

## November outlook for haze over Indonesia

November 4, 2015

For more information, please contact Dr. Robert Field ([robert.field@columbia.edu](mailto:robert.field@columbia.edu))

The following is an interpretation of current [NOAA Climate Prediction Center GEFS](#) 2-week precipitation forecast amounts compared to the amounts that ended haze events in 2006 and 2014, using Central Kalimantan as a reference.

TRMM and GPM precipitation are available from available from [NASA GIOVANNI](#). Visibility reports are available from the [NOAA National Climatic Data Center Global Summary of Day](#). In Indonesia, airport visibility reports are an approximate indicator of haze severity.

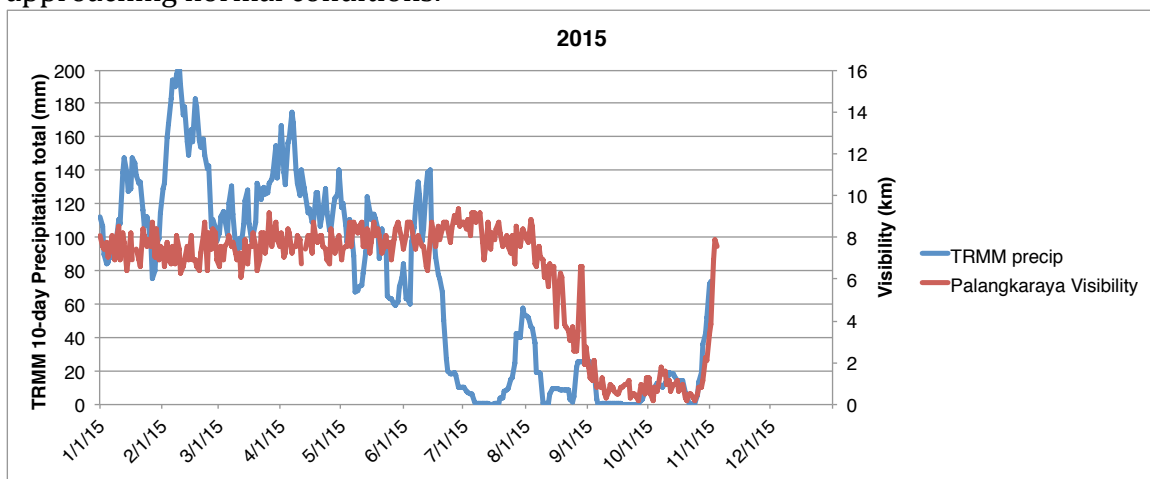
**Summary:** Based on recent precipitation patterns, current forecasts, and the requirement for at least 80mm of rain over a 10-day period,

- further severe fire and haze is unlikely in Kalimantan
- conditions will continue to improve in southern Sumatra for the next two weeks.

### Current conditions

Below is the 10-day 'back-total' GPM precipitation for 2015, averaged over 112E to 115E, 1S to 3S in Central Kalimantan, plotted with the visibility at Palangkaraya.

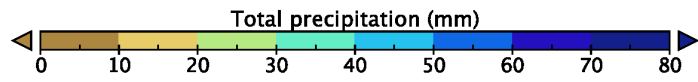
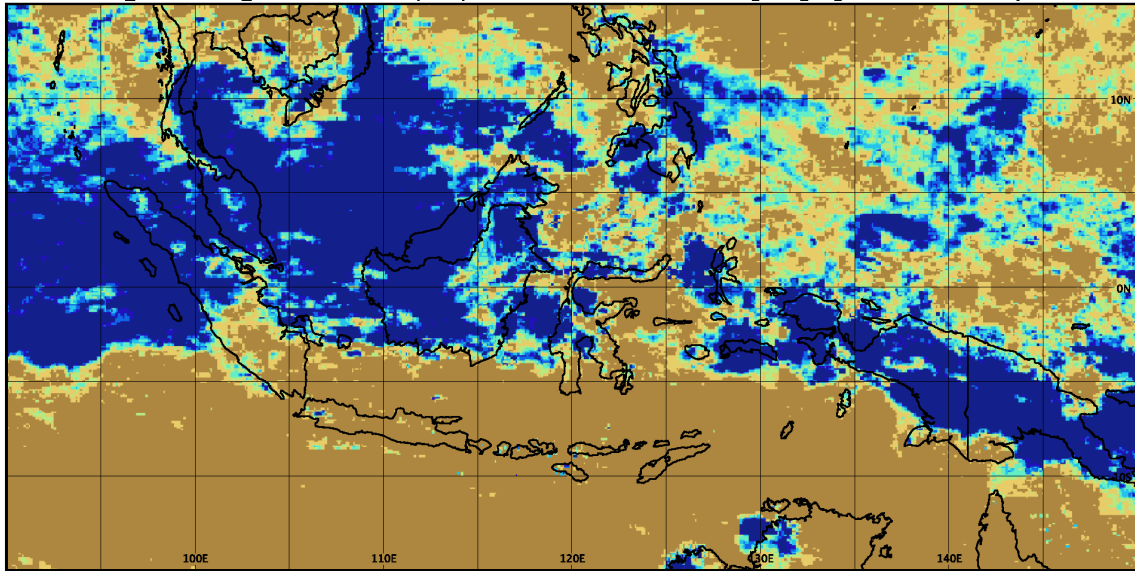
In 2015, drying began in late June, interrupted by substantial precipitation in late July. Visibility deteriorated over August, continuing through October in the absence of substantial precipitation. With recent rainfall in Kalimantan, visibility is approaching normal conditions.



Below is the total GPM precipitation from October 25 to November 3, 2015 across Indonesia. Over 80mm of precipitation fell during the past 10 days over parts of the main burning regions in Central Kalimantan. Fire activity has fallen and visibility has improved considerable. Some rain has fallen over East Kalimantan. Less rain has fallen over South Sumatra, but conditions there have begun to improve.

### GPM Precipitation, October 25 to November 3, 2015

GPM\_3IMERGHE\_03 Multi-satellite precipitation estimate with climatological gauge calibration - Early Run



