

REAL-TIME ON-LAKE MEASUREMENTS

PARTICLE COUNTS, O₃, NO_y, *etc.*
aboard

RV TED FRANTZ

May-Aug 2003

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Goal

Observe Spatial and Temporal Variation
of the
Boundary Layer Air Quality over Lake Tahoe

Shore Zone Effects

Diurnal Variation of Flows and Pollutant Loads

Land-use Effects on Pollutant Loads

Determine Area of Influence of Shoreline Emissions

Contribute to Conceptual Model of Tahoe Basin
Circulation

RV Frantz Experimental Set-up

- Instrument Package from UCD/LAWR
(Courtesy of Prof. John Carroll, UCD)
 - Air Quality:
 - NO_y, O₃, PM2.5 (Optical)
 - Meteorology:
 - RH, Air Temperature, Air Pressure
 - Support:
 - GPS, Data Logging
 - 3-Second Integration
- *CLIMET* CI 500 Particle Counter
 - 0.5-1, 1-2.5, 2.5-5, 5-10, 10-25, 25+ μm
 - 1-Minute Integration



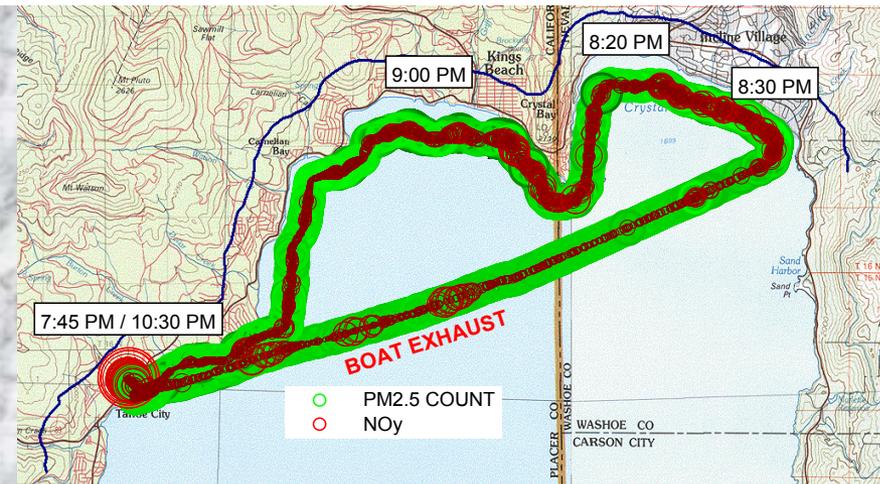
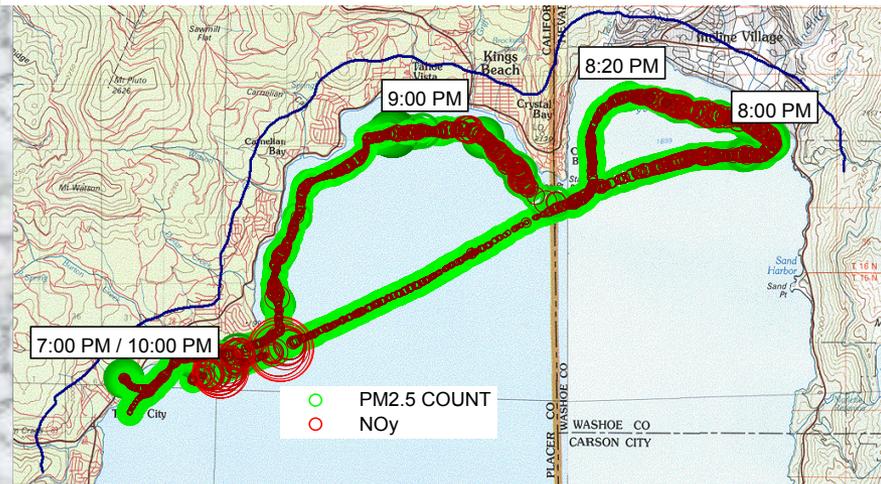
Sampling Program

- North Shore West am/pm Slope Flows
 - 5 / 22-23 / 2003*
- North Shore East am/pm Slope Flows
 - 7 / 9-11 / 2003
- South Shore am/pm Slope Flows
 - 8 / 18-19 / 2003
- North-South Lake Transects
 - 8 / 18, 20 / 2003

