Managing Agricultural Open Burning through Smoke Management Systems and their Effectiveness in Minimizing Air Quality Impacts from Open Burning

Central Valley Summit
on Alternatives to Open Burning of Agricultural Waste
November 7, 2017

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History of Managing Agricultural Burning

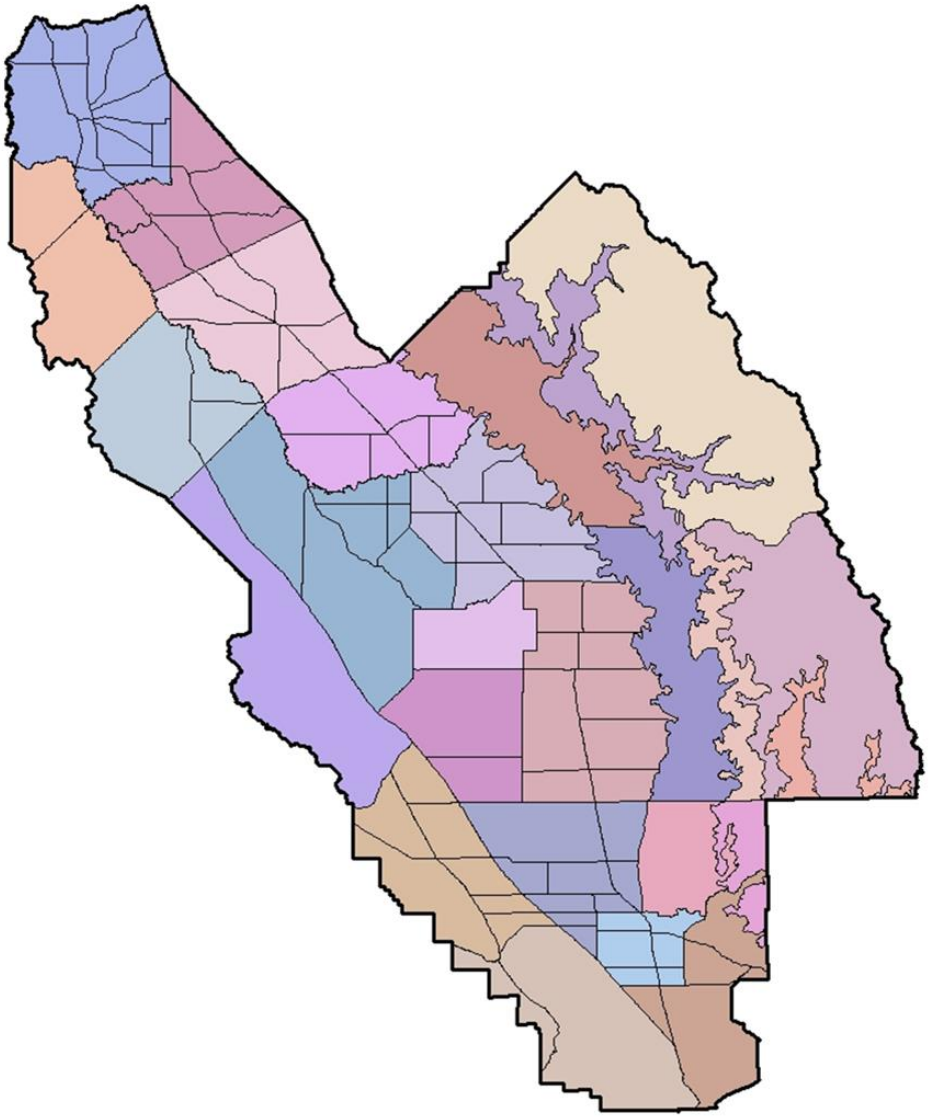
- District has managed smoke from agricultural burning since 1992
  - Rule 4103 (Open Burning) established to regulate agricultural burning in the San Joaquin Valley
  - Methods of managing smoke from agricultural burning has been refined over time
- Initially, agricultural burning declarations were issued by large regions defined in the California Code of Regulations (CCR) Title 17:
  - Northern region (San Joaquin, Stanislaus, Merced)
  - Central/Southern region below 3,000 feet elevation (Madera County and south)
  - Central/Southern region above 3,000 feet elevation (Madera County and south)

History of Managing Agricultural Burning (cont'd)

