Fire Weather Products in the National Blend of Models v3.1

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The National Blend of Models (NBM) v3.1

- Implemented October 2018
- Based on a blend of both NWS and non-NWS numerical weather prediction model data and post-processed model guidance
- The goal of the NBM is to create a highly accurate, skillful and consistent starting point for the gridded forecast
- New in NBM v3.1
  - Additional global and mesoscale models (ECMWF, HRRR-Extended)
  - New Aviation, Fire Weather, Water Resources, and Marine elements
  - Text products for stations (using NBM's nearest grid point to the station)

Fire Weather Elements

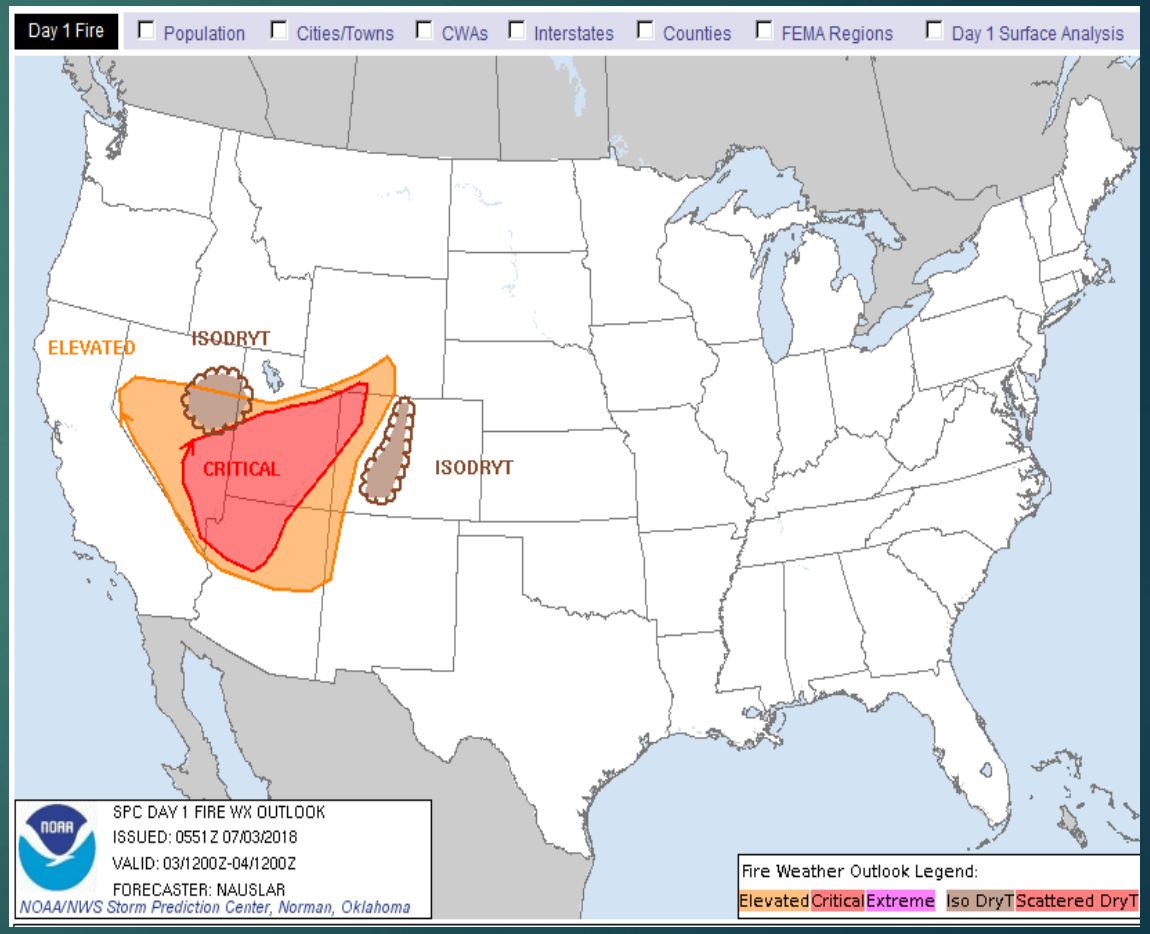
- NBM v3.1 fire weather grids create nationally consistent fire weather and smoke guidance
  - Coordinated effort through National Fire Weather Program, National Interagency Fire Center, Western Region science officers
- Will be used by WFO forecasters to support the wildland fire community in predicting the potential of fire onset and/or spread, and determining the ideal timing for prescribed burns
- Elements included:
  - Mixing Height
  - Transport Wind speed
  - Transport Wind Direction
  - Ventilation Rate
  - 6-hour maximum Haines Index
  - 6-hour maximum Fosberg Fire Weather Index
- Model inputs: GFS, NAM, NAM Nest, RAP

Fire Weather Elements

- Produced for 4 domains:
  - CONUS, 2.5 km
  - Alaska, 3 km
  - Hawaii, 2.5 km
  - Puerto Rico, 1.25 km
- Guidance will run hourly
  - hourly projections 1-36 hours
  - 3-hourly 39-192 hours
  - 6-hourly 198-270 hours

