ESRL Theme Presentation on the Weather-Climate Connection

Panel Speakers and Topics

Allen White (PSD) – Observing System Needs
Gary Wick (PSD) – Satellite Observations
David Parrish (CSD) – Ozone Trends in the Eastern Pacific Troposphere
Ola Perrson (PSD) – Linking Synoptic Events with Variability of Arctic Sea Ice Thickness
John Brown (GSD) – Operational NWP Perspective on West Coast Heavy Precipitation Events
Bill Neff (PSD) – Climate Variability and Air Quality

Presented at:
ESRL Theme Presentation on the Weather-Climate Connection
DSRC Building, Boulder, CO: 1 November 2007
ESRL Theme Presentation on the Weather-Climate Connection

Observing System Needs

Allen B. White

NOAA/Earth System Research Lab./Physical Sciences Div., Boulder, CO

Presented at:
ESRL Theme Presentation on the Weather-Climate Connection
DSRC Building, Boulder, CO: 1 November 2007
Atmospheric River Observatory

Atmospheric River (AR) Observatory: Russian River Prototype

Objectives: Detect and monitor the fuel and forcing that causes extreme precipitation

Observing systems:
1. Wind profiler/RASS
2. S-band radar
3. Disdrometer
4. Surface met
5. GPS-IWV
6. Rain gauges

Map of Mendocino County with stations indicated:
- Wind profiler/RASS
- S-band precip profiler
- GPS IWV
- Sfc. met. + rain gauge
- Raindrop disdrometer

Weather station locations:
- Mendocino River
- Cazadero (475 m)
- Bodega Bay (12 m)

Weather data:
- Time (UTC)
- Coastal rain (BBY) 0.75 in.
- Mountain rain (CZC) 4.20 in.
A Different Flow Regime in the American River Basin?

Changes in Peak Flows
American River

American River Runoff
Annual Maximum 1-Day Flow

Unimpaired Runoff at Fair Oaks

Water Year

Red Line = Construction of Folsom Dam

Lester Snow, CA-DWR
ESRL Theme Presentation on the Weather-Climate Connection

Satellite Observations

**Ongoing Activities**
- Model intercomparisons
- GPS radio occultation data

**Key Challenges**
- Obtaining quantitative transport information (wind profiles)
- Maintaining the status quo in measurements over the near future

Figure courtesy Jack Dostalek, CIRA/CSU

Weather-Climate Connection Panel Discussion
Gary Wick, ESRL/PSD
ESRL Theme Presentation on the Weather-Climate Connection

Ozone Trends in Eastern Pacific Troposphere: Effect of Interannual Meteorological Variability?

David Parrish¹
¹NOAA/Earth System Research Lab./Chemical Sciences Div., Boulder, CO

Presented at:
ESRL Theme Presentation on the Climate-Weather Connection
DSRC Building, Boulder, CO: 1 November 2007
Tropospheric Ozone Entering the US from the Pacific Has Increased over the Past 2 Decades
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Examine 2 other data sets:

Trinidad Head Ozone sondes
Sam Oltmans
NOAA/ESRL/GMD
1998 to present
Generally weekly

MOZAIC* aircraft profiles
1995 to present
avg. 10/month in winter

*Measurements of Ozone, Water Vapour, Carbon Monoxide and Nitrogen Oxides by In-Service Airbus Aircraft
Tropospheric Ozone Entering the US from the Pacific Has Increased over the Past 2 Decades

<table>
<thead>
<tr>
<th>Data Set</th>
<th>slope (ppbv/yr)</th>
<th>intercept 2000</th>
<th>r</th>
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</thead>
<tbody>
<tr>
<td>MOZAIQ</td>
<td>0.63 ± 0.16</td>
<td>44.8 ± 0.7</td>
<td>0.62</td>
</tr>
<tr>
<td>TH sondes</td>
<td>0.49 ± 0.20</td>
<td>48.4 ± 0.7</td>
<td>0.78</td>
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O$_3$ (ppbv) vs. Time (1994-2008)

Winter

2 km < altitude < 8 km

Map showing ozone concentration over the US west coast.
Tropospheric Ozone Entering the US from the Pacific Has Increased over the Past 2 Decades

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<td>0.78</td>
</tr>
<tr>
<td>Average:</td>
<td>0.56 ± 0.12</td>
<td>46.7 ± 0.5</td>
<td>0.59</td>
</tr>
</tbody>
</table>

Ozone (ppbv) over time from 1994 to 2008.

Winter

2 km < altitude < 8 km
Can Interannual Meteorological Variability Explain Some of the Variance and/or the Cause of the Trend?