* Not presented

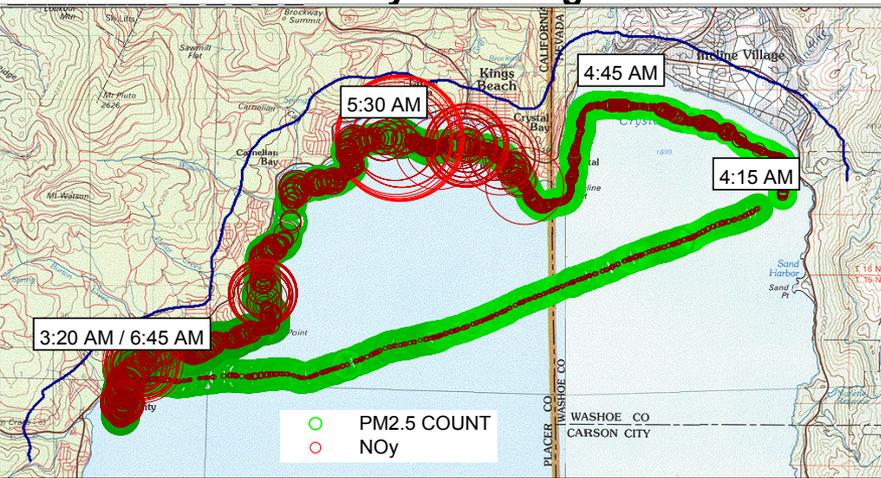
North Shore East am/pm Slope Flows

PM2.5 Counts and NOy - Evening Cruise 07-09-2003 Particle Counts and NOy - Evening Cruise 07-10-2003



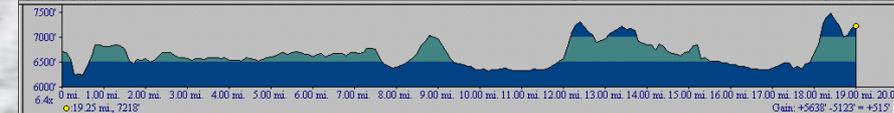
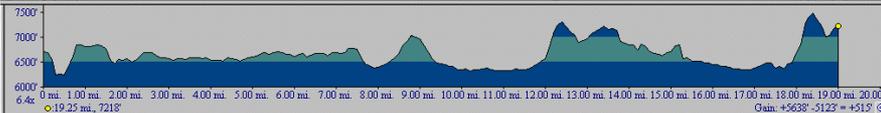
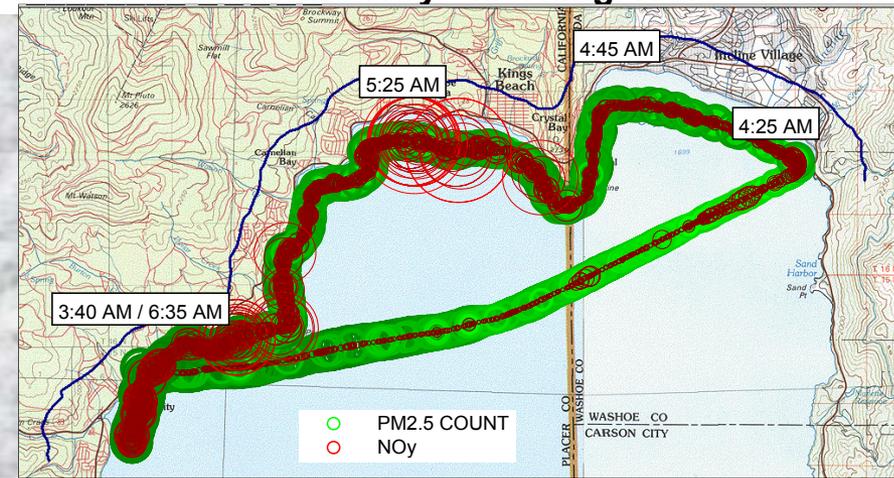
TYPICAL CONDITIONS

