





### **1-Introduction**

From the fall through spring, offshore winds, commonly referred to as "Santa Ana" winds, occur across southern California from Ventura County south to Baja California and west of the coastal mountains and passes. Each of these synoptically driven wind events vary in frequency, intensity, duration, and spatial coverage, thus making them difficult to categorize. Since fuel conditions tend to be driest from late September through the middle of November, Santa Ana winds occurring during this time have the greatest potential to produce large, devastating fires when an ignition occurs. Such catastrophic fires occurred in 2003, 2007, 2008, and 2014. Because of the destructive nature of such fires, there has been a growing desire to categorize Santa Ana wind events in much the same way that tropical cyclones and tornadoes have been categorized.



Major passes in southern California that favor Santa Ana winds. Zones were used in beta test product.



High resolution satellite image showing the fires that occurred across southern California in 2003

During the past three and a half years, the Forest Service (through Predictive Services) has collaborated with the San Diego Gas and Electric utility (SDG&E) and the University of California at Los Angeles (UCLA) to develop the Santa Ana Wildfire Threat Index (SAWTI), which categorizes Santa Ana wind events according to the potential for a large fire to occur. This unique approach addresses the main impact Santa Ana winds could have on the population of southern California beyond experiencing the casual effects of windy, dry weather.

# **Developing and Validating the Santa Ana Wildfire Threat Index**

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2-Methodology

- The SAWTI which predicts Large Fire Potential (LFP) during Santa Ana wind events, is informed by both weather and fuels information.
- We define LFP to be the likelihood of an ignition reaching or exceeding 250 acres or approximately 100 ha.
- For SAWTI, the following equation was formulated:

$$LFP = W_s^2 D_d FMC$$

Where  $W_s$  is the near surface wind speed,  $D_d$  is the near surface dew point depression, and FMC is the Fuel Moisture Component expressed by this equation:

$$FMC = \left\{ \left( \frac{DL}{LFM} - 1 \right) + G \right\}^{1.7}$$

Where DL is a Dryness Level index (a function of the Energy Release Component [ERC] and Dead Fuel Moisture [DFM]). LFM is the Live Fuel Moisture of Chamise (Adenostoma fasciculatum), and G is the green-up/curing of the annual grasses using the Normalized Difference Vegetation Index (NDVI).



# **3- Fuels**

Fuel moisture plays a critical role in the propagation of wildfires. FMC incorporates 3 kinds of fuel moisture (DFM, LFM, and G) because each component can be in phase or out of phase with each other.



Considering any one component alone may give a false representation of fuel moisture.



can be accessed at: **santaanawildfirethreat.com** 



The SAWTI shown on The Weather Channel (TWC) on the day of the press conference (September 17, 2014).



KUSI news in San Diego showing a direct link to the product on their main web page.



Google search provides a list of news articles on the release of the SAWTI



Map above depicts fire potential during the May 14, 2014 Santa Ana event. Colors represent the product of wind speed squared (mph) and the dew point depression (°F)





Used by fire agencies and the general public, the Santa Ana Wildfire Threat Index (SAWTI) was made publically available on September 17, 2014. The product

### **4- Operational SAWTI**

In 2013, the SAWTI was beta tested through a controlled release via a password protected website. On September 17, 2014, the USDA Forest Service conducted a press conference at which time the product was made publically available. Since then it has been featured on numerous southern California news stations and on The Weather Channel. When discussing upcoming Santa Ana wind events, The Weather Channel uses the SAWTI output.

## **5-APPLICATION**

SAWTI in beta test mode provided operational guidance during 13-14 May 2014

- Extreme weather and fuel conditions (map below left) were forecasted for this event up to 5 days in advance
- Multiple fires occurred over San Diego County on 13-14 May 2014



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