- Initially declaration was "Yes" or "No" for each region for each day – no mechanism to limit emissions in each defined region
- Air Resources Board (ARB) directly involved in early years of managing agricultural burning in the Valley
  - ARB daily reviewed the CCR Title 17 criteria – based on meteorological parameters (500 mb height, temperature stability, wind speed)
  - ARB would issue daily agricultural burning declarations for the District based on Title 17 criteria and current air quality conditions
  - District would adhere to ARB declarations (but could be more stringent than ARB if needed)
- 200 acres of agricultural material per county per day was still allowed to burn on a declared No burn day
  - Permit holders required to call in to District and make case of hardship to gain permission
  - District staff kept track of these additional daily allowances to ensure 200 acre county limit was not exceeded

History of Managing Agricultural Burning (cont'd)

- Seeking local control of agricultural burning declarations for the Valley, District prepared and submitted a Smoke Management Plan (SMP) to ARB in 2002
  - SMP outlined District's plan to manage smoke from agricultural burning, and the resources it had to administer the program
  - Approval gained from ARB provided District authority to issue agricultural burning declarations locally
- District began to issue agricultural burning declarations on a county basis in 2002
- In 2004 District refined the counties into smaller agricultural burn allocation zones for better localized smoke management
- Smaller burn allocation zones provided additional flexibility while being more health protective



- District developed burn allocation zones based on a number of criteria
  - Crop distribution throughout the Valley
  - Historical burning activities
  - Nearby sensitive receptors
  - Known geographic boundaries

Smoke Management System Operations

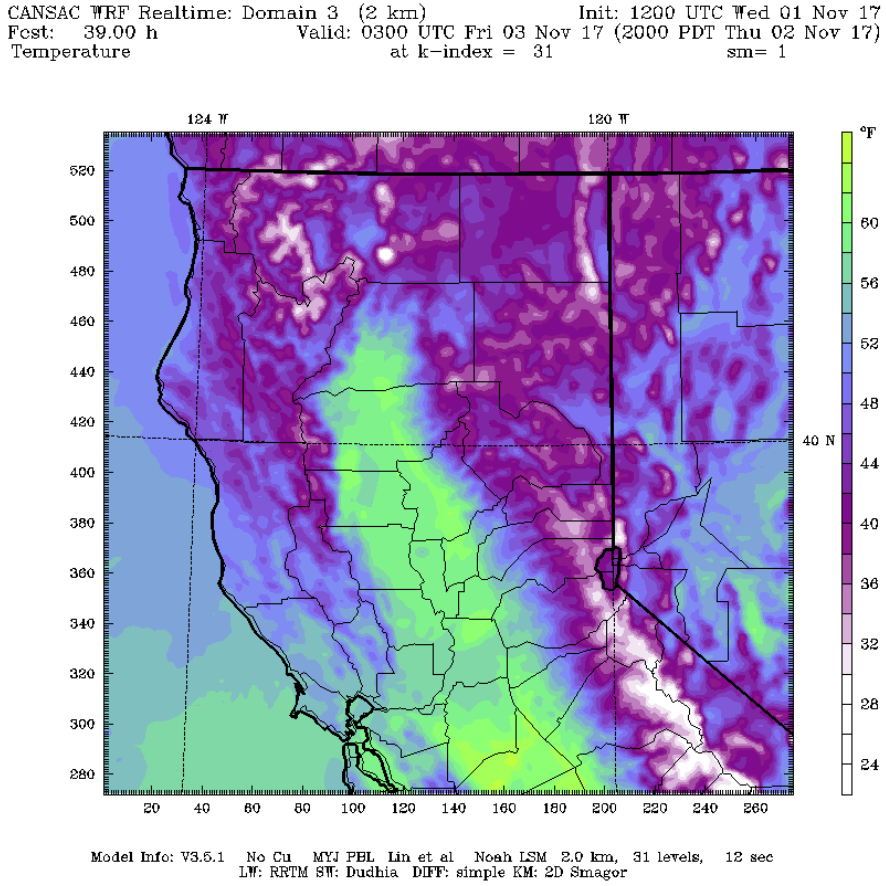
- District sets daily emissions allocation for each burn zone based on projected meteorological and air quality conditions
  - Allocations set at levels assuring no violations of air quality standards
  - Permit holder submits a request to burn through the Smoke Management System (SMS)
  - SMS calculates the emissions from the burn request and compares this against the set emissions allocation for that zone
- If emissions allocated for the burn zone are still available at time of request
  - Burn is immediately authorized; or
  - Requested acreage is reduced (based on available emissions)
  - Otherwise, burn request is placed on waiting list for when emissions are allocated for the applicable burn zone in the future

