Synoptic sampling of stratospheric intrusions by TOLNet lidars on May 24-25, 2013

A. O. Langford, NOAA ESRL

LeBlanc, Alvarez, Senff, Kuang, Newchurch, Yates, Iraci, Pierce,…

Profiling of ozone in stratospheric intrusions was one of the first applications of ozone lidar

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Tropopause Fold Structure Determined From Airborne Lidar and in Situ Measurements

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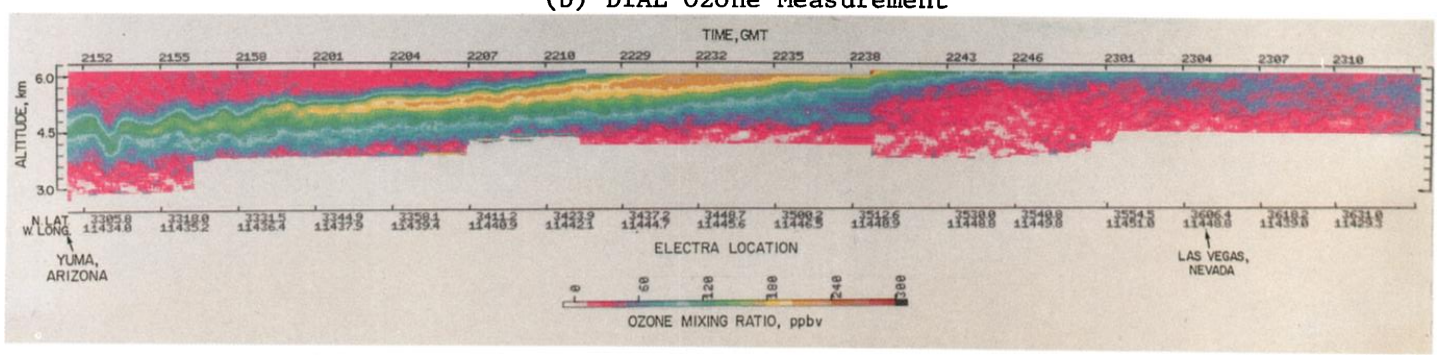
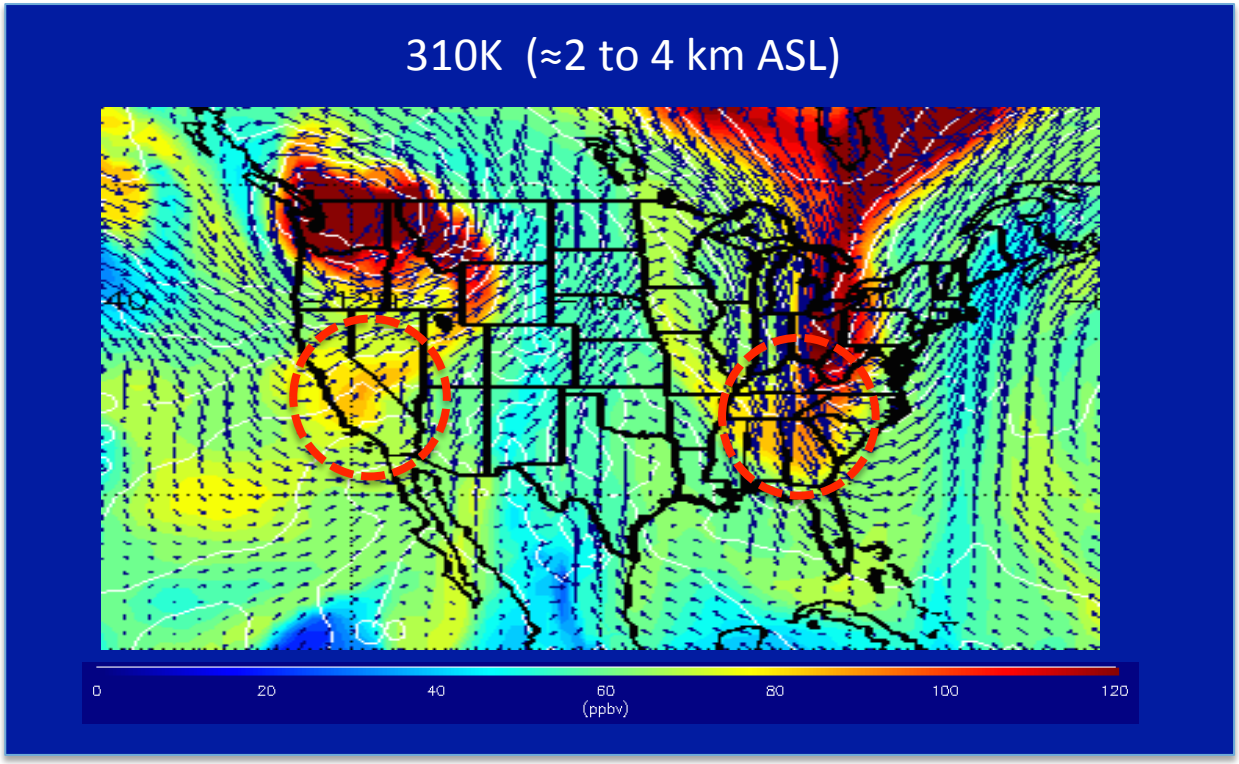
(b) DIAL Ozone Measurement