PM2.5 Counts and NOy - Morning Cruise 07-10-2003

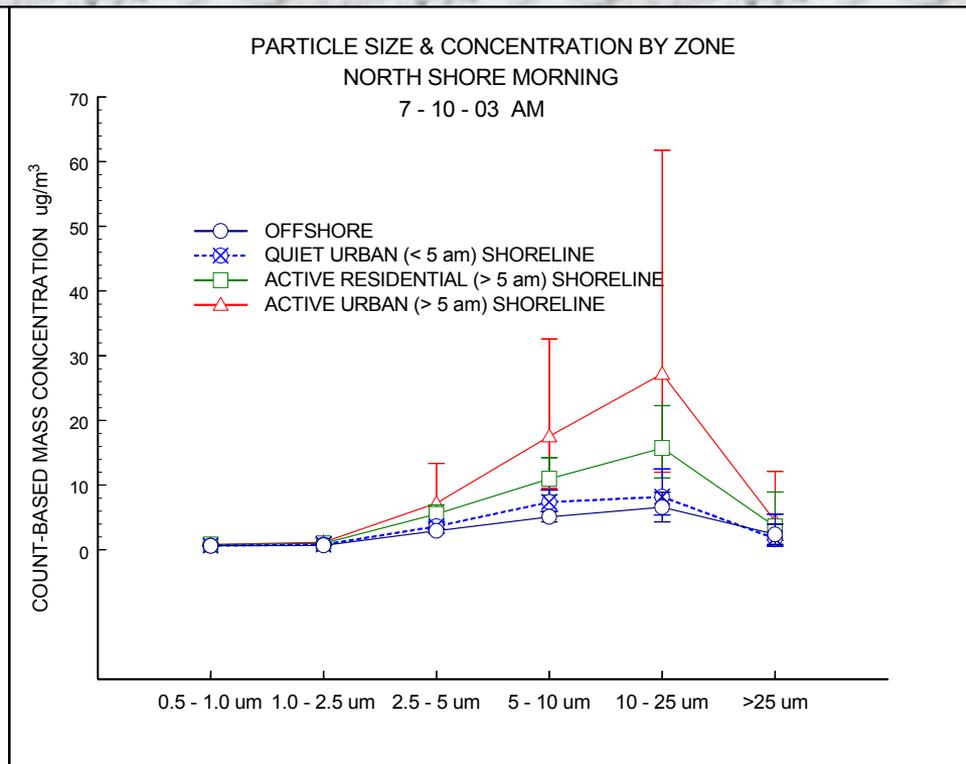
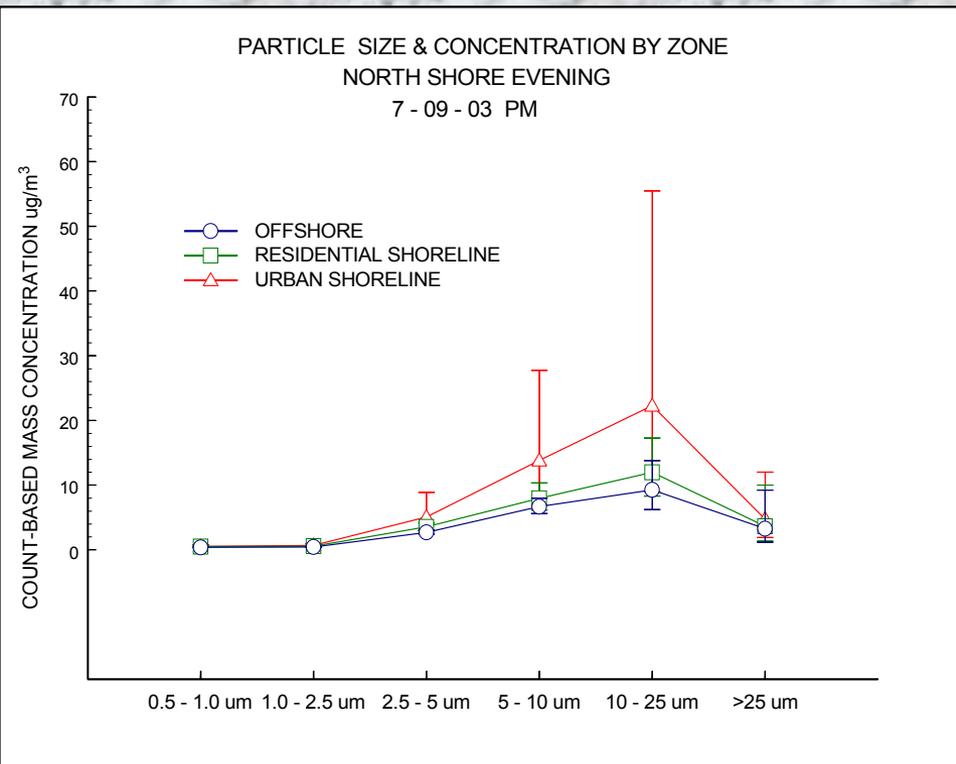