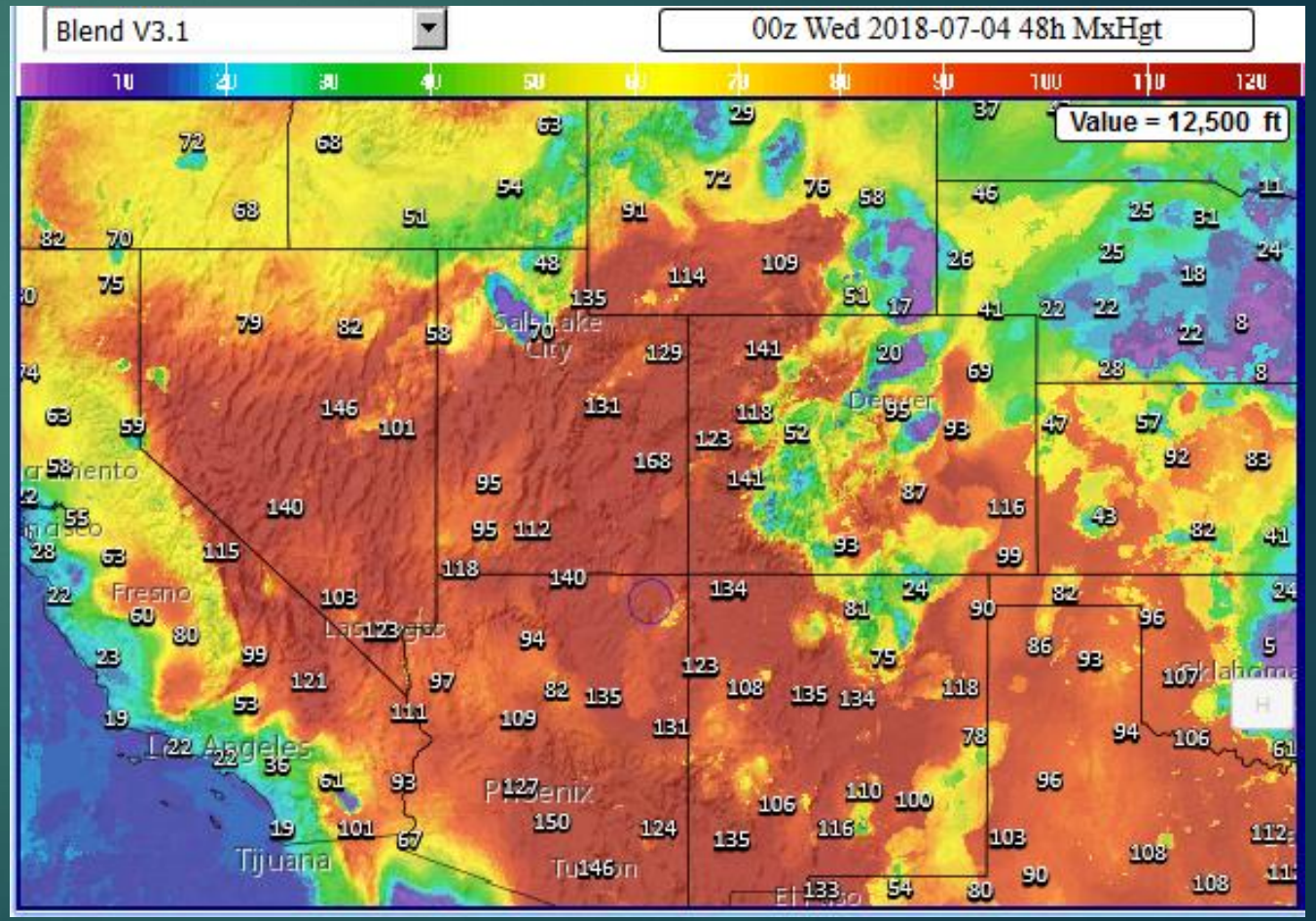
Fire Weather Elements - examples

- SPC Critical Fire Weather Day
  - July 3-4, 2018
  - Eastern Nevada, northwest Arizona, most of Utah, northwest Colorado, and far southern Wyoming
  - dry air mass
  - well-mixed boundary layer
  - sustained south-southwest surface winds of 15-20 mph
  - RH values of 5-20%
- NBM viewer
- https://www.weather.gov/mdl/nbm_home