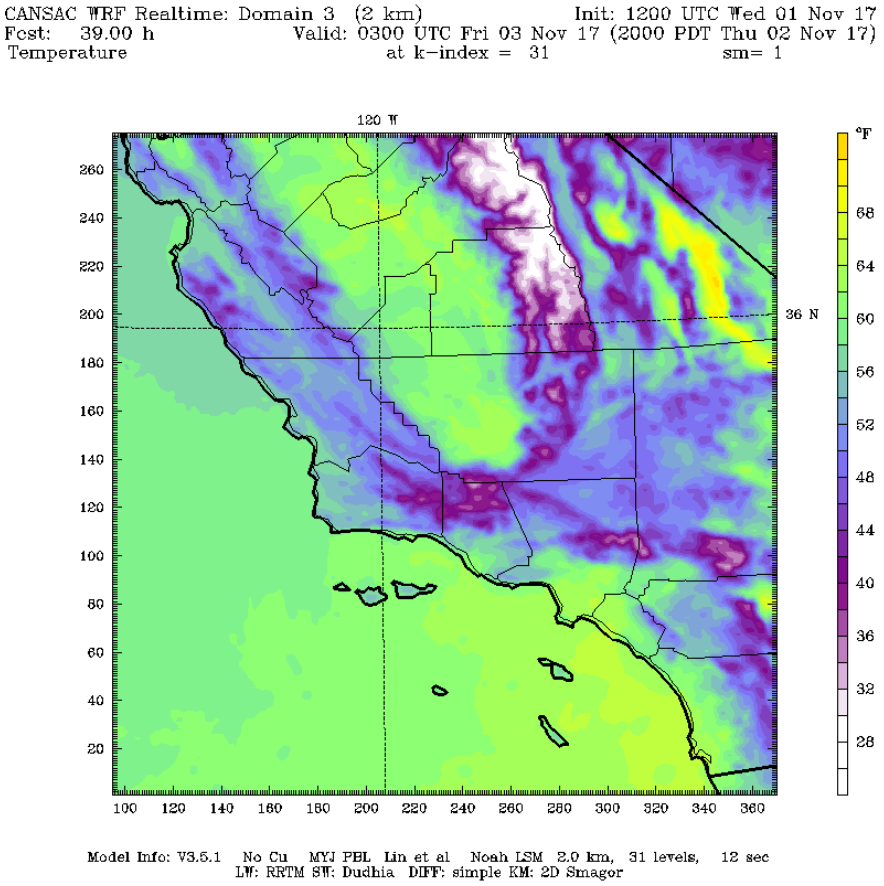
Supportive Analysis for Allocation of Agricultural Burning Emissions

- District evaluates air quality and meteorological conditions daily to determine appropriate emissions allocation for over 100 burn allocation zones
  - Conducted 365 days per year (including holidays and weekends)
- Air quality assessment includes
  - Review of District air quality model output of forecasted air quality levels from predictive equations based on multi-variable linear regression analysis: $Y = \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_n x_n$
  - Analysis of potential air quality events, e.g. wind-blown dust, wildfire smoke, ongoing structure fires
  - Burning not allowed in impacted zones, with limited burning potentially allowed elsewhere
- Agricultural burning not allowed in a county when residential wood-burning curtailment in effect

Supportive Analysis for Allocation of Agricultural Burning Emissions (cont'd)

