How Upper Air Winds Affect Ozone and Particulate Matter Concentrations in the Paso del Norte

THE UNIVERSITY OF TEXAS AT AUSTIN

Center for Energy and Environmental Resources

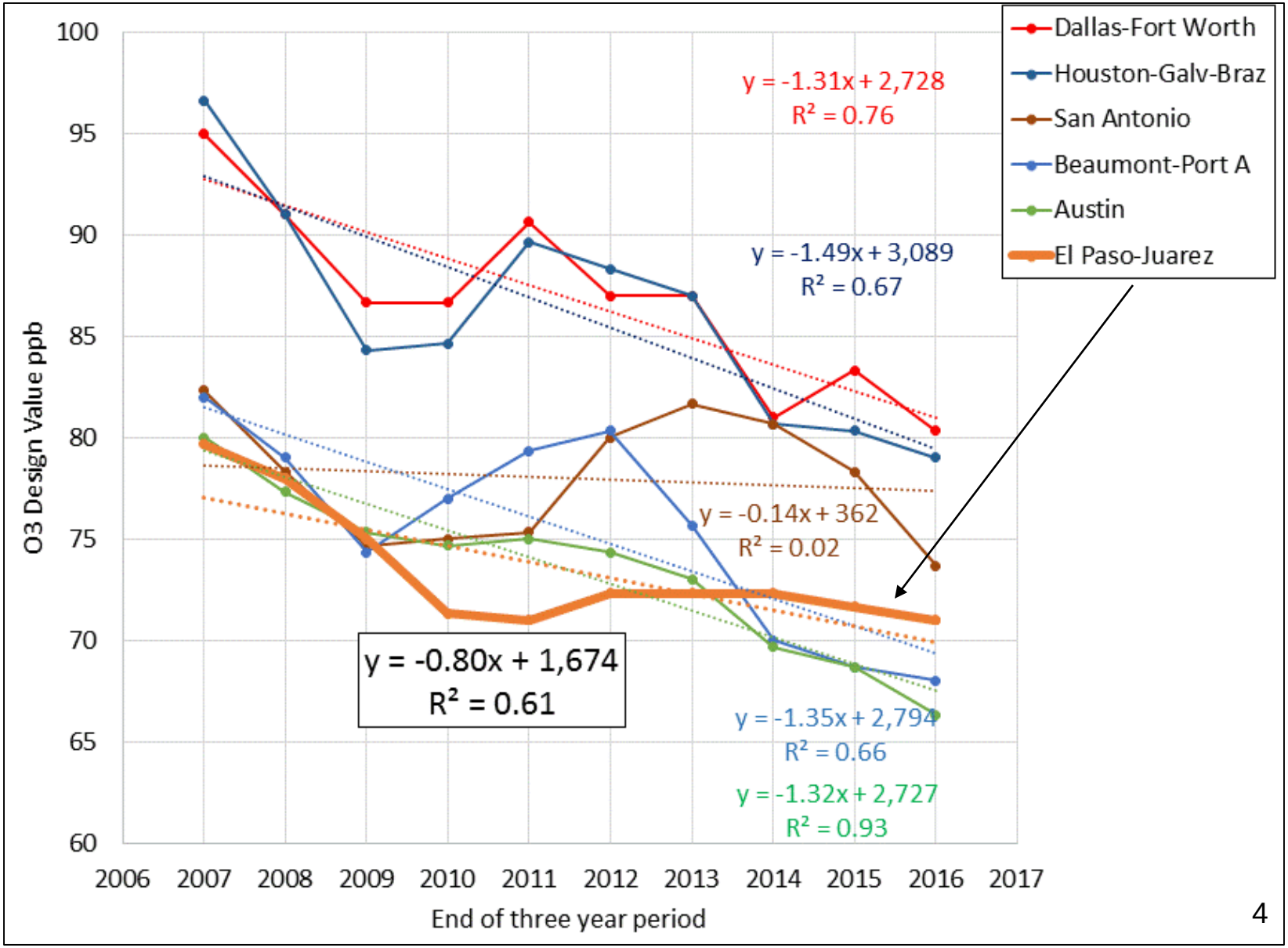
Dave Sullivan, Ph.D.
sullivan231@mail.utexas.edu
(512) 471-7805 office; (512) 914-4710 cell
October 5, 2017

- ***The preparation of this talk was***
  - ***financed through a grant from the Texas Commission on Environmental Quality (TCEQ),***
  - ***administered by The University of Texas at Austin Center for Energy and Environmental Resources.***
  - ***The contents findings, opinions and conclusions are the work of the author and do not necessarily represent findings, opinions or conclusions of the TCEQ.***
- **All data presented are preliminary and subject to change during the QA process.**

Project Goal: research upper air winds affecting pollutant transport in Paso del Norte

- Collect accurate and reliable aloft meteorological data to support various air quality research activities in El Paso, TX.
  - Use data to explain causes of elevated concentrations of ozone and particulate matter
  - Use data in computer simulation modeling for ozone and particulate matter
  - Provide data to NOAA for upper air modeling and forecasting (used in HYSPLIT)
  - Provide data to compare with measurements around the region to assess geographic variability and scale