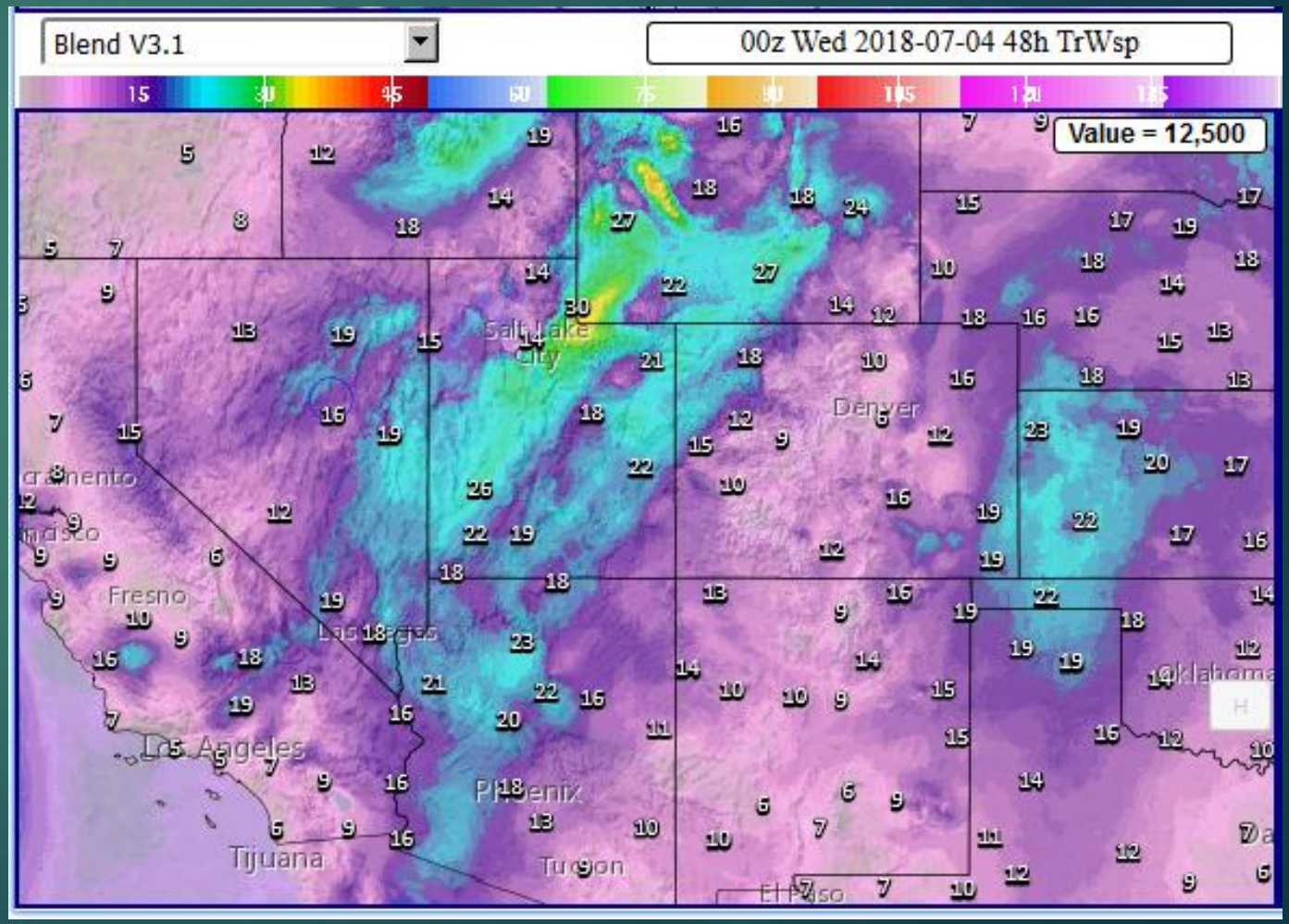
Mixing Height

- Defined as the location of a capping temperature inversion or statically stable layer of air
- Signifies the height above the surface up to which a pollutant (such as smoke) can be dispersed
- Calculated using a modified Stull method (virtual potential temperature)
- SPC Critical Day forecasts well-mixed boundary layer



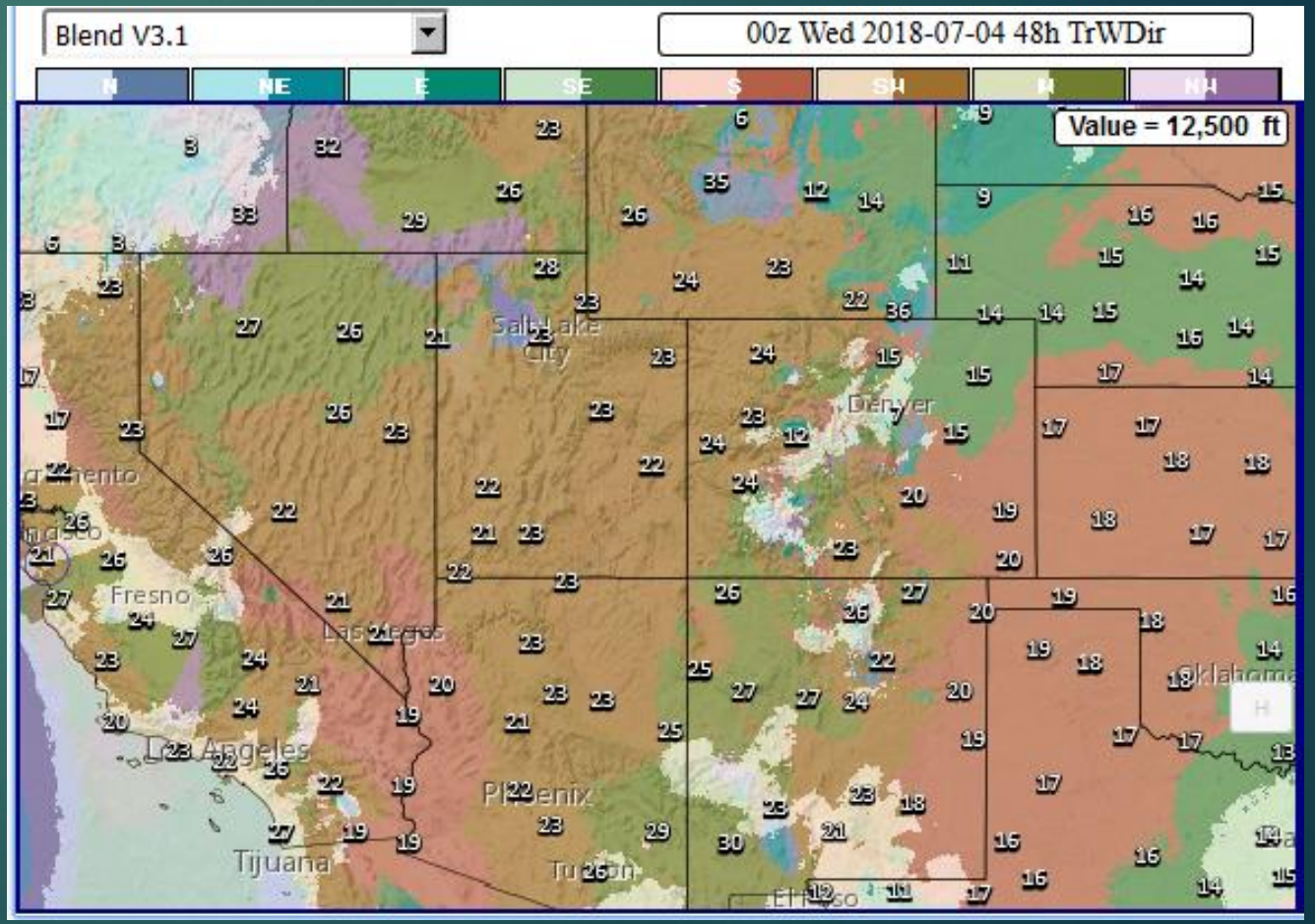
Transport Wind Speed

- Average wind speed throughout the mixed layer
- Calculated as average wind speed magnitude from surface to mixing height
- SPC Critical Day forecasts sustained south-southwest surface winds of 15-20 mph