April 20, 1984 (30 years ago!)

May 24, 2013 12UT RAQMS ozone

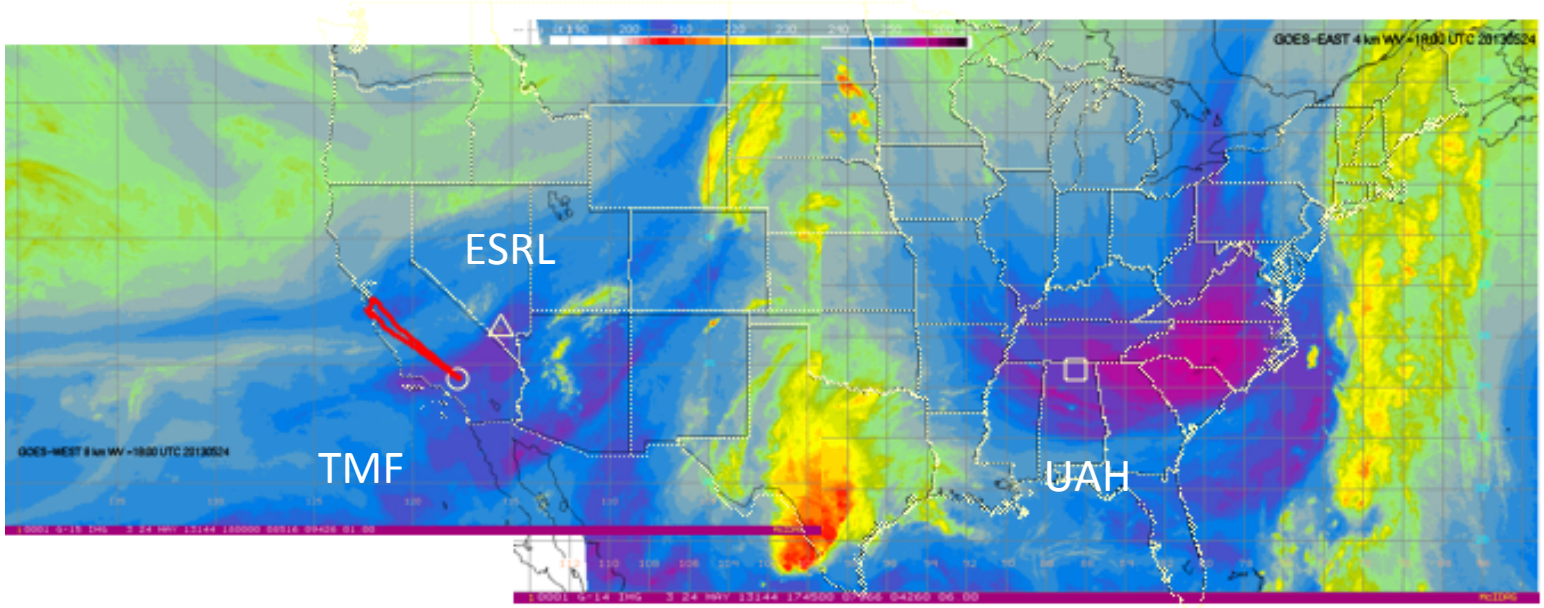


Simultaneous tropopause folds above the eastern and western U.S.