O_3 design values in Texas



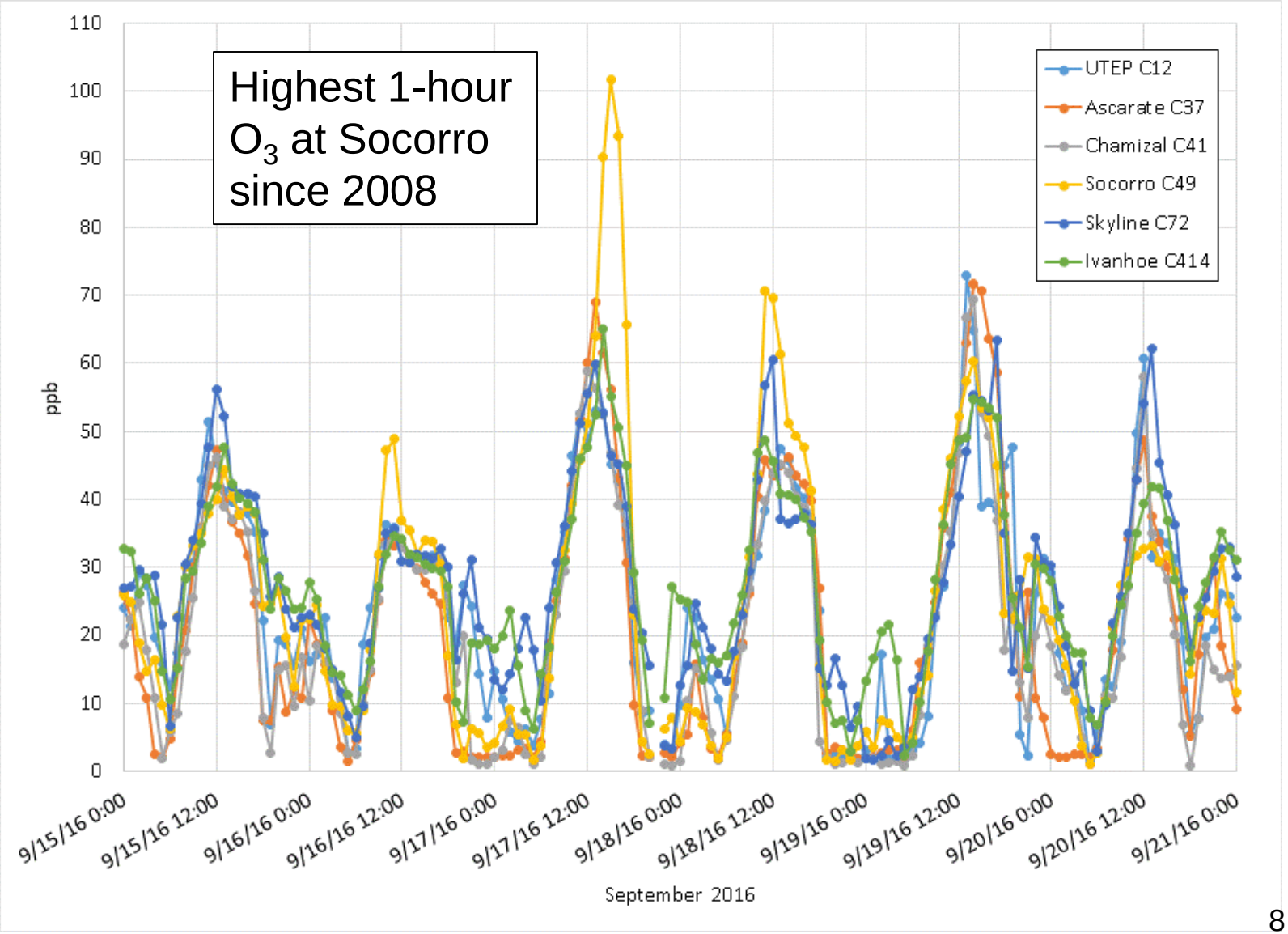
Upper Air instruments & data

- **TCEQ Socorro Hueco CAMS 49 site**
  - Vaisala LAP 3000 radar wind profiler (RWP) - winds 150 m to 4 km
  - Vaisala CL31 ceilometer – measures cloud height and estimates mixing height
  - Standard 10 m meteorological tower for surface wind speed & direction
- **Website & FTP sites** set up for data transfer

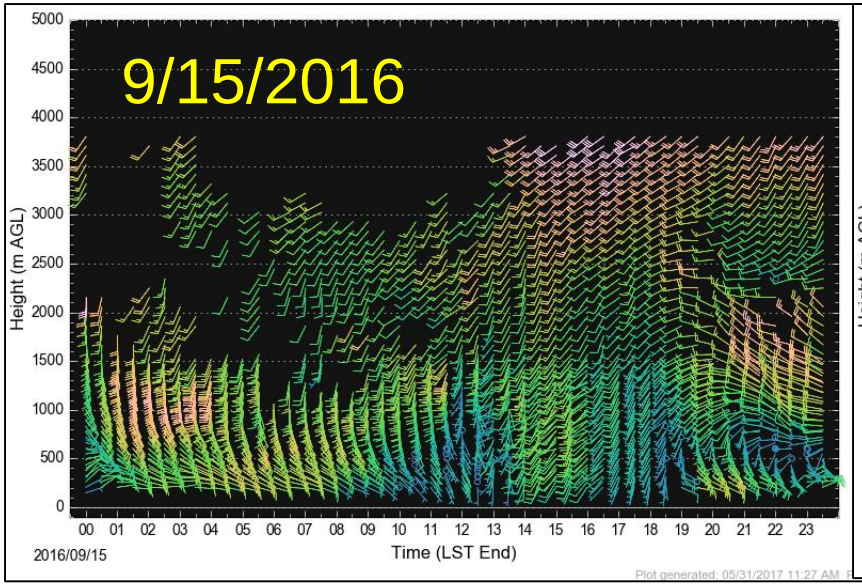
Aerial from altitude 60 km of current profiler location at Socorro Hueco CAMS 49

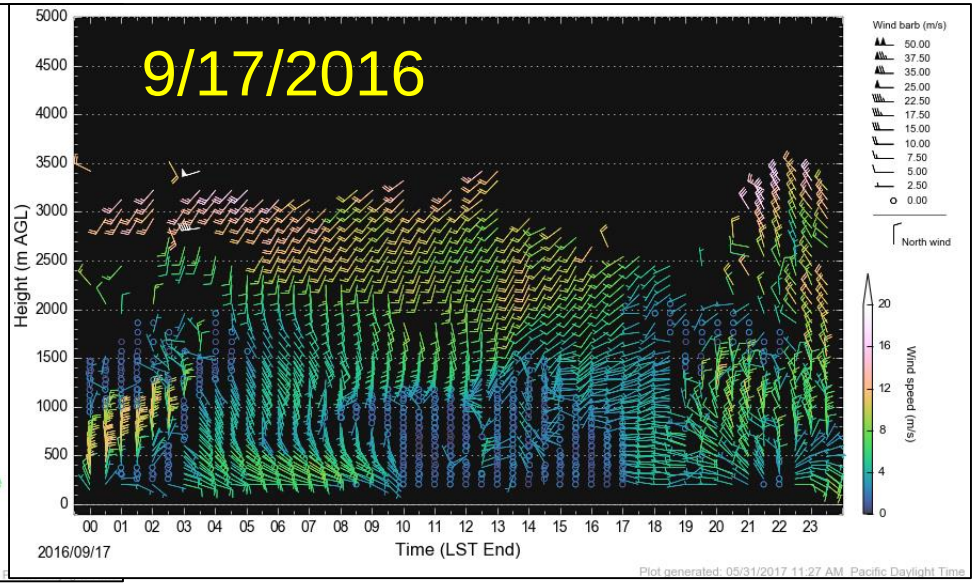
Radar wind profiler, Ceilometer

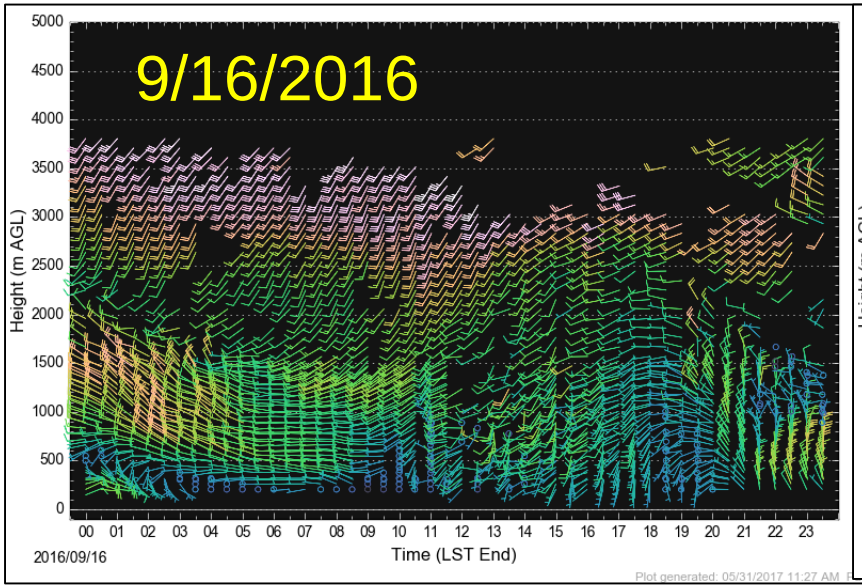
Case Study # 1: El Paso O_3 mid-Sept. 2016

