**Aerosol Composition and Variability in the San Joaquin Valley Measured during DISCOVER-AQ**


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**Variability Analysis**

During January & February 2013, aerosol properties were measured:
1. **First period** - aerosol is confined to the lowest 2000 ft with no contact with the boundary layer.
2. **Second period** - air masses spend larger periods of the day in the boundary layer.

**Significance of Dust**

Presence of dust is determined by measuring the super-micron fraction of scattering:
- **Scattering**

- **Precursors**

- **Water**

- **Relative Component Contribution to AOD**

**Conclusion**

Two periods of increasing loadings measured. Aerosol properties differences attributed to:
- Vertical distribution of aerosols due to measurement of aged local pollution
- Precursor source strength which was lower during the second phase
- A latitudinal gradient in aerosols were measured with highest concentrations typically in the south (Bakersfield).

**Mission Overview**

Two sampling periods under the influence of high pressure ridges:
- January 16-22: AOD increased from 0.06 to 0.16
- January 30 - February 6: AOD increased from 0.05 to 0.22

**Variability Analysis**

During most flights a gradient was seen in aerosol loading with the largest AOD in the southeast.
- Measurements at the Bakersfield ground site also measured higher aerosol scattering than at Fresno.
- Ammonium nitrate mass was consistent among the sites while organic masses varied amongst them. Highest organic component measured at Bakersfield (37%).

**Conclusions**

- Increased AOD and aerosol properties in the San Joaquin Valley over two periods.
- Differences attributed to vertical distribution, precursor source strength, and latitudinal gradient.
- Monitoring of aged local pollution and agricultural emissions.

**Aerosol Composition**

- **Ammonium Nitrate**
- Ammonium emissions from dairy facilities and vehicular combustion
- Anthropogenic NOx oxidized to nitric acid
- 27% Water-Soluble Organic Matter
- 2.3% Ammonium Sulfate
- 0.5% Black Carbon
- 1.3% other species including sea salt and dust

- Particulate organics were slightly more prevalent during the second period (in comparison to ammonium nitrate). Black carbon varied between 0.2% to 0.7% of mass.

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- Water – aerosol humidification contributes 27% of AOD on average but much higher towards the end of the campaign due to high relative humidities.
- NH4NO3 – largest contributor to AOD (39%), decreased in the second period due to high influence of aerosol humidification
- WSOM – 25% of AOD on average, higher MSE than ammonium nitrate
- Dust – overall a minor contributor (5%) but greater during January 20-22 when dust is responsible for 10% of aerosol optical depths

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