AQAST supports Wyoming Exceptional Event Demonstration

By Sarah Witman, May 28, 2013

This week kicks off the public comment period for a document concerning an air quality exceptional event that took place last summer.

The event took place June 5, 2012, and led to increases in surface ozone that exceeded national ozone standards the following day, according to the Thunder Basin ozone monitor in northeast Wyoming. It was initially observed over California by the NASA Ames Alpha Jet Atmospheric eXperiment (AJAX), a NASA-funded project that uses planes to measure ozone and greenhouse gases in the area.

The U.S. Environmental Protection Agency (EPA) defines exceptional events as any unusual or naturally occurring events that can affect air quality but are not reasonably controllable using techniques that tribal, state or local air agencies may implement in order to attain and maintain the National Ambient Air Quality Standards.

The document, released Tuesday by the Air Quality Division of the Wyoming Department of Environment Quality and supported in part by the NASA Air Quality Applied Sciences Team (AQAST), aims to demonstrate to the EPA that this exceptional event was associated with stratospheric intrusion. Moreover, it is meant to show that the exceedances in surface ozone occurred as a direct result of this event.

Stratospheric intrusion is the process of stratospheric air entering, or intruding, into the troposphere. When this happens, stratospheric ozone may be introduced into the troposphere, so there is a chance it could affect surface ozone concentrations.

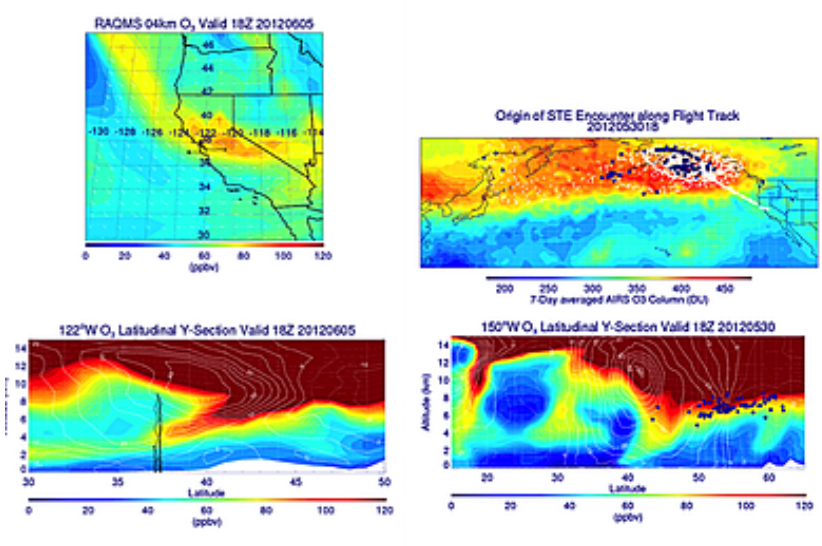
To determine the origins of the June 5, 2012, event, the Wyoming Department of Environmental Quality used the Real-time Air Quality Modeling System (RAQMS) developed by NASA AQAST member Brad Pierce. To be specific, backward trajectories from a global ozone analysis from RAQMS were used.

The results of this effort, contained in the full document, titled “Exceptional Event Demonstration Package for the Environmental Protection Agency Thunder Basin, Wyoming Ozone Standard Exceedance June 6, 2012,” confirmed that the intrusion sampled by the AJAX flight was associated with stratospheric intrusion that had its origins over the Gulf of Alaska.

Following the public comment period, this document will be submitted to the EPA for review.

The document may be found at http://deq.state.wy.us/aqd/Exceptional Events/June_6_2012ThunderBasin/June_6_2012_SI_Package.pdf

A preliminary manuscript that provides further details on the June 5, 2012, airborne observations is also available here.



The upper left image shows a map from the Real-time Air Quality Modeling System (RAQMS).

The upper right image shows a map of the 7-day ozone average from May 30-June 5, 2012.

The lower left image shows June 5, 2012, at 11 a.m. MST: the day of the air quality exceptional event over California. The route of the AJAX plane that recorded the event is shown in black. Also, note the stratospheric intrusion indicated by the tongue of high ozone extending from the lower stratosphere into the mid-troposphere.

The lower right image shows ozone and wind on RAQMS, as well as the encounter between the AJAX flight and the stratospheric intrusion (blue dots) at 11 a.m. MST on May 30, 2012.

Sources

- Tracey Holloway
- Brad Pierce
- Ryan McCammon
- Laura Iraci
- Emma Yates