Brad Pierce (NOAA/NESDIS)

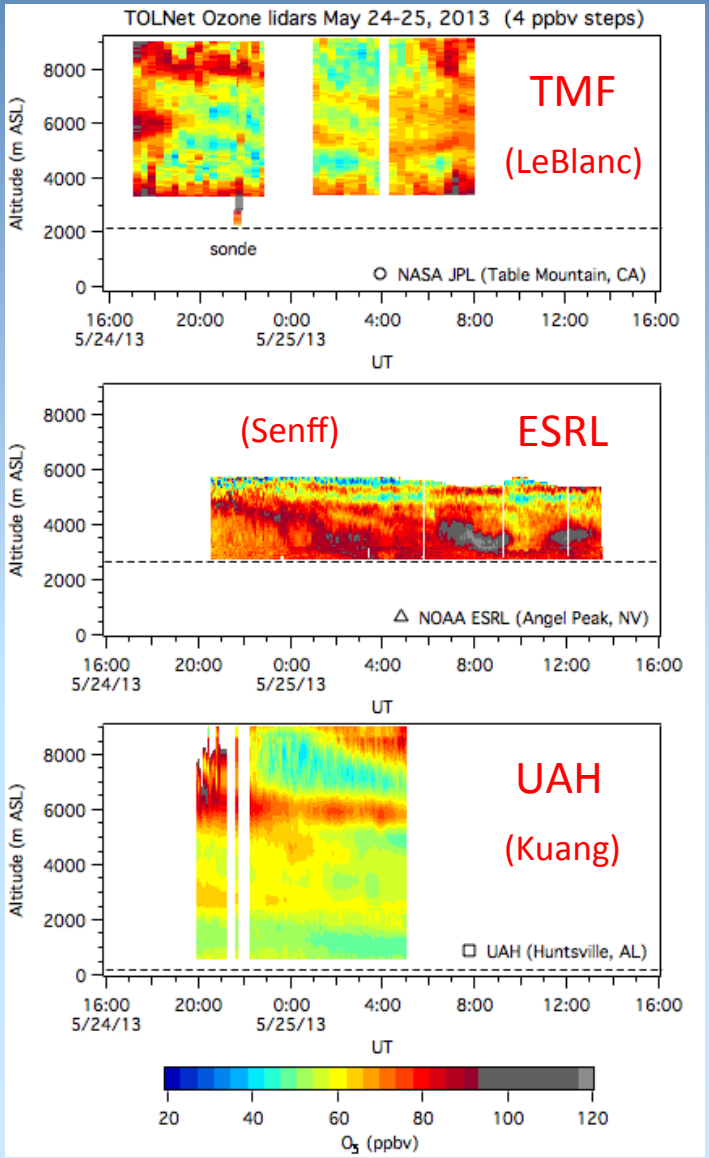
SIs visible as dry slots in water vapor imagery

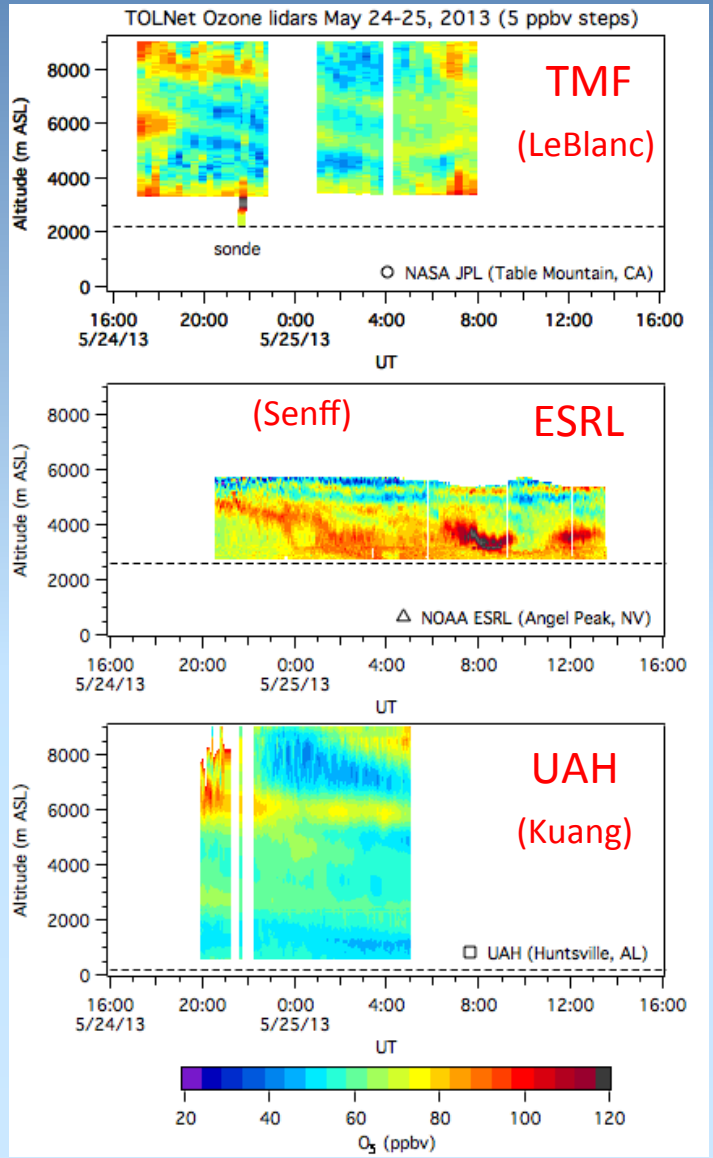
GOES-W/E Composite 4 km WV 1800 UT May 24, 2013