SMOKE FROM FIRE NEAR CHESTER

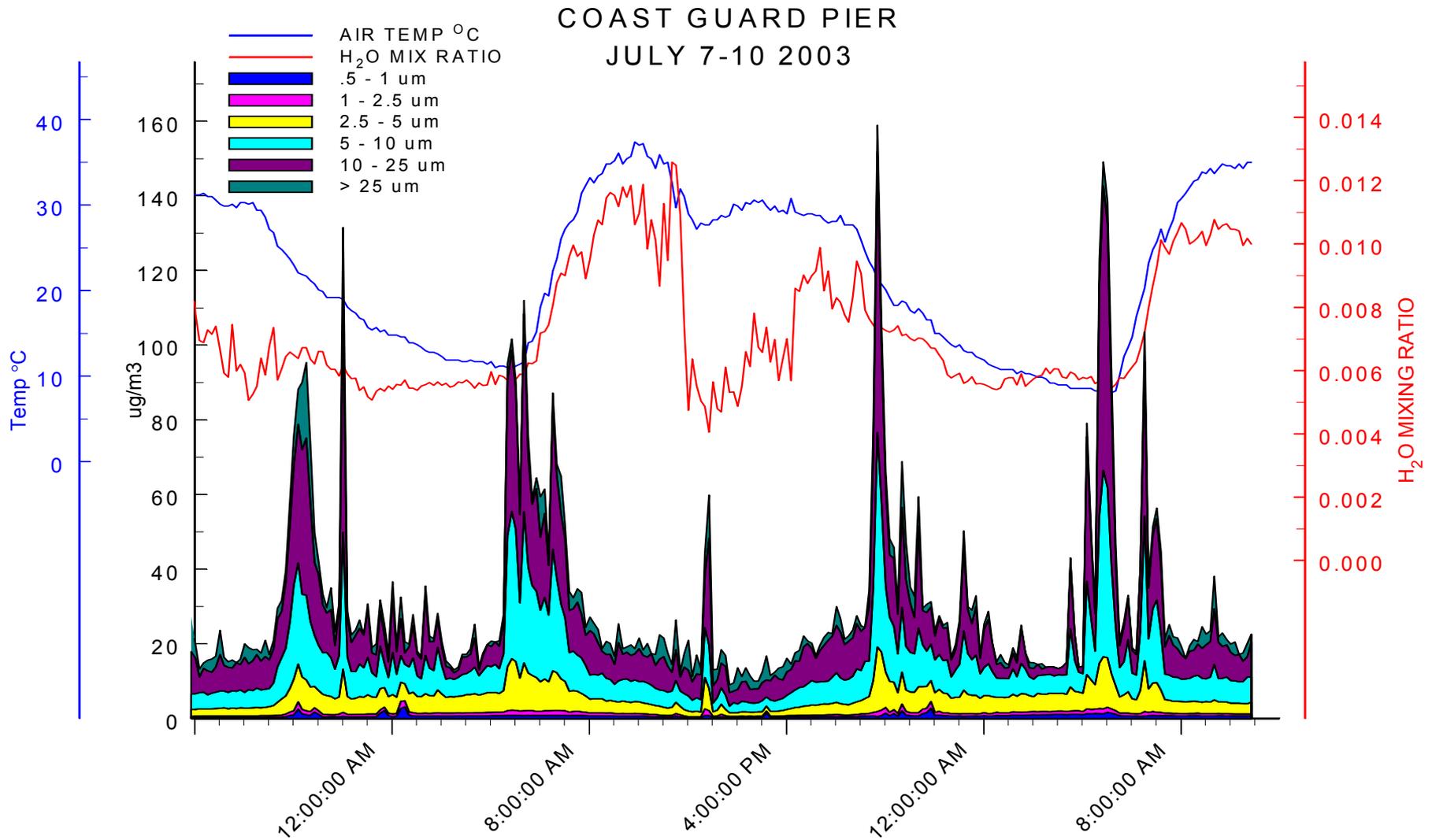
PM2.5 Counts and NOy - Morning Cruise 07-11-2003