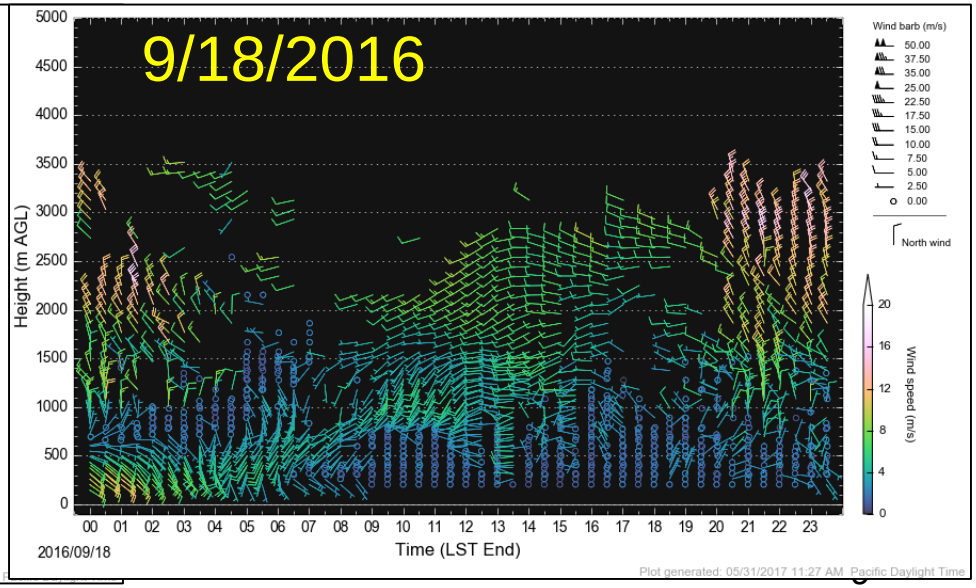


Upper air winds mid-Sept. 2016

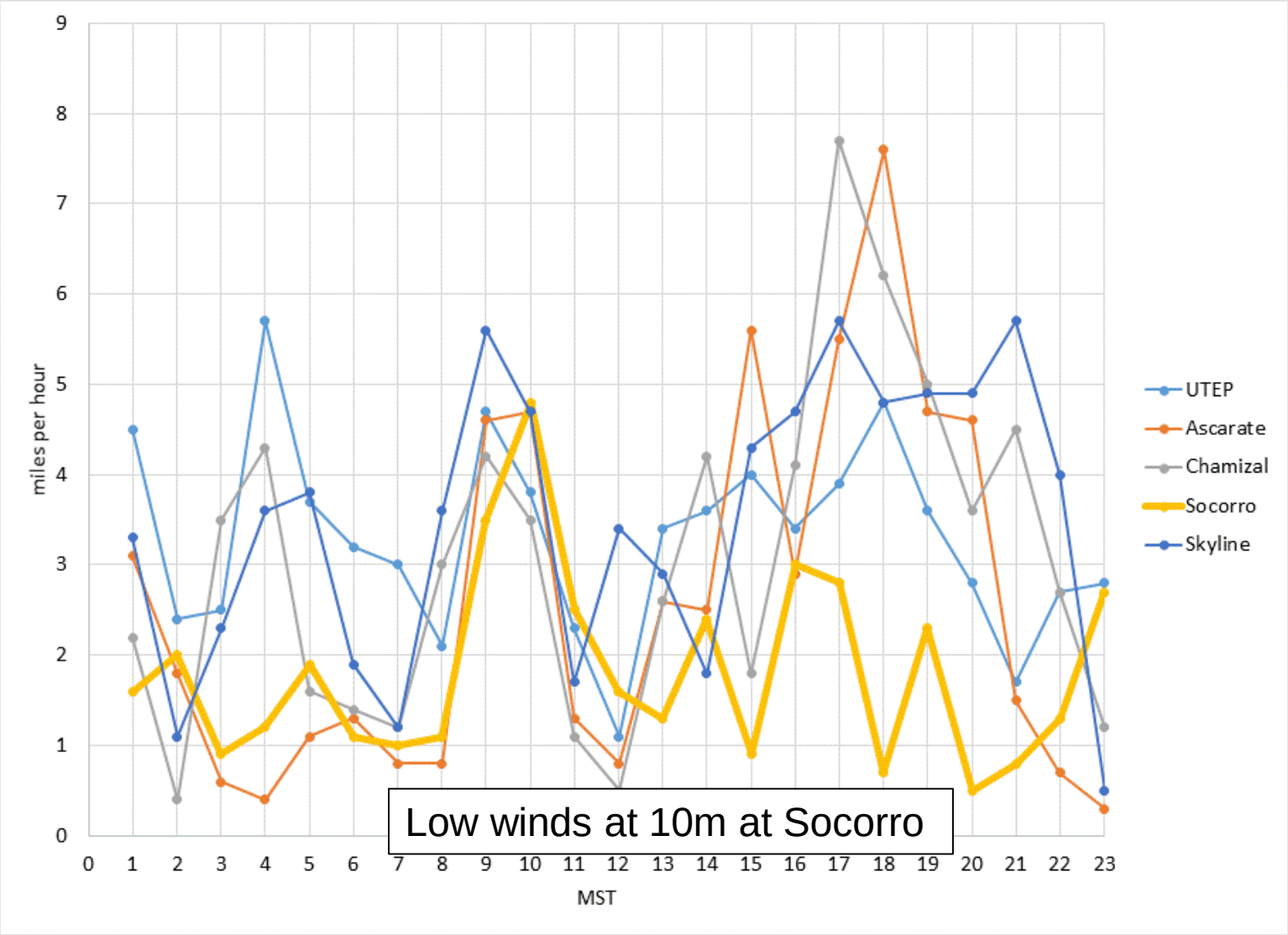




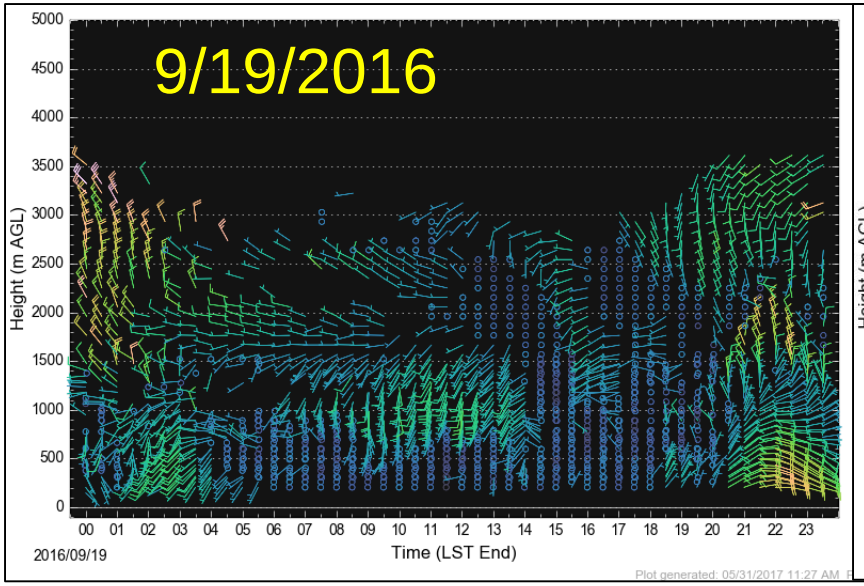


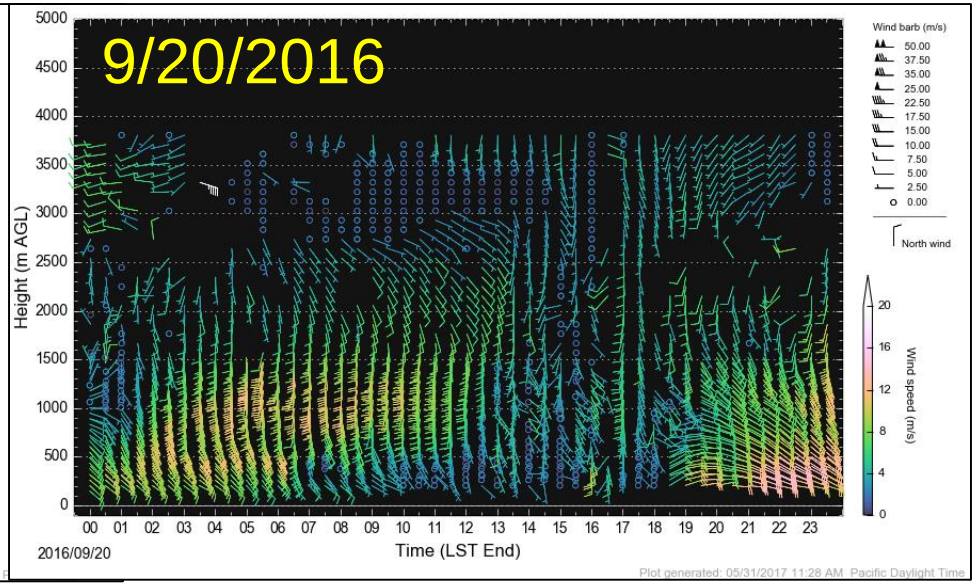


Hourly wind mph Sept. 17, 2016



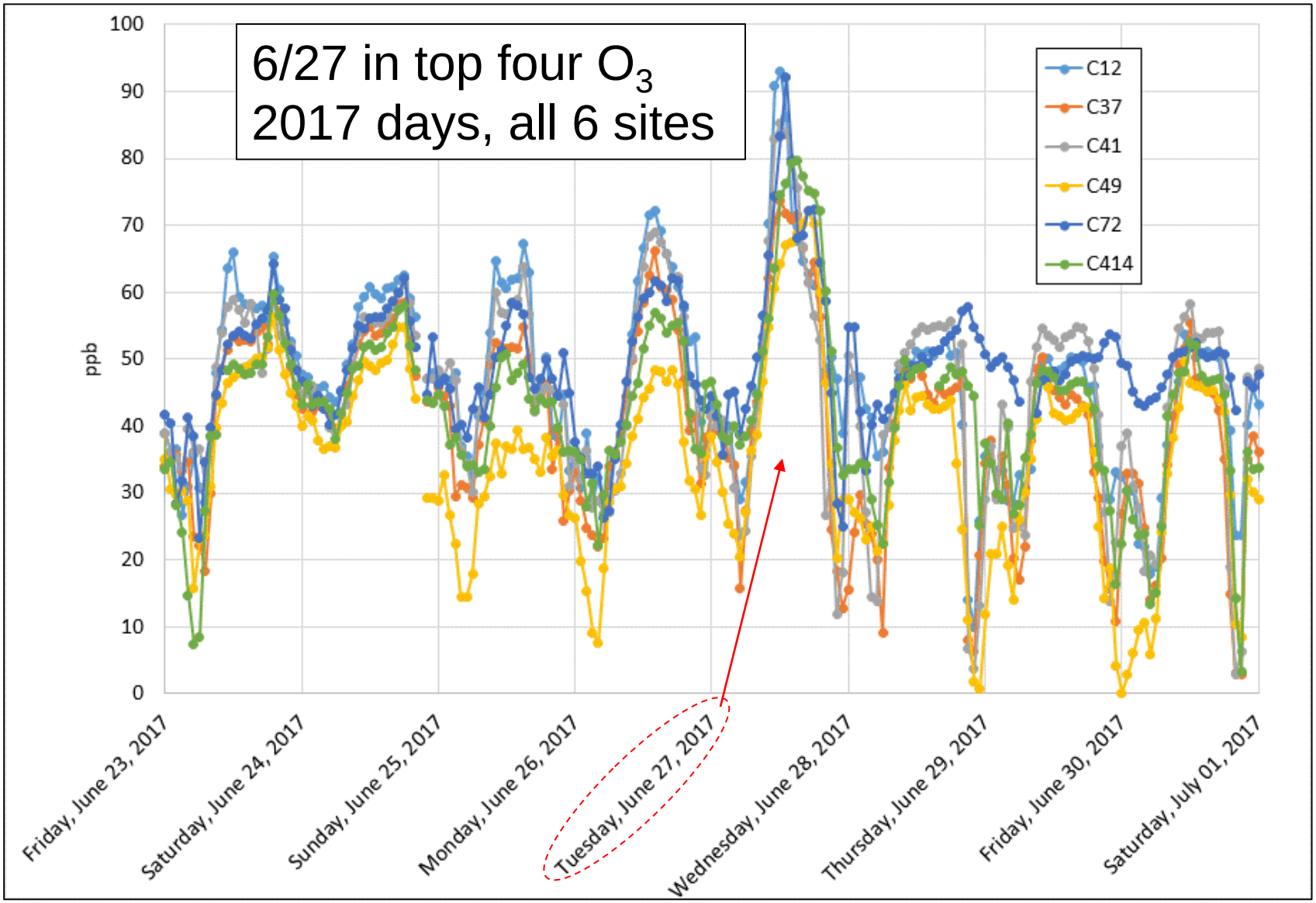