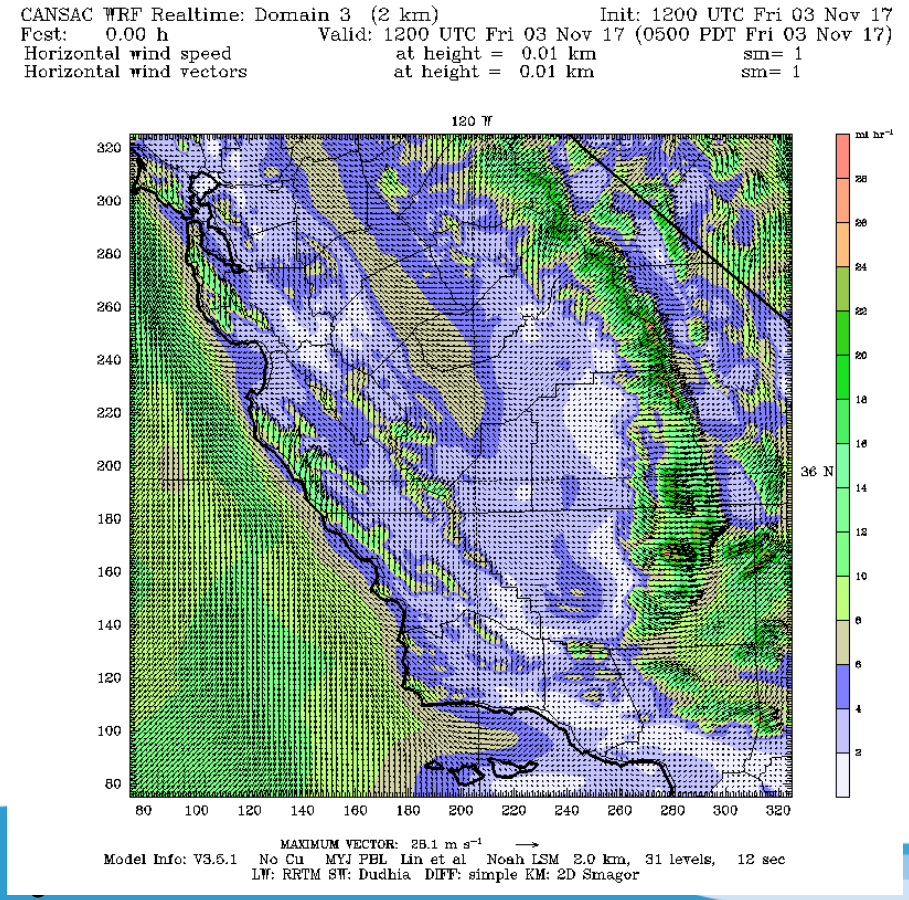
- Meteorological assessment includes
  - Analysis of modeled and projected Valley temperatures
  - Timing of atmospheric warming and improved lofting of emissions

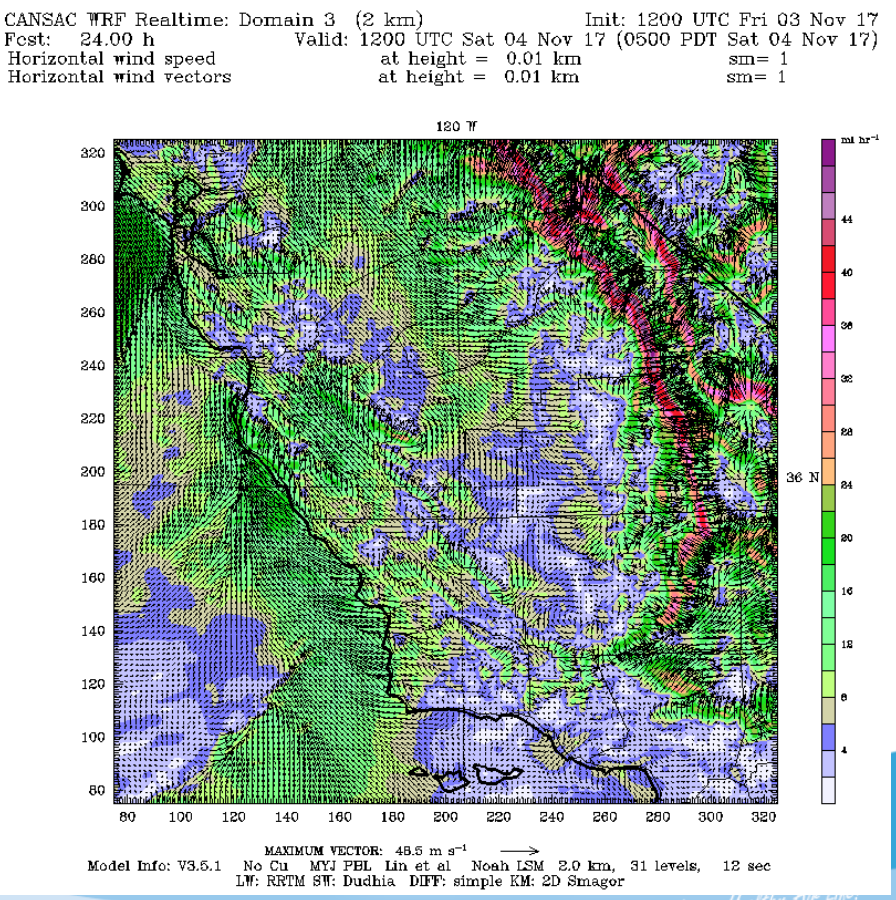




Supportive Analysis for Allocation of Agricultural Burning Emissions (cont'd)