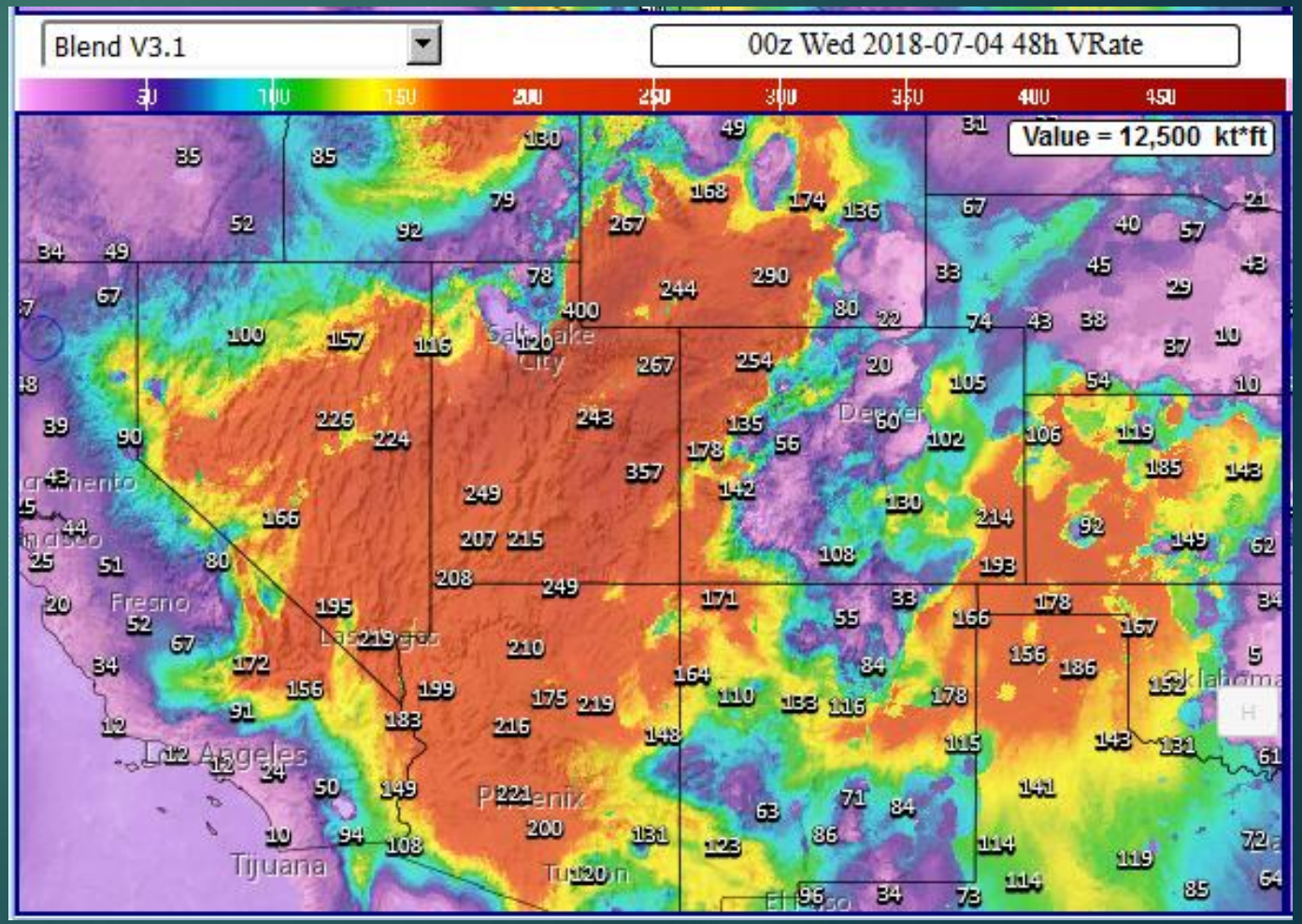
Transport Wind Direction

- Average wind direction throughout the mixed layer
- Calculated as vector of average U and average V from surface to mixing height
- SPC Critical Day forecasts sustained south-southwest surface winds of 15-20 mph