Upper air winds around mid-Sept. 2016



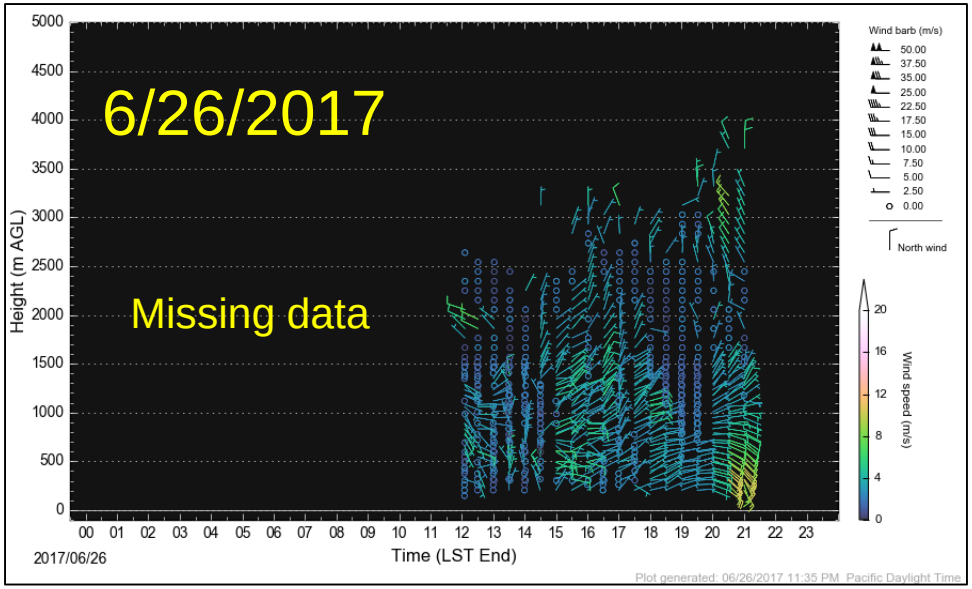


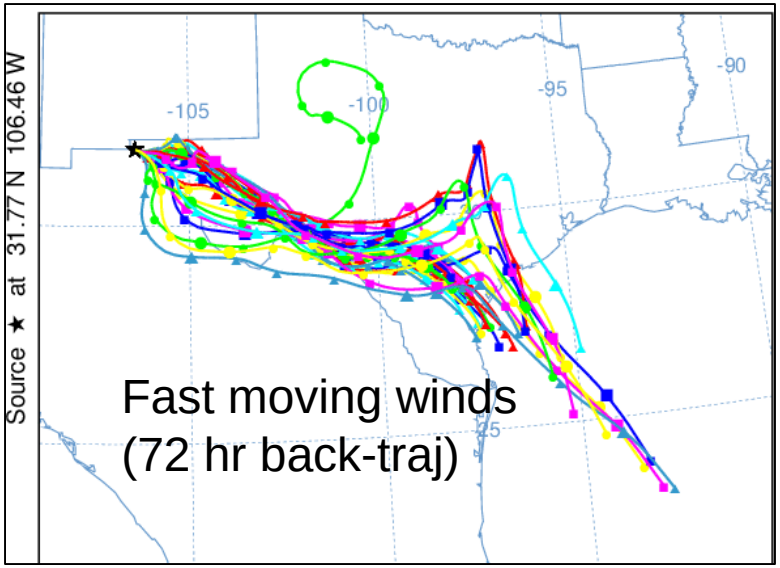
By 9/20, winds have picked up and ventilated the area.

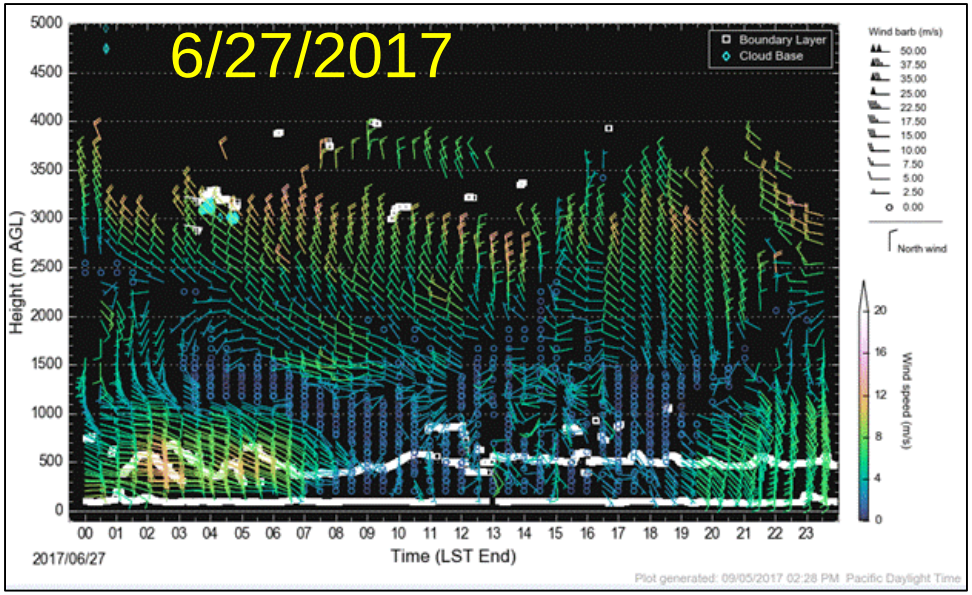
Case Study # 2: El Paso O_3 6/23 – 7/1, 2017