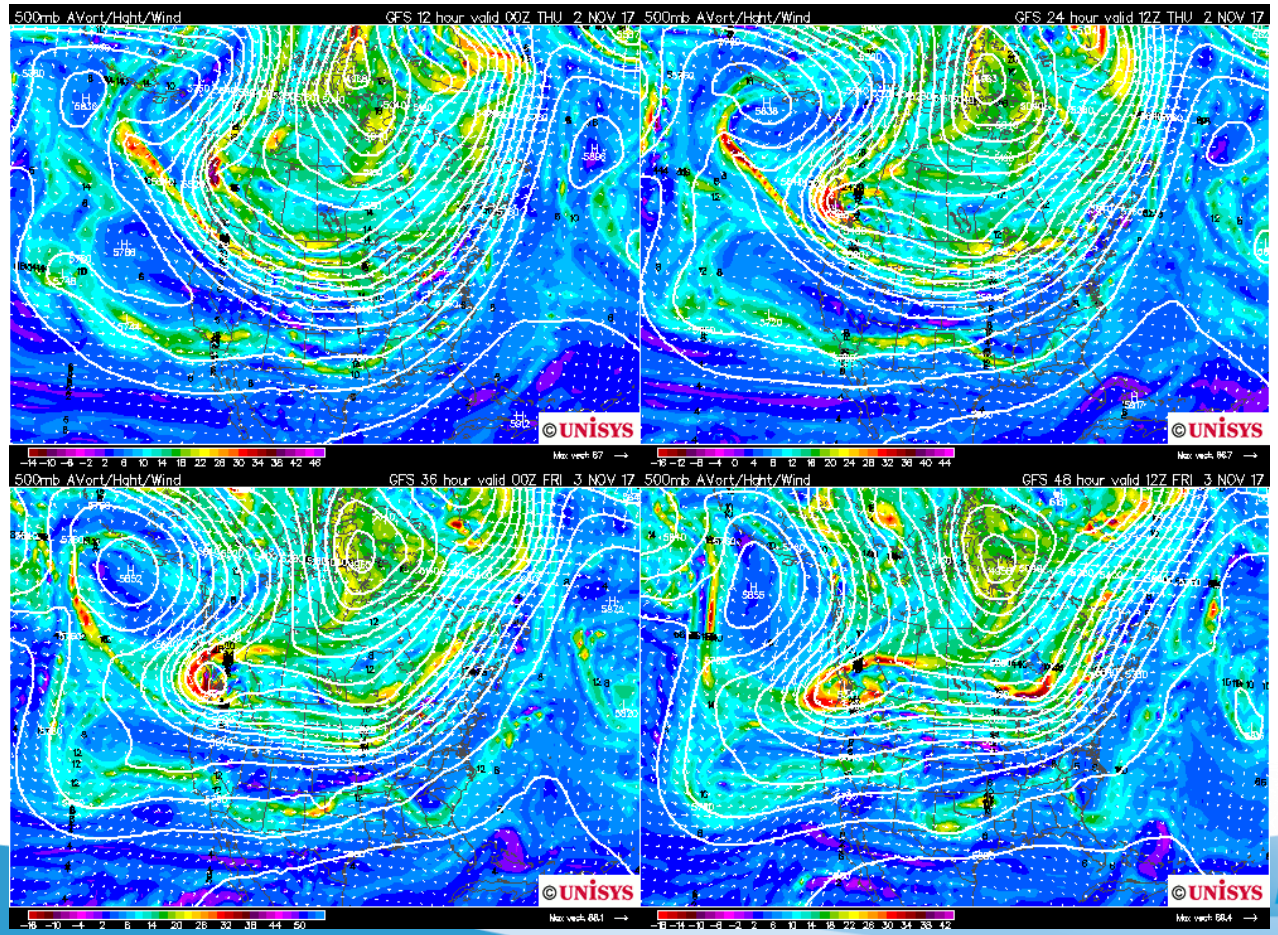
- Meteorological assessment also includes
  - Wind speed and wind direction – specifically when projects are near communities or sensitive receptors