North Shore East am/pm Zoned PM Concentrations



North Shore Temporal Pattern

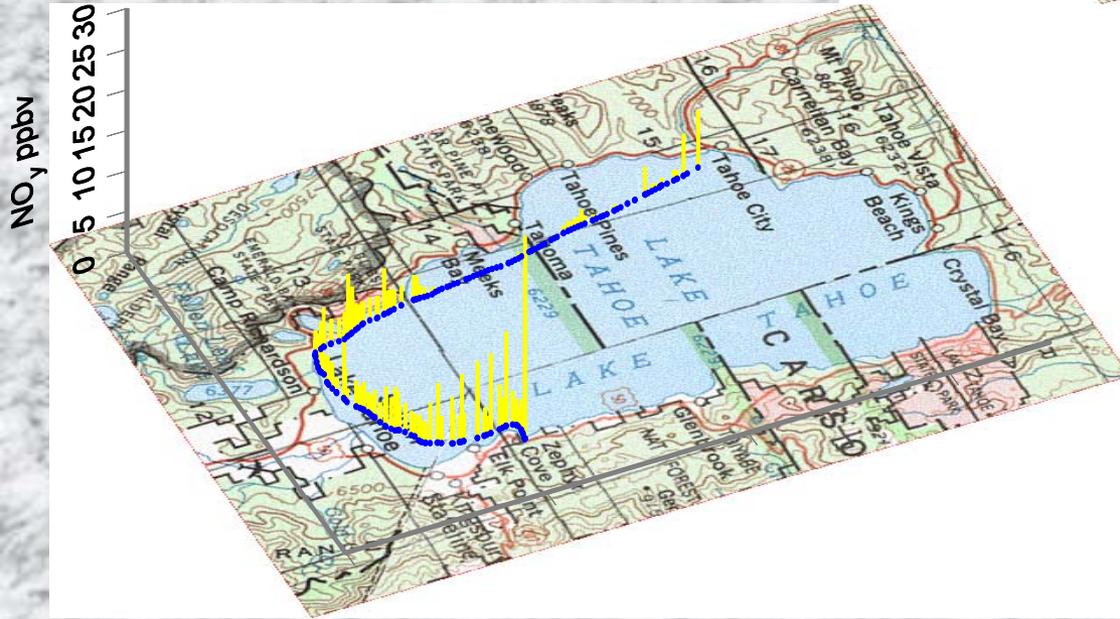


North-South Lake Transect O_3 and NO_y

TAHOE CITY TO ZEPHYR COVE

NO_y

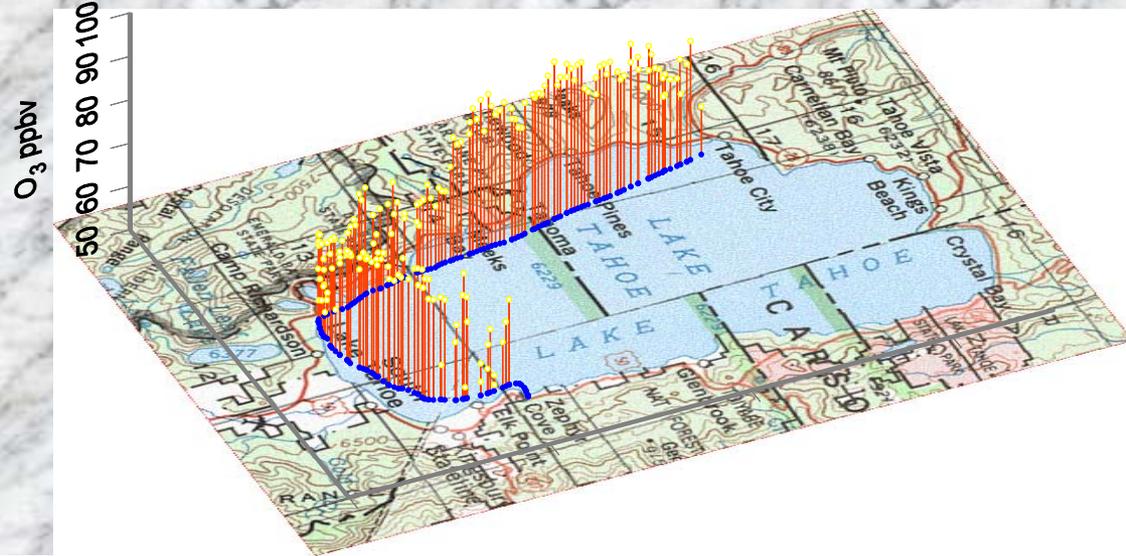
8-18-03 PM



TAHOE CITY TO ZEPHYR COVE

O_3

8-18-03 PM

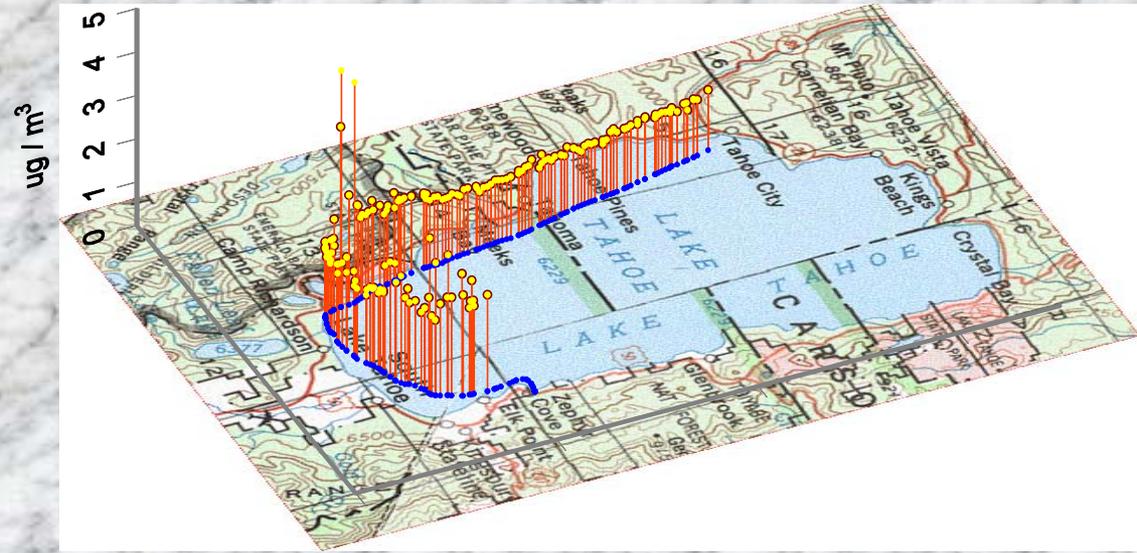