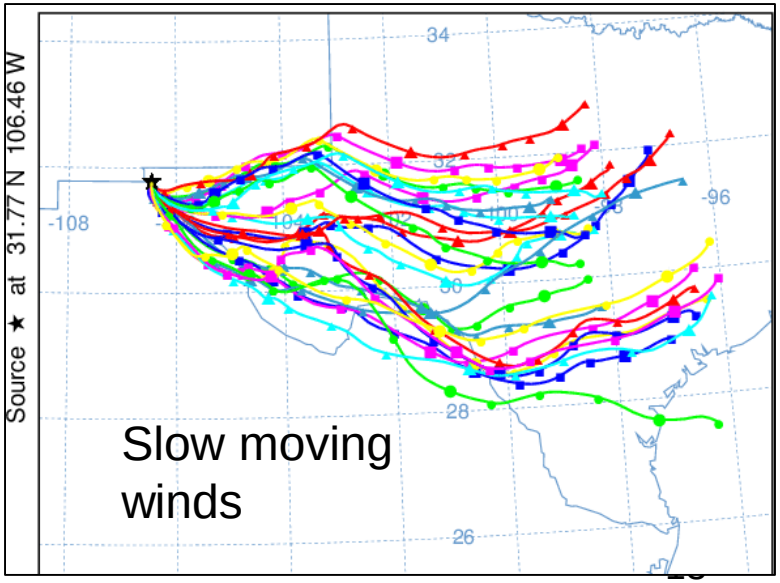


Upper air winds, HYSPLIT 6/26-27/2017

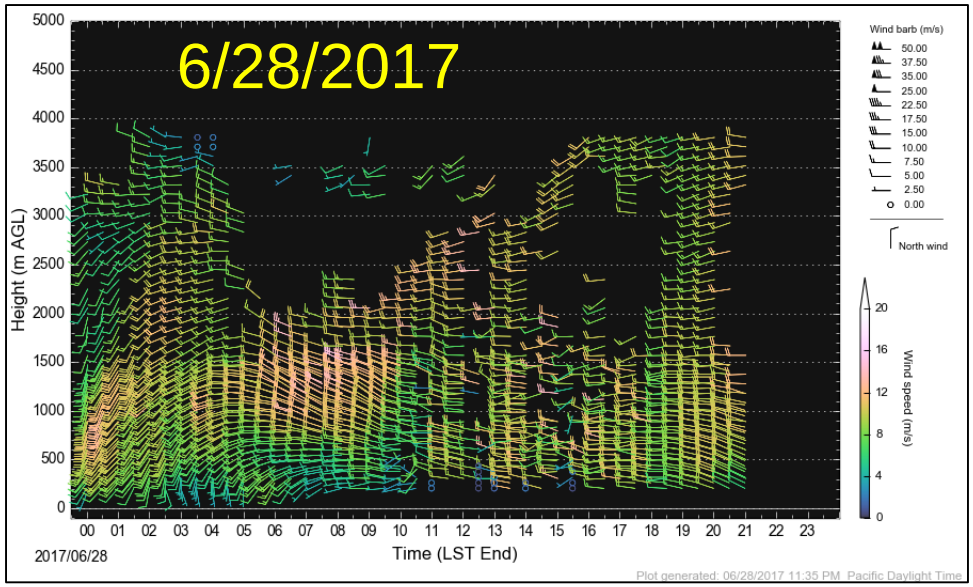


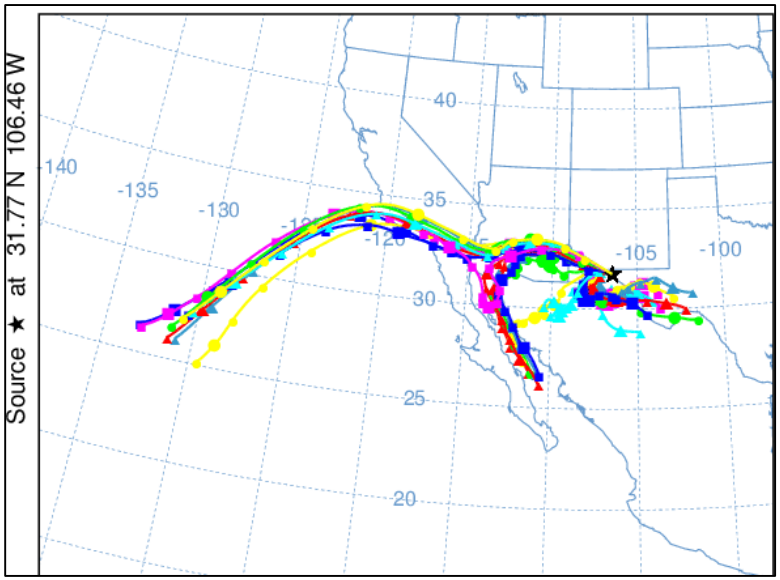






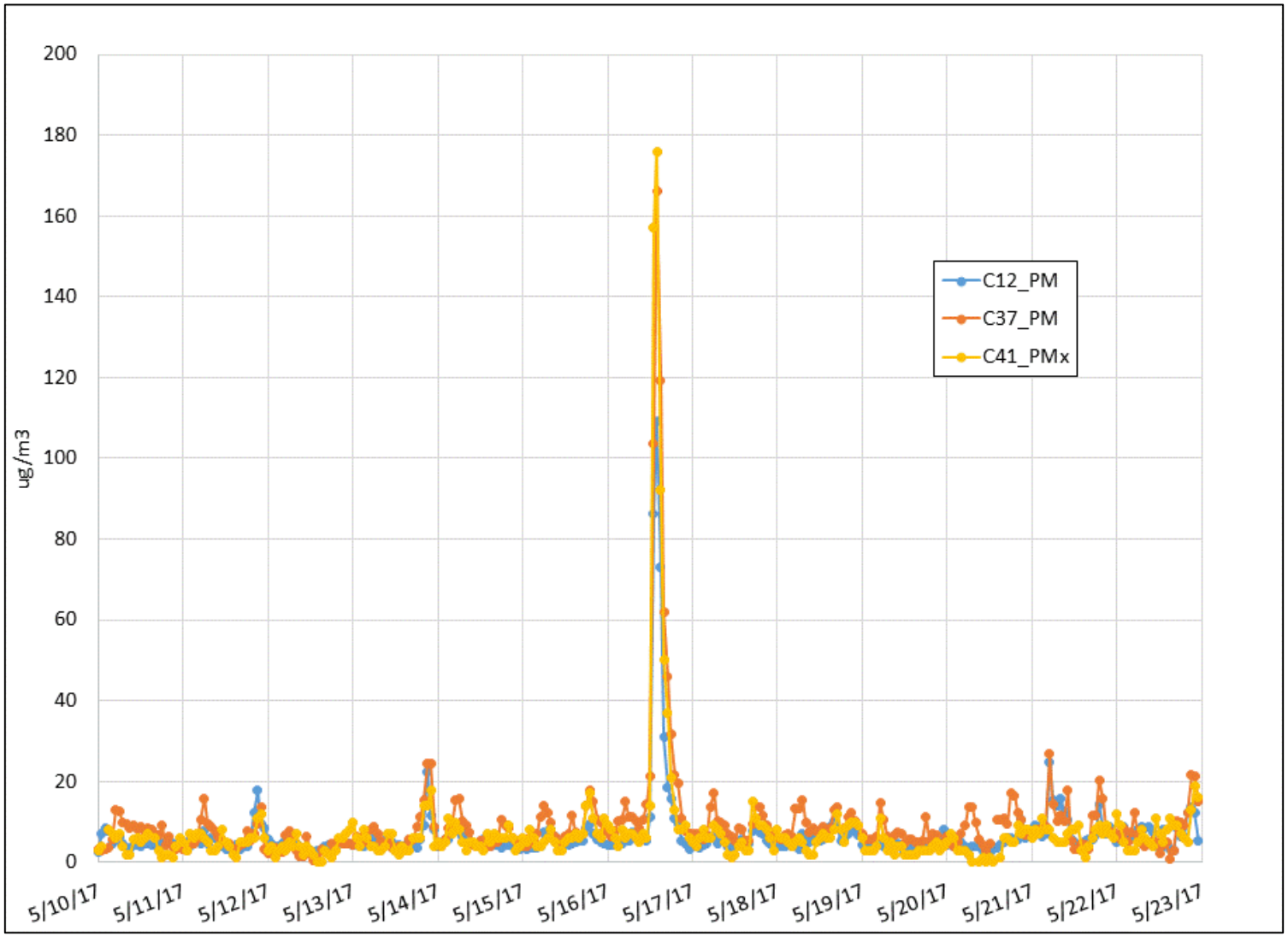