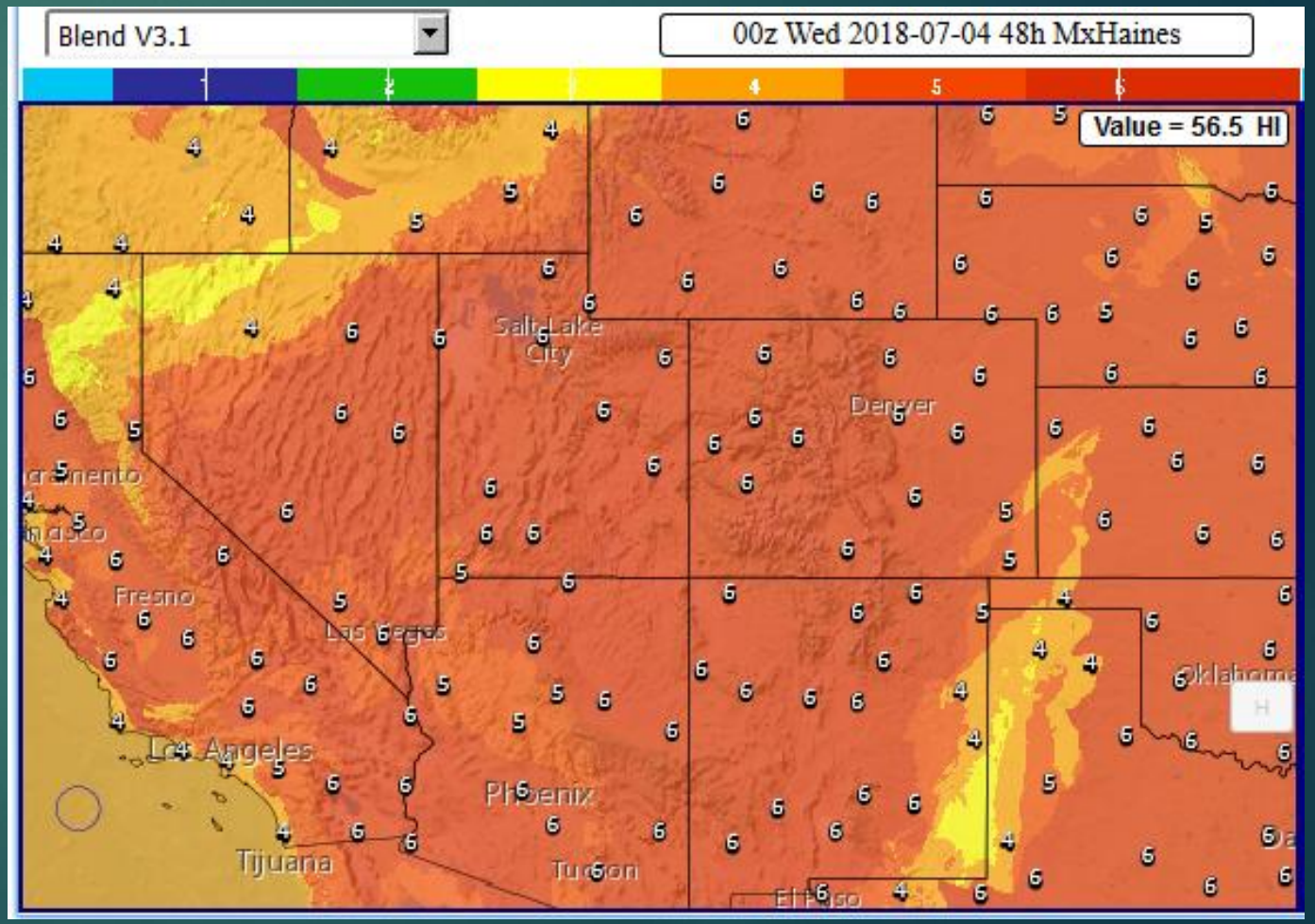
Ventilation Rate

- Represents the ability of the boundary layer to disperse smoke
- Product of mixing height and transport wind speed
- SPC Critical Day: well-mixed boundary layer and 15-20 mph sustained wind speeds



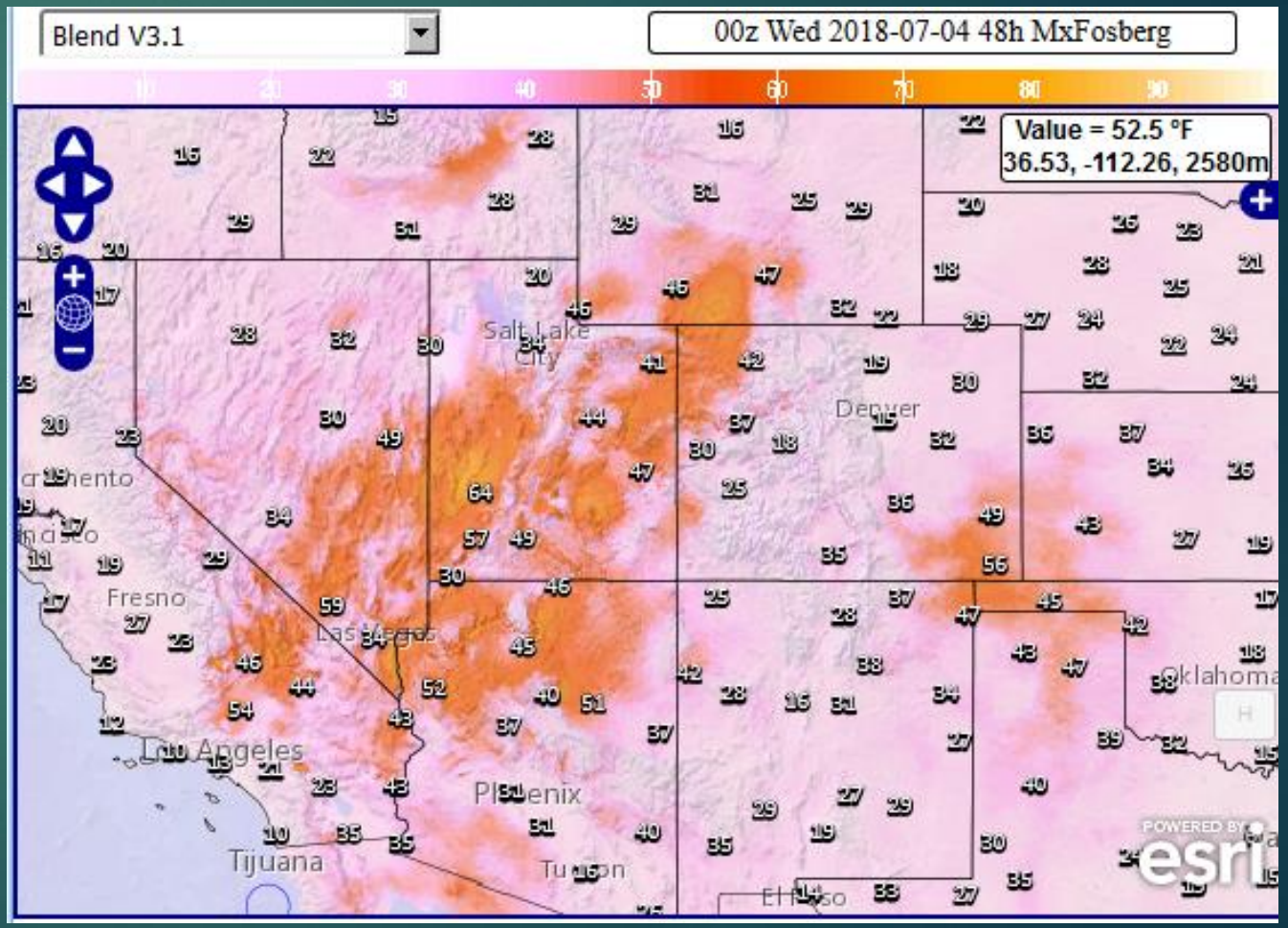
6-hour maximum Haines Index

- Based on the stability and moisture of the lower atmosphere
- Intended to measure the potential for existing fires to become large or behave erratically
- Elevation category based on grid point elevation
  - Low Elevations (< 1000 ft / 305 m)
  - Mid Elevations (1000-3000 ft / 305-914 m)
  - High Elevations (> 3000 ft / 914 m)



