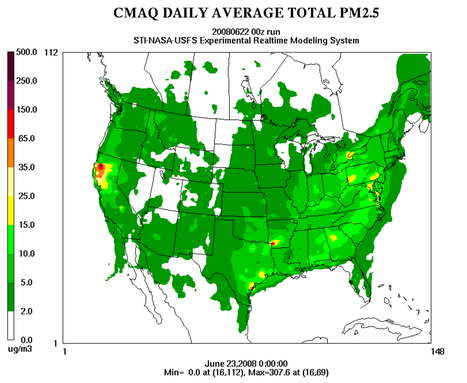
PRODUCTS AND TOOLS AVAILABLE VIA THE BLUESKY GATEWAY WEB PORTAL

Graphical Products

Real-time graphical products from the BlueSky Gateway Modeling System include:

- Surface $PM_{2.5}$ (total, fire-only, and non-fire)
- Surface ozone due to all emission sources
- Visual range, derived by combining CMAQ's non-fire $PM_{2.5}$ extinction with extinction estimated from fire $PM_{2.5}$ concentrations
- Surface wind speed, surface wind direction, PBL depth, and ventilation index.

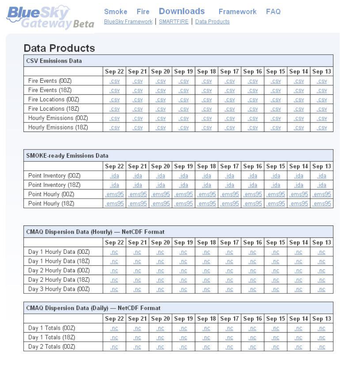
KML files for all model products will be available soon for visualization with Google Earth.



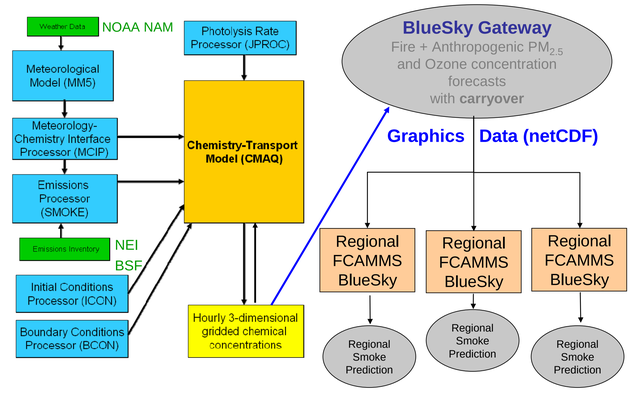
Next-day forecast of total $PM_{2.5}$ concentrations for 23 June, 2008 produced by the BlueSky Gateway Modeling System.

Data Downloads

Outputs from SMARTFIRE and the BlueSky Gateway Modeling System are available for FTP download. SMARTFIRE web services are also available.



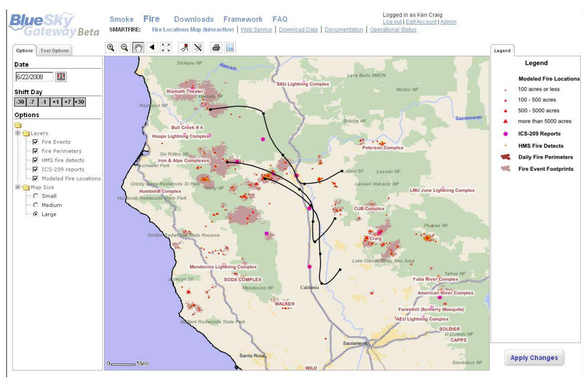
REAL-TIME SYSTEM WORKFLOW



The "early bird" 18z run cycle relies on preliminary SMARTFIRE data to provide timely two-day forecasts, while the main 00z run cycle relies on SMARTFIRE data supplemented with ground reports to provide three-day forecasts. Current and carryover $PM_{2.5}$ are tracked separately to facilitate use within regional fire modeling systems.

SMARTFIRE Data Viewer

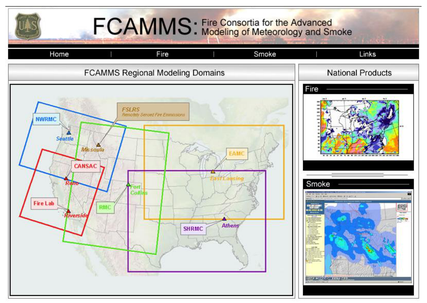
The interactive SMARTFIRE viewer provides graphical access to real-time and historical fire location information, with the ability to overlay trajectories from the NOAA HYSPLIT model. SMARTFIRE data are also available via FTP and web services technology.



Sample graphic generated from the BlueSky Gateway SMARTFIRE viewer for June, 22 2008. Fire events (grey shading) represent cumulative area burned as of September 22, 2008. Black lines are 24-hour HYSPLIT forward trajectories originating from various fire locations.

Access to Smoke Forecast Products

The BlueSky Gateway Web Portal provides access to other publicly available smoke prediction products.



The Fire Consortia for the Advanced Modeling of Meteorology and Smoke (FCAMMS) apply the BlueSky Framework to facilitate regional higher-resolution smoke predictions using HYSPLIT, CALPUFF, or CMAQ.

The National Weather Service produces operational forecasts of smoke impacts using the HYSPLIT dispersion model and an earlier version of the BlueSky emissions module.

ACCESS TO THE BLUESKY GATEWAY

http://www.getbluesky.org

Public Access:

- Graphical products from the experimental BlueSky Gateway Modeling System
- Links to experimental graphical products from regional FCAMMS
- Links to operational smoke predictions form the NOAA Air Quality Forecast Model

Controlled Access:

- netCDF and CSV data from the experimental BlueSky Gateway Modeling System
- SMARTFIRE viewer
- SMARTFIRE data (FTP and web services)
- BlueSky Framework distribution

Access to controlled data is routinely granted upon request. Password protection is used to monitor and control the use of resources on experimental computing systems. To request an account, please email BlueSkyGateway@sonomatech.com.

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For more information, contact Neil Wheeler via email at neil@sonomatech.com.