Upper air winds, HYSPLIT 6/28/2017



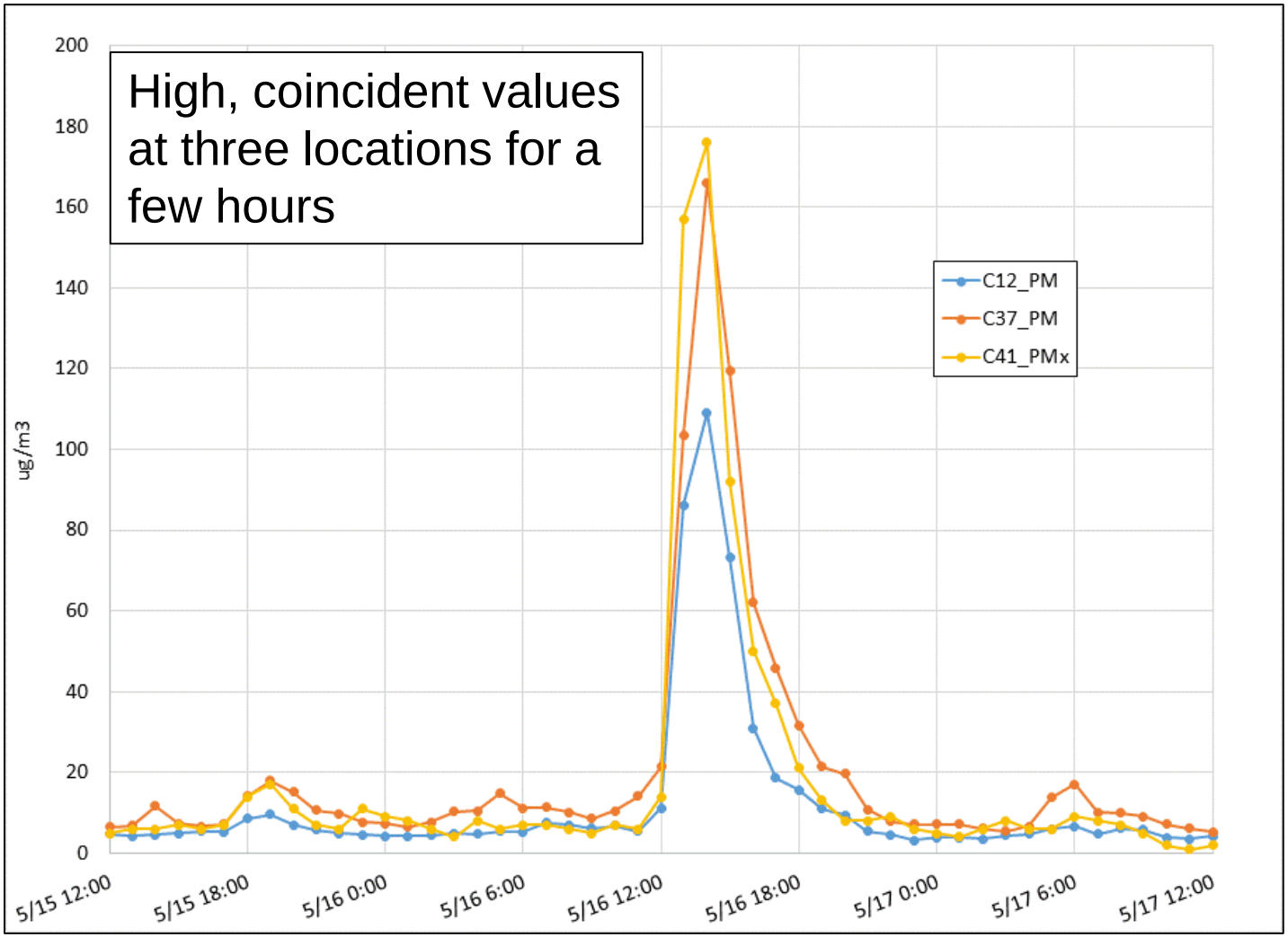


Winds now shifted to the west

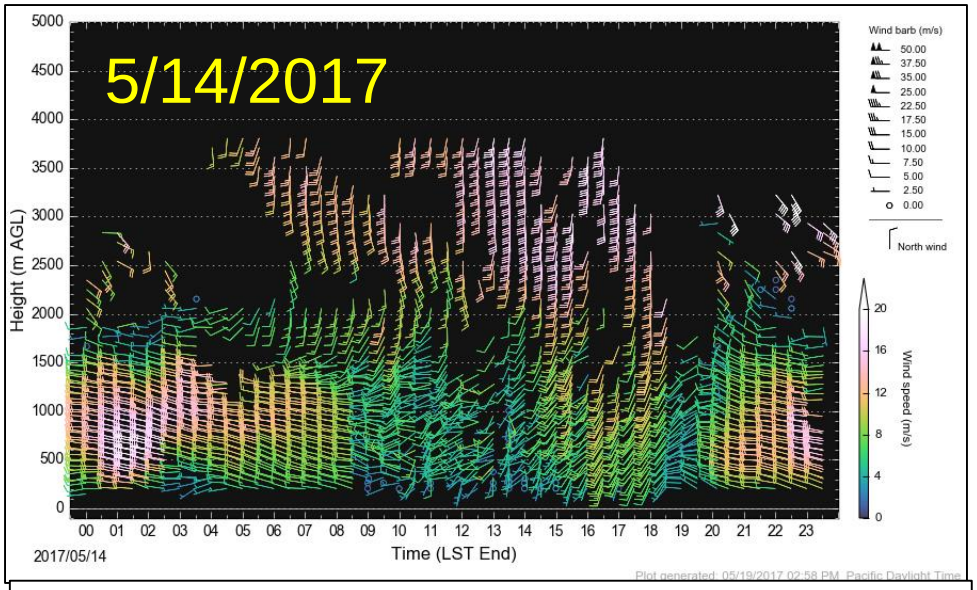
Case Study #3: El Paso $PM_{2.5}$ (TEOM & β-gauge) mid-May 2017