North-South Lake Transect $PM_{2.5}$ and PM_{5-10}

TAHOE CITY TO ZEPHYR COVE

$PM_{2.5}$

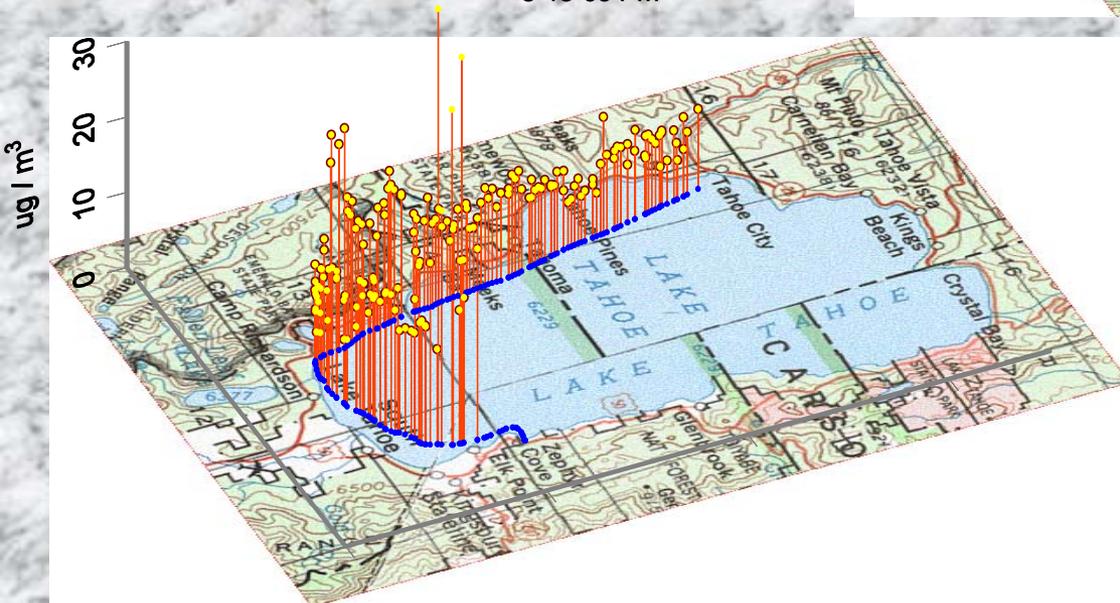
8-18-03 PM



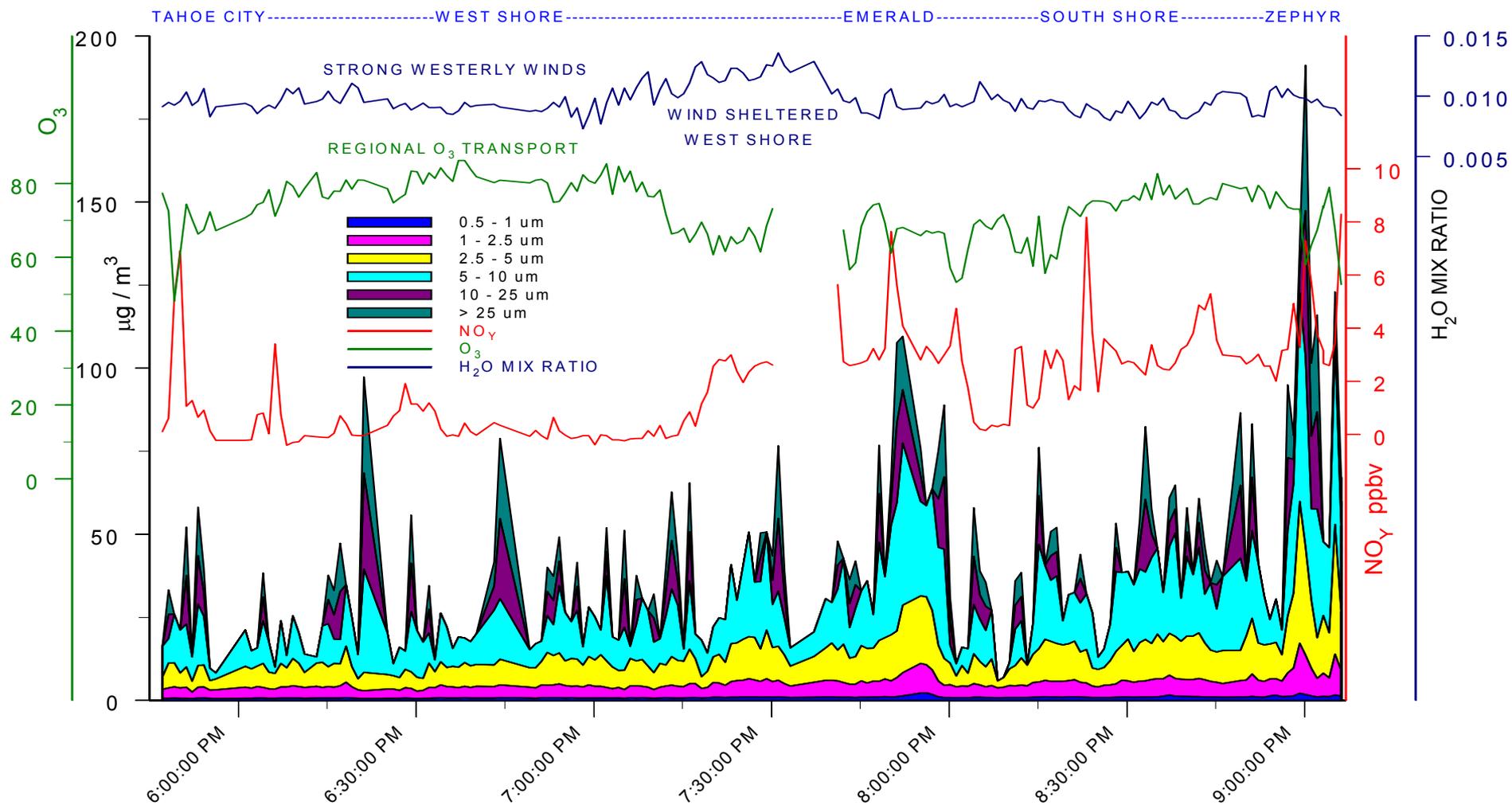
TAHOE CITY TO ZEPHYR COVE

$PM_{2.5-10}$

8-18-03 PM

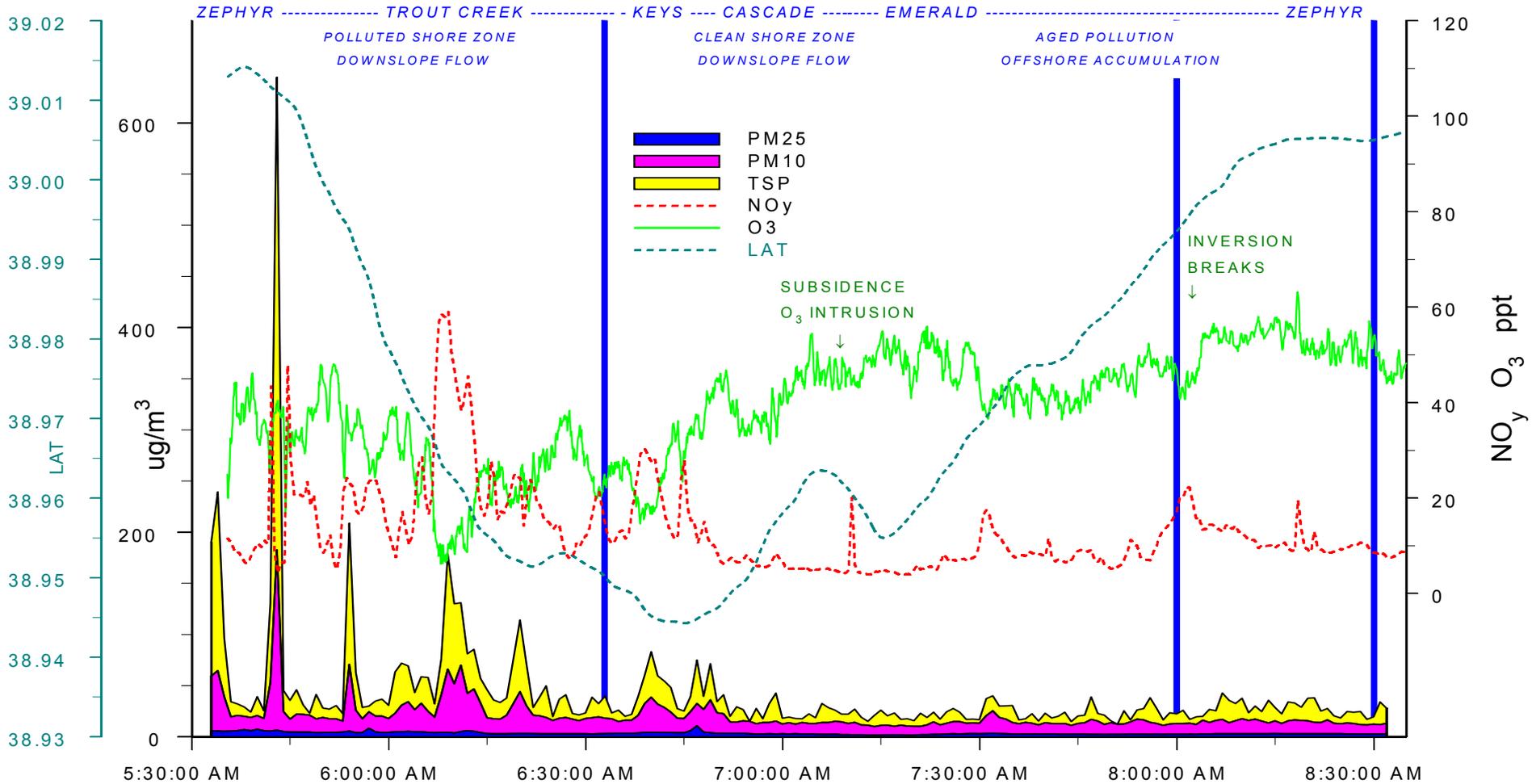


Tahoe City to Zephyr Cove Gas and PM Concentrations