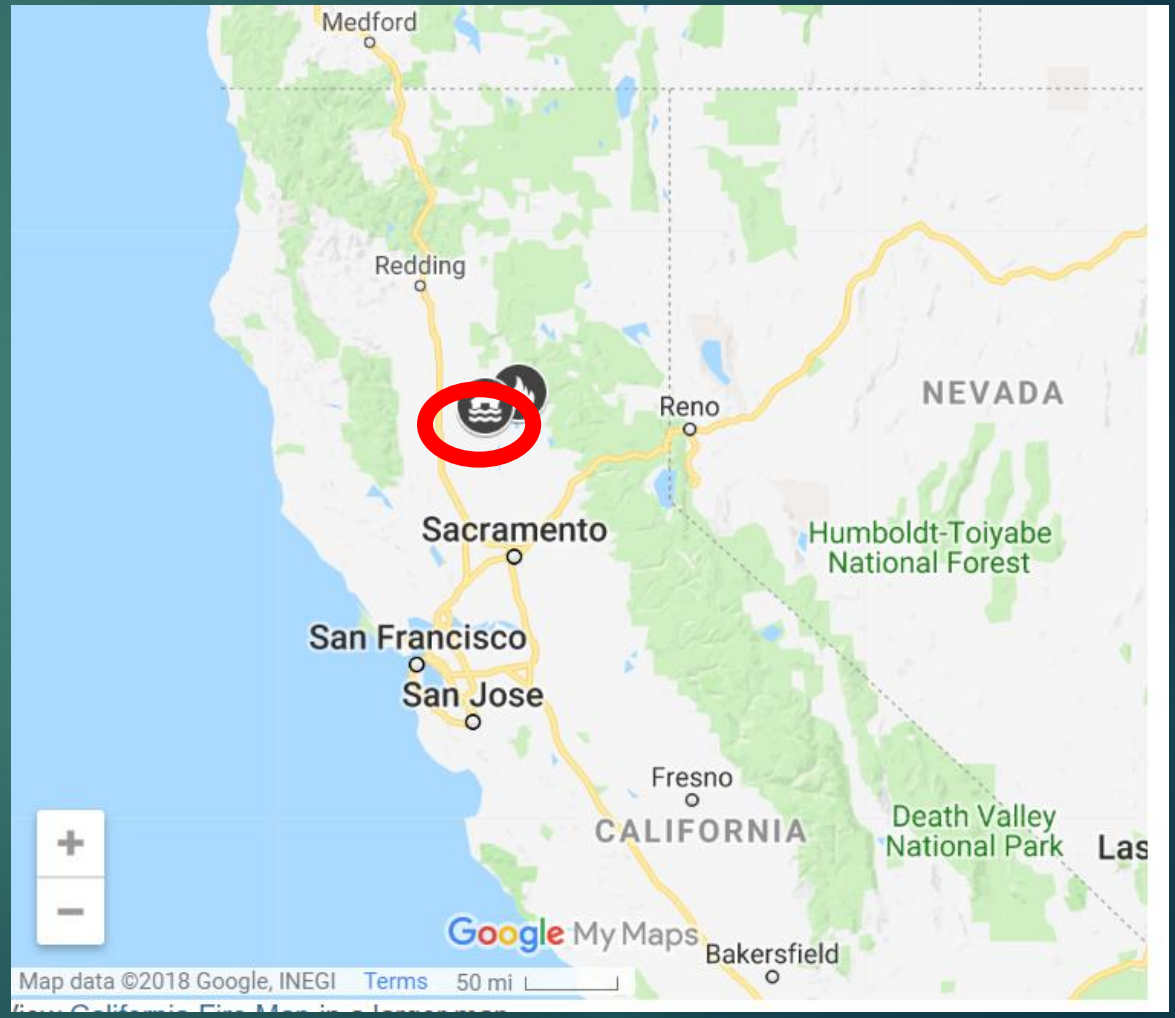
6-hour Maximum Fosberg Fire Weather Index

- Tool for evaluating the potential influence of weather on a wildland fire based on temperature, relative humidity and wind speed
- Calculated using NBM blended, MAE-weighted 2m temperature, 2m RH, and 10m wind speed
- FFWI of 50+ is typically significant on a national scale
- SPC Critical Day forecasts 15-20 mph surface winds and low surface RH



Camp Fire

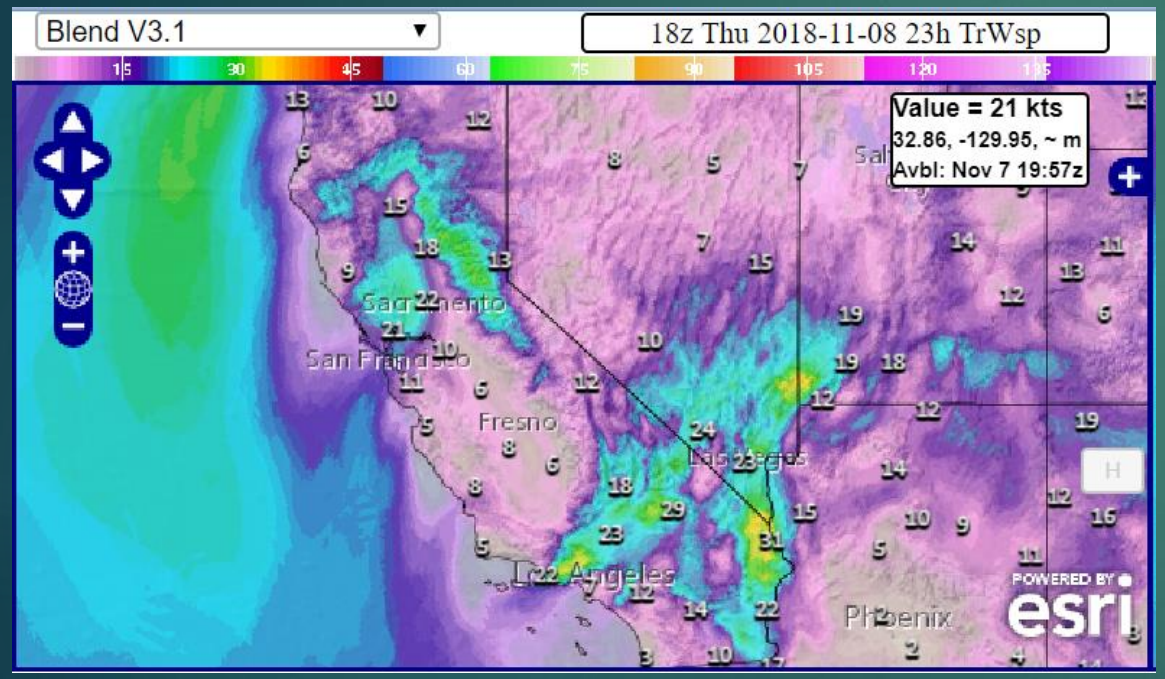
- November 8 – November 25, 2018
- Over 150,000 acres burned
- Deadliest and most destructive wildfire in California history
- Wind speeds enabled rapid spread