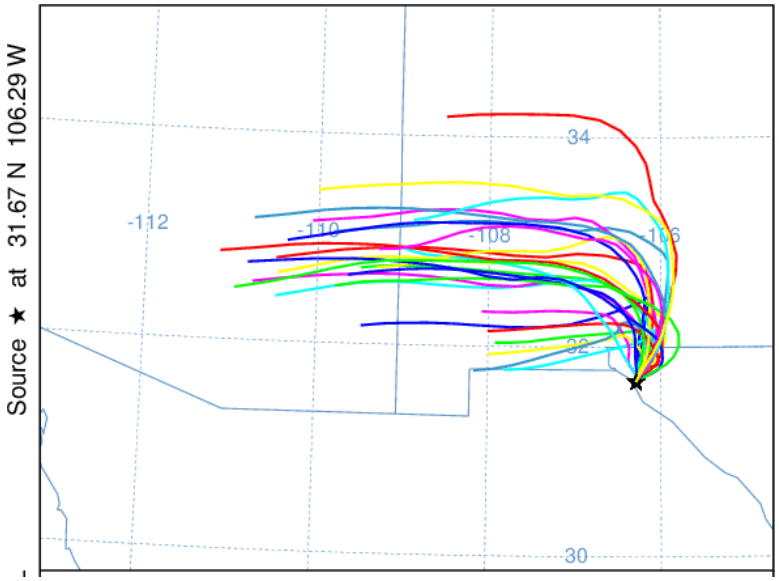


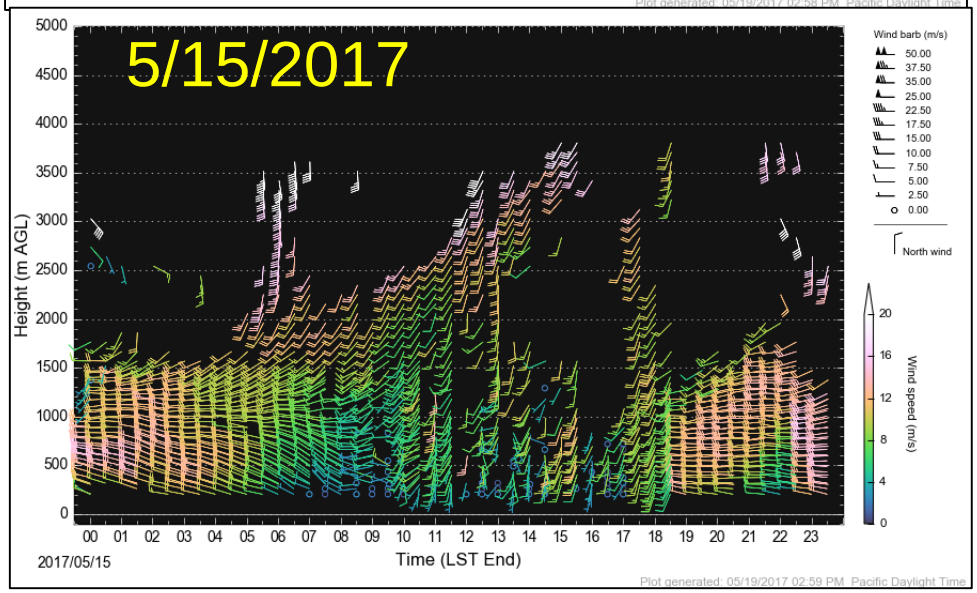
El Paso $PM_{2.5}$ (TEOM&β-gauge) May 15-17 2017