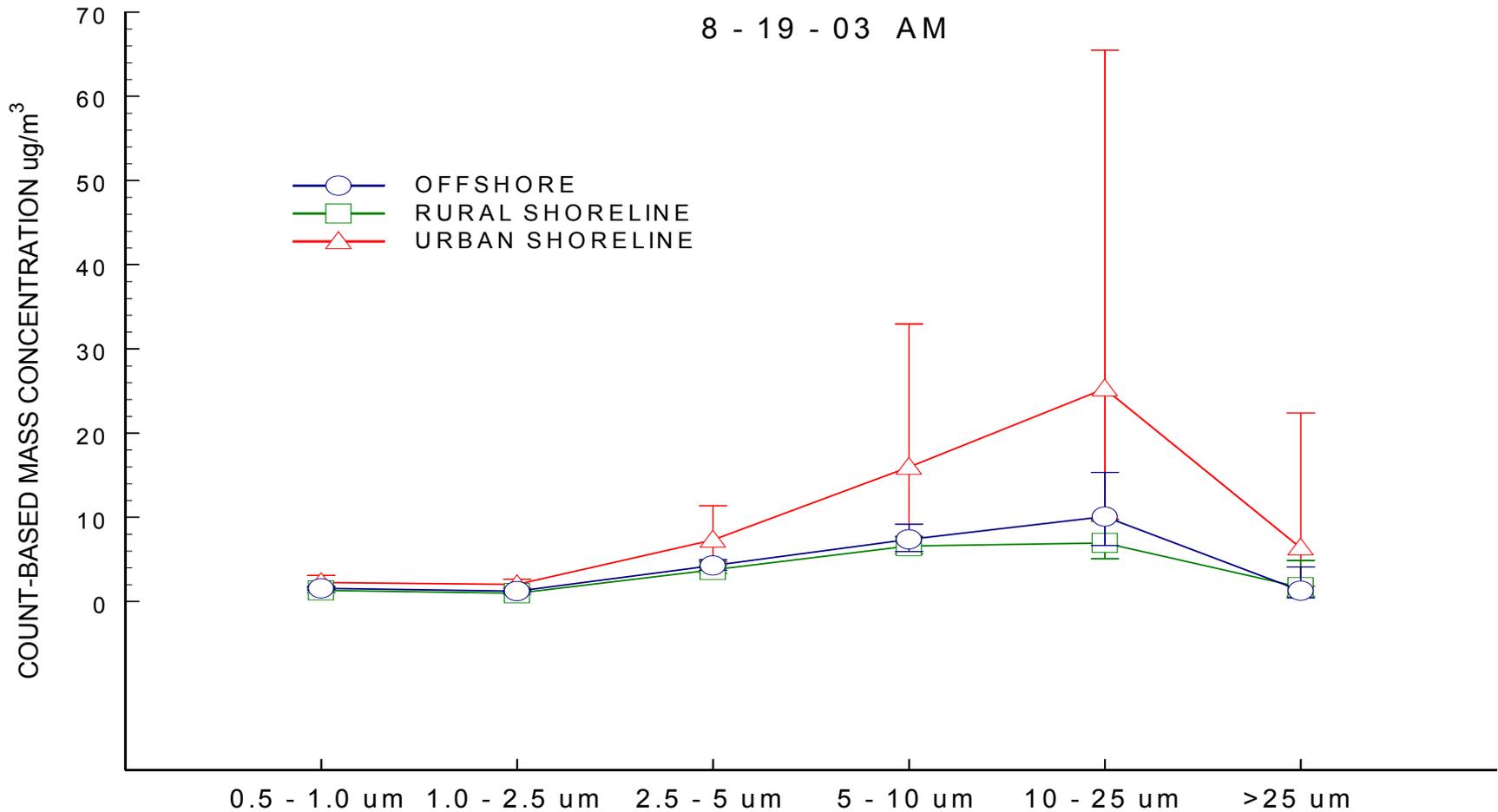
South Shore am Gas and PM Concentrations

LAKE CRUISE SOUTH SHORE 8-19-03



South Shore Morning - Zoned PM

PARTICLE SIZE & CONCENTRATION BY ZONE
SOUTH SHORE MORNING
8 - 19 - 03 AM



CONCLUSIONS

- Night and Morning Downslope Flows Deliver Gas and Particle Pollutants to the Near-shore Zone of Lake Tahoe
- Near-shore Concentrations Are Strongly Related to Shoreline Land Use and Activity Patterns
- Midlake Concentrations Are Weakly Affected by Shoreline Emissions
- Midday Lake Breezes Disrupt Shore-zone – Lake Transport
- Local Sources Dominate $PM > 2.5 \mu m$
- Regional Transport Controls O_3 And $PM_{2.5}$
- Transport Is Unevenly Distributed in the Tahoe Basin