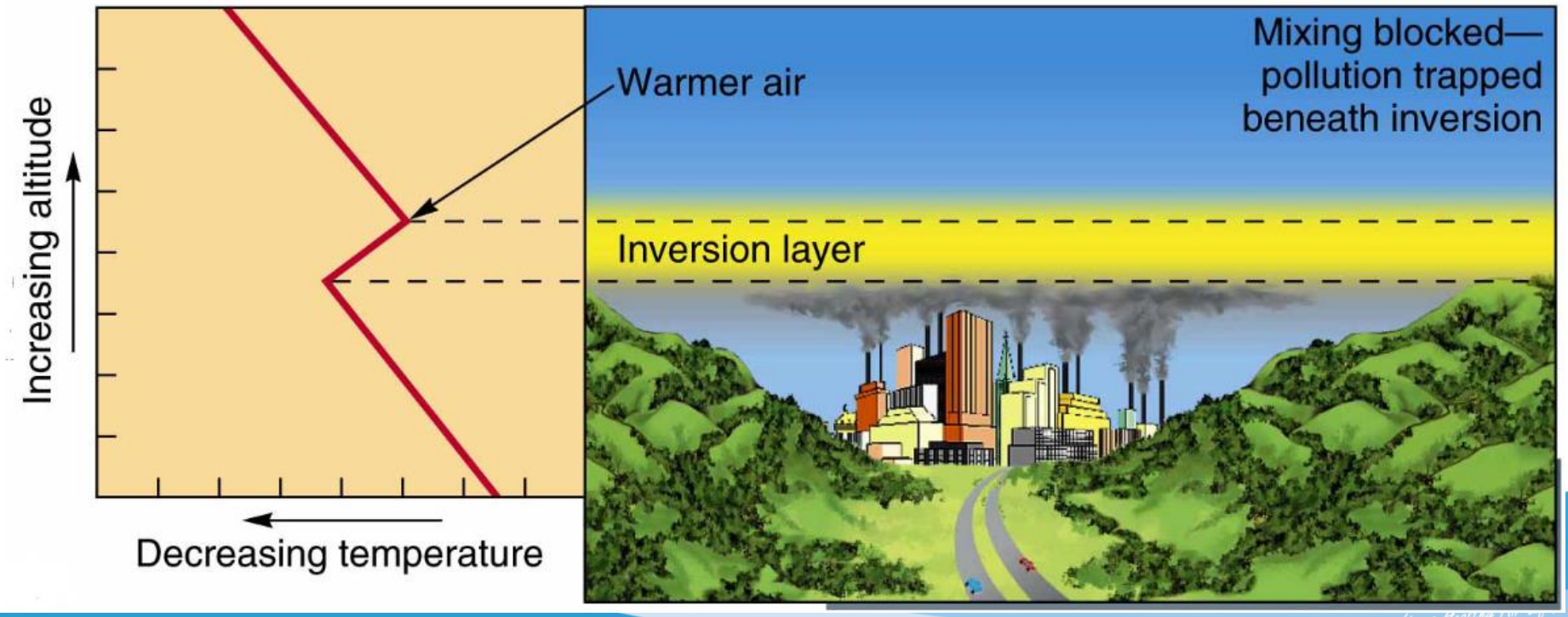
Supportive Analysis for Allocation of Agricultural Burning Emissions (cont'd)

- Meteorological assessment also includes
  - Incoming changes to weather pattern (high pressure ridges and low pressure troughs)



Supportive Analysis for Allocation of Agricultural Burning Emissions (cont'd)

- Meteorological assessment also includes
  - Elevation of 500 millibar level of atmospheric pressure
  - Vertical temperature gradients: $T_{\Delta} = T_{850mb} - T_{surface}$ (metric of atmospheric stability)
  - Strength of temperature inversion for areas across the Valley



Summary of Agricultural Burning Smoke Management

- District able to manage emissions effectively from agricultural burning through its refined burn allocation zones and innovative SMS
- Provides for better control of pollution and more permissive burn days through cerebral allocation of emissions across the Valley
- SMS provides flexible and streamlined process to both District staff and agricultural stakeholders
- Successful approach with agricultural burning smoke management will continue to be important as District faces challenges to meet strict federal PM2.5 standards