Owen Cooper (NOAA/CIRES)

Simultaneous measurements of both SIs



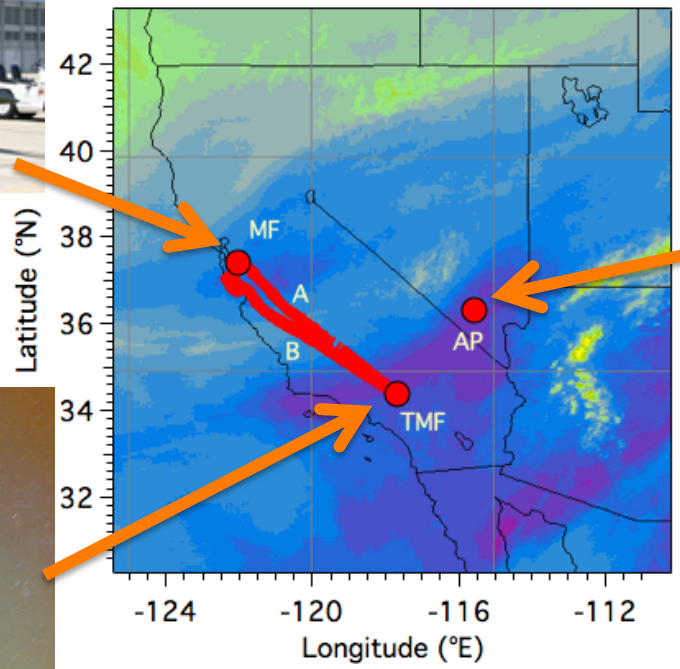


Western U.S. measurements

In situ O_3, CO_2, CH_4, H_2O

lidar, sonde, in situ O_3

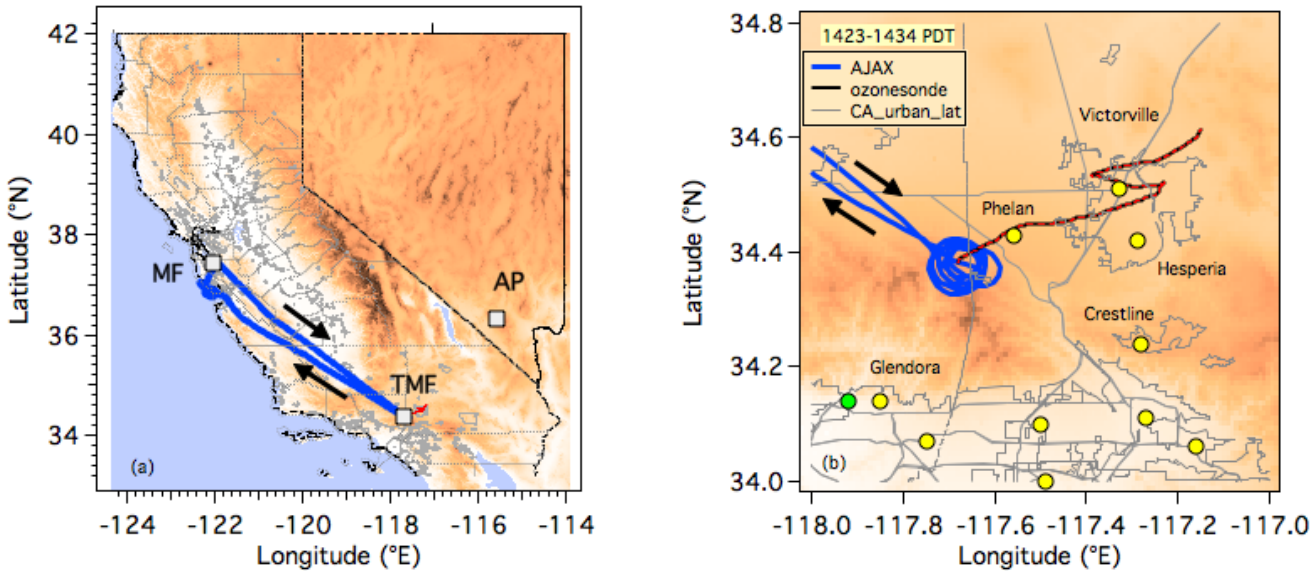
GOES-WEST WV distribution
at 18UT (11PDT)