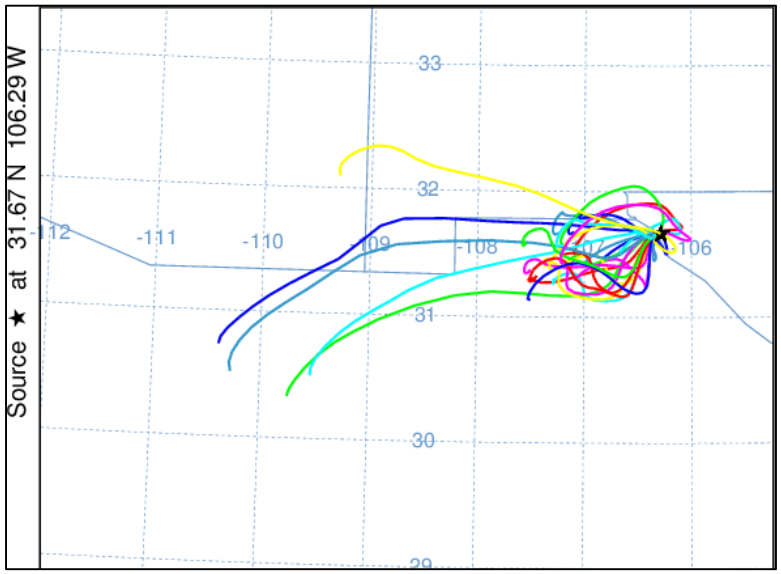


Upper air winds, HYSPLIT May 14,15, 2017

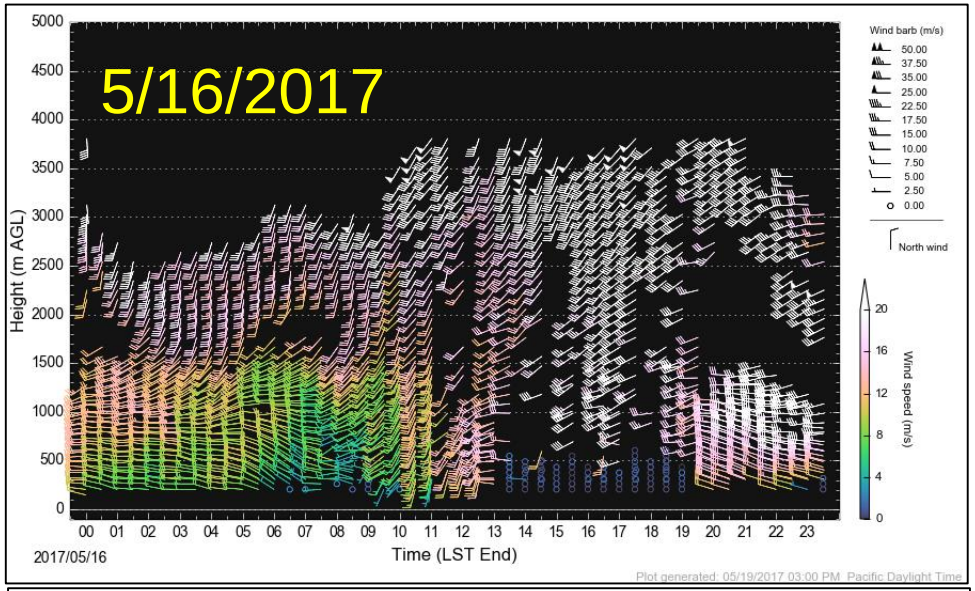


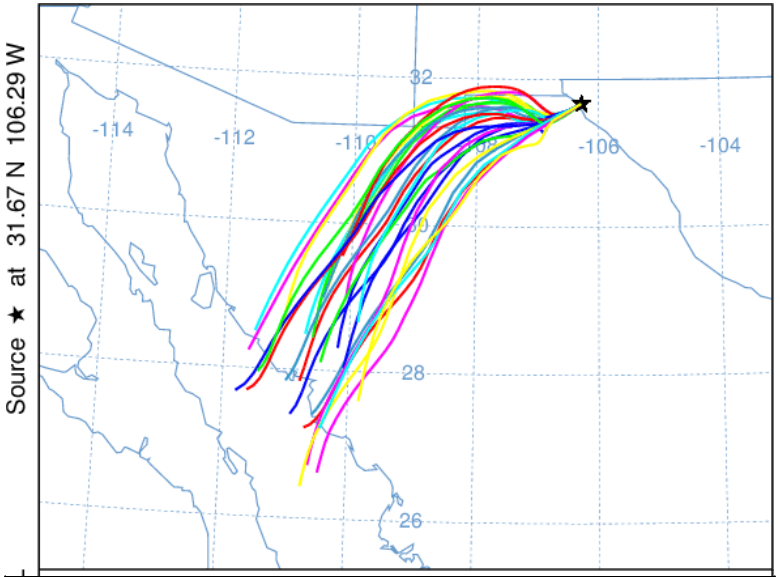


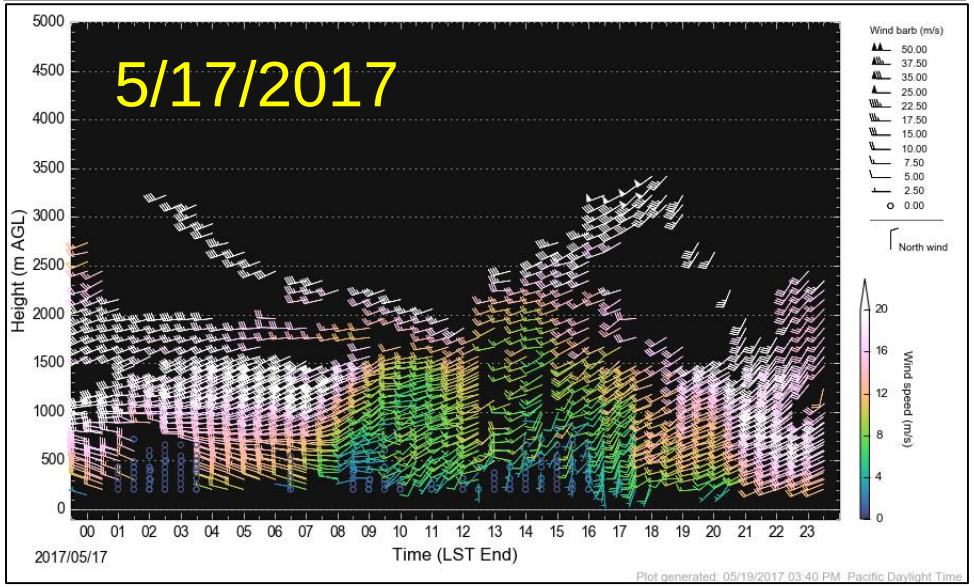


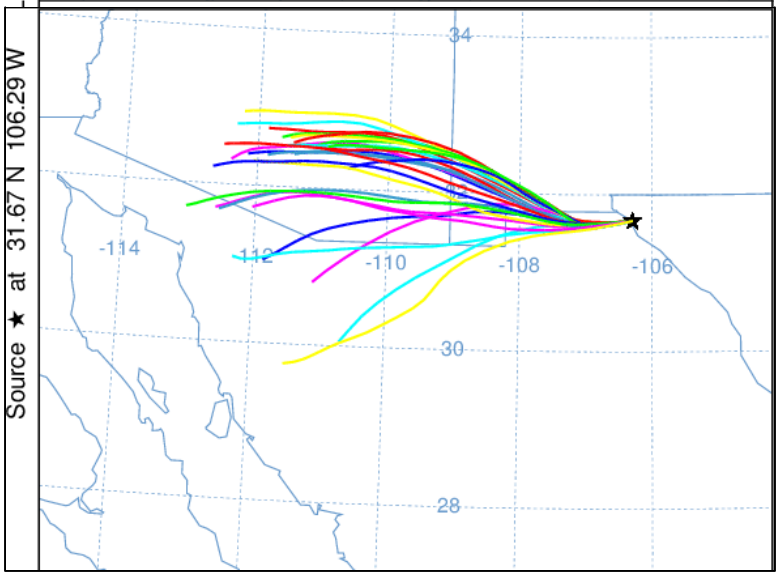


Upper air winds, HYSPLIT May 16,17, 2017

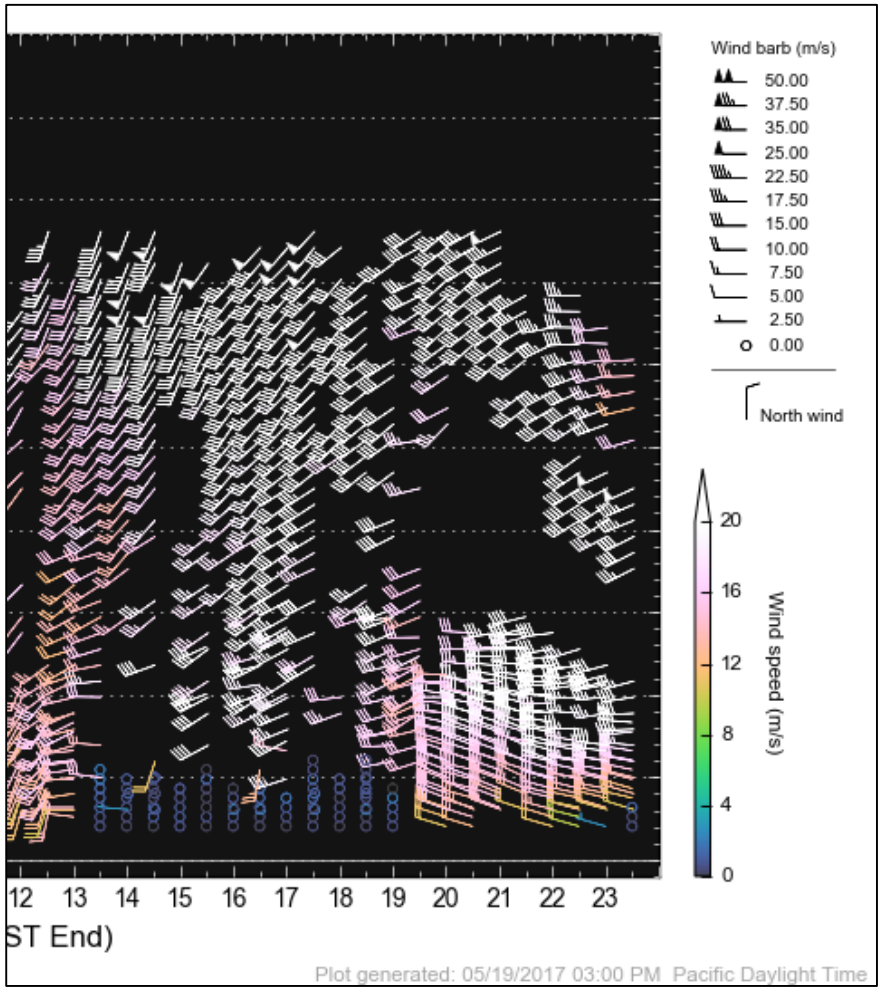


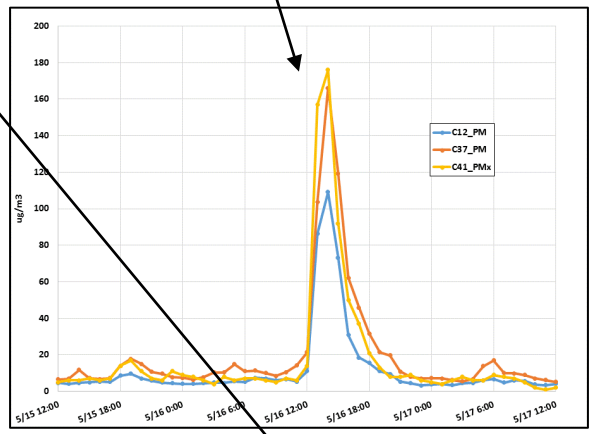


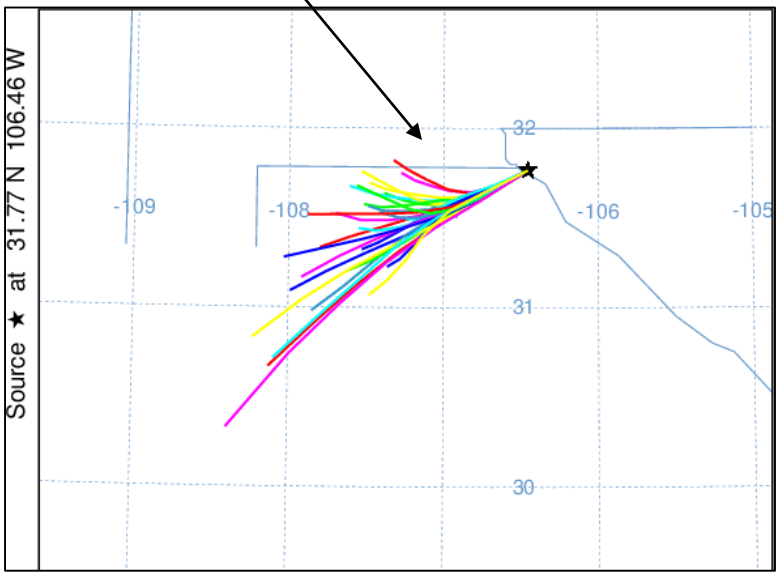




High speed winds carrying dust from dry area SW of El Paso







Thanks!

- Questions, comments?

- Reminder: *All data presented are preliminary and subject to change during the QA process*
- Acknowledgements:

Clinton MacDonald, Max Dillon, and Kevin Smith with Sonoma Tech