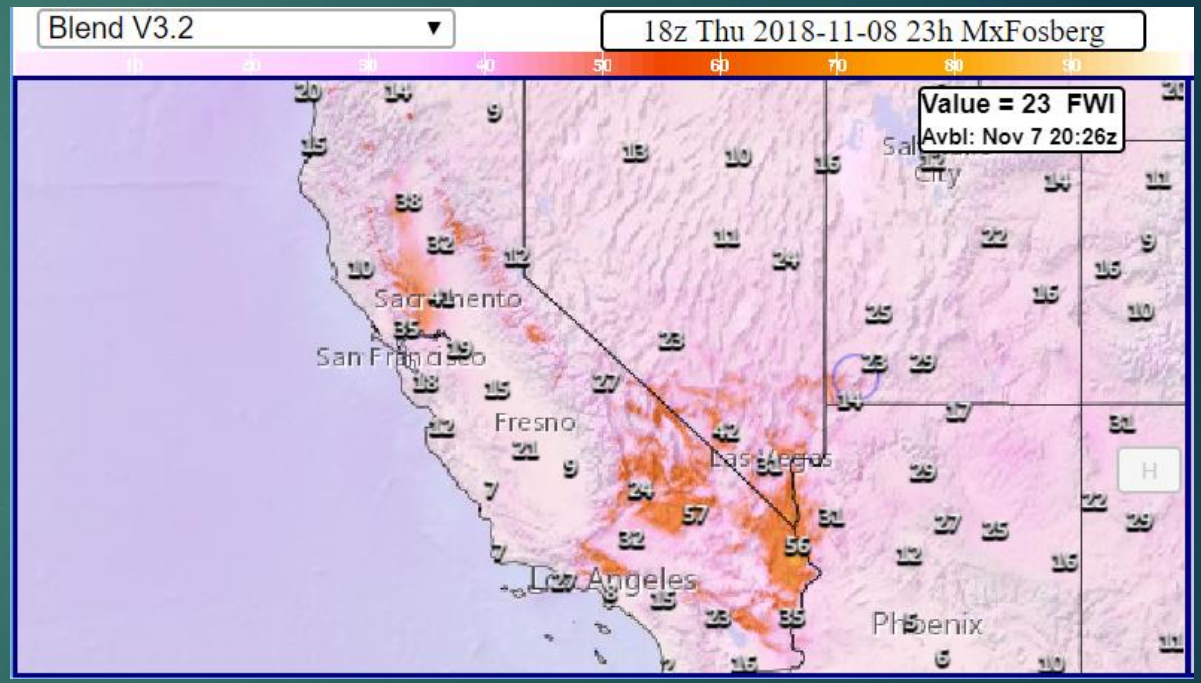
Map Source: Cal Fire

Camp Fire

NBM v3.1 Transport Wind Speed

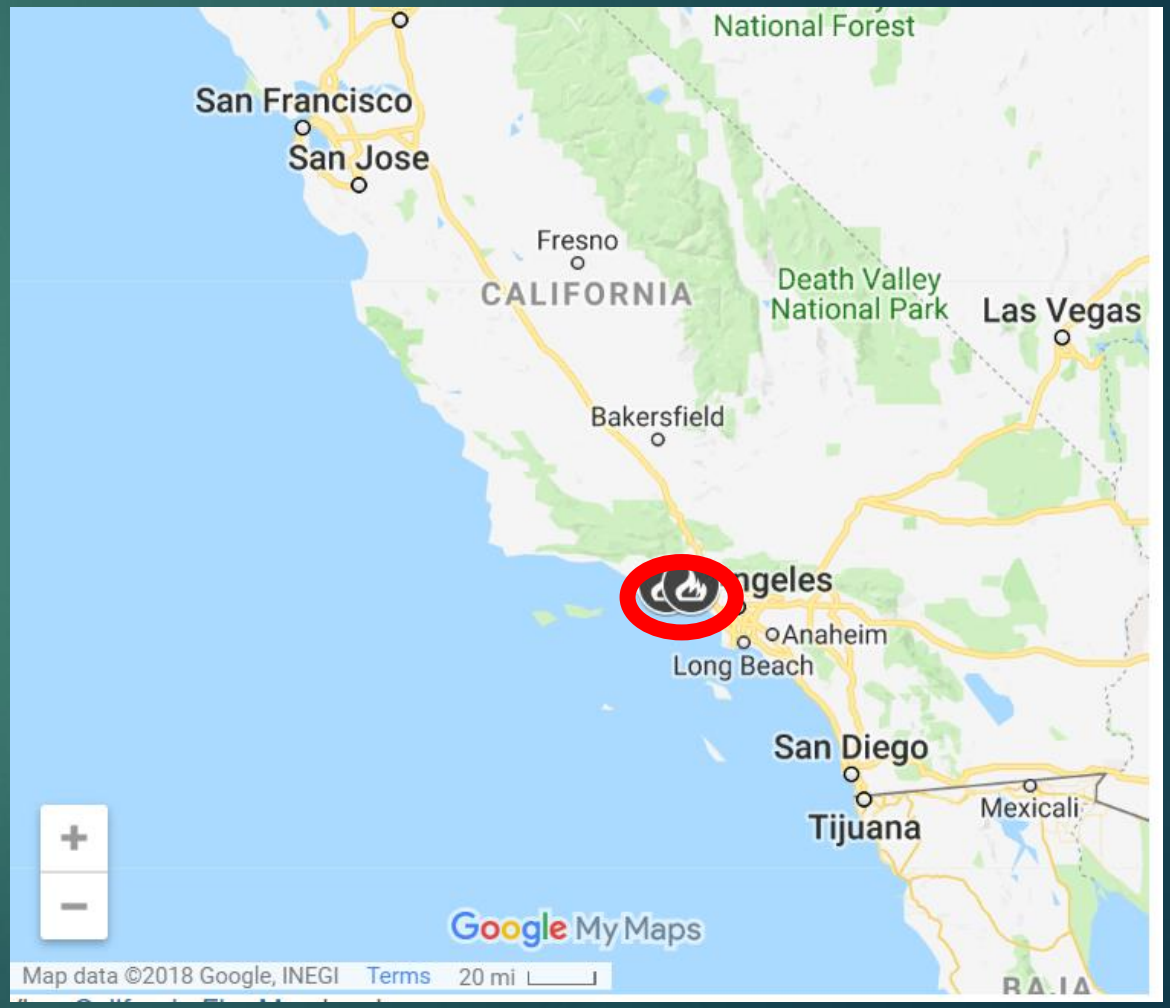


NBM v3.1 6-hour max Fosberg FWI



Woolsey Fire

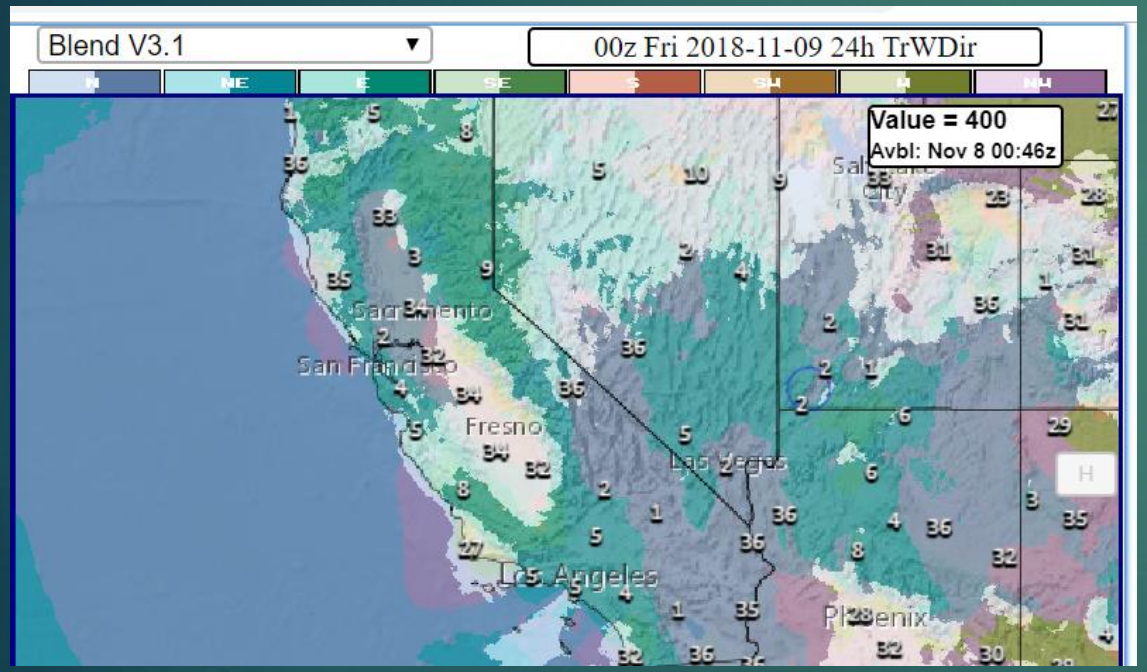
- November 8 – November 21, 2018
- Over 95,000 acres burned
- Fueled in part by Santa Ana winds
  - N or NE wind direction



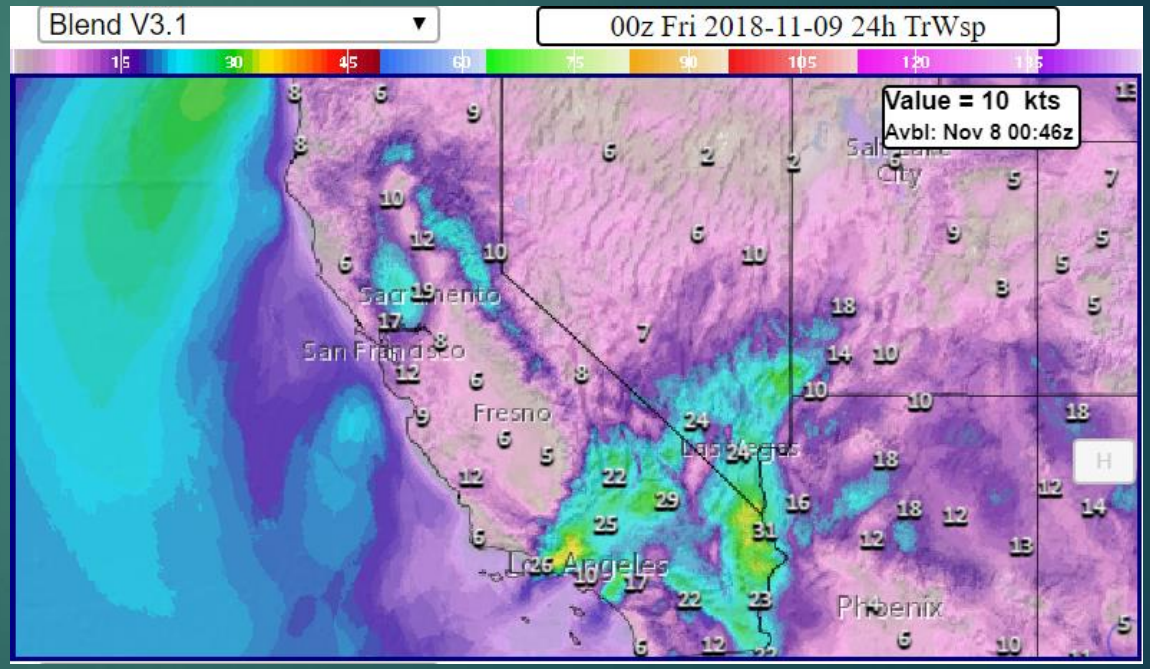
Map Source: Cal Fire

Woolsey Fire – Santa Ana winds

NBM v3.1 Transport Wind Direction



NBM v3.1 Transport Wind Speed



Additional developments for NBM v3.2

- More models added
  - HRRR, HRRR-Extended, RAP-Extended
  - WRF-ARW, WRF-MEM2, and NEMS-NMMB
  - ECMWFD and ECMWFE
- Downward Solar Radiation Flux (surface)
- Precipitation Duration

Questions?

Further information on the National Blend of Models can be found at:

https://www.weather.gov/mdl/nbm_home