Owen Cooper (NOAA/CIRES)

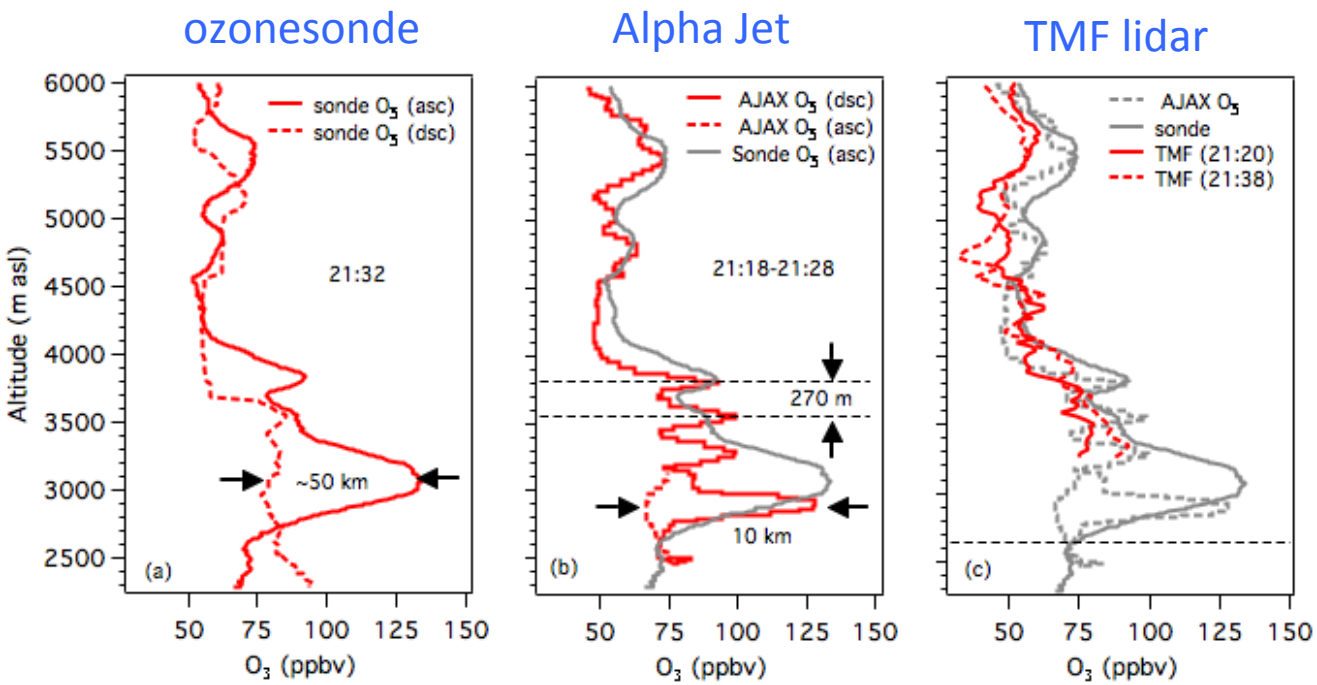
lidar, in situ O_3, CO, H_2O

AJAX flight path to and from TMF



10 km spiral to 200 m AGL above TMF

Ozone profiles above TMF on May 24, 2013



Small-scale structures above TMF caused by topographically forced gravity waves

Take Home

Ozone *lidars* can provide information about small-scale features of SI.

Ozone lidar *networks* can provide synoptic view of large-scale features of SI.

Tropopause folds often form on the western flanks of deep upper level troughs

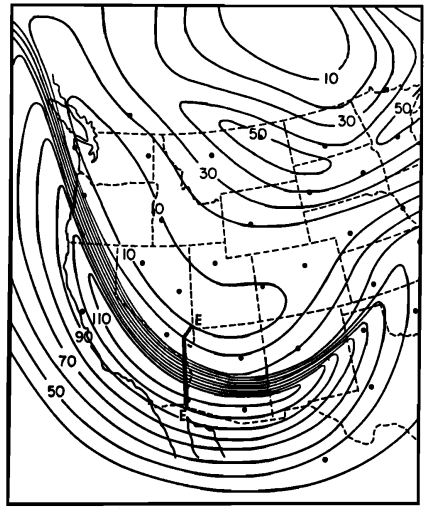


Fig. 1. Isotach (kt) analysis for 500-mbar surface at 1200 UT on April 20, 1984. Dots indicate radiosonde locations, and the Electra flight track is shown as line E–E.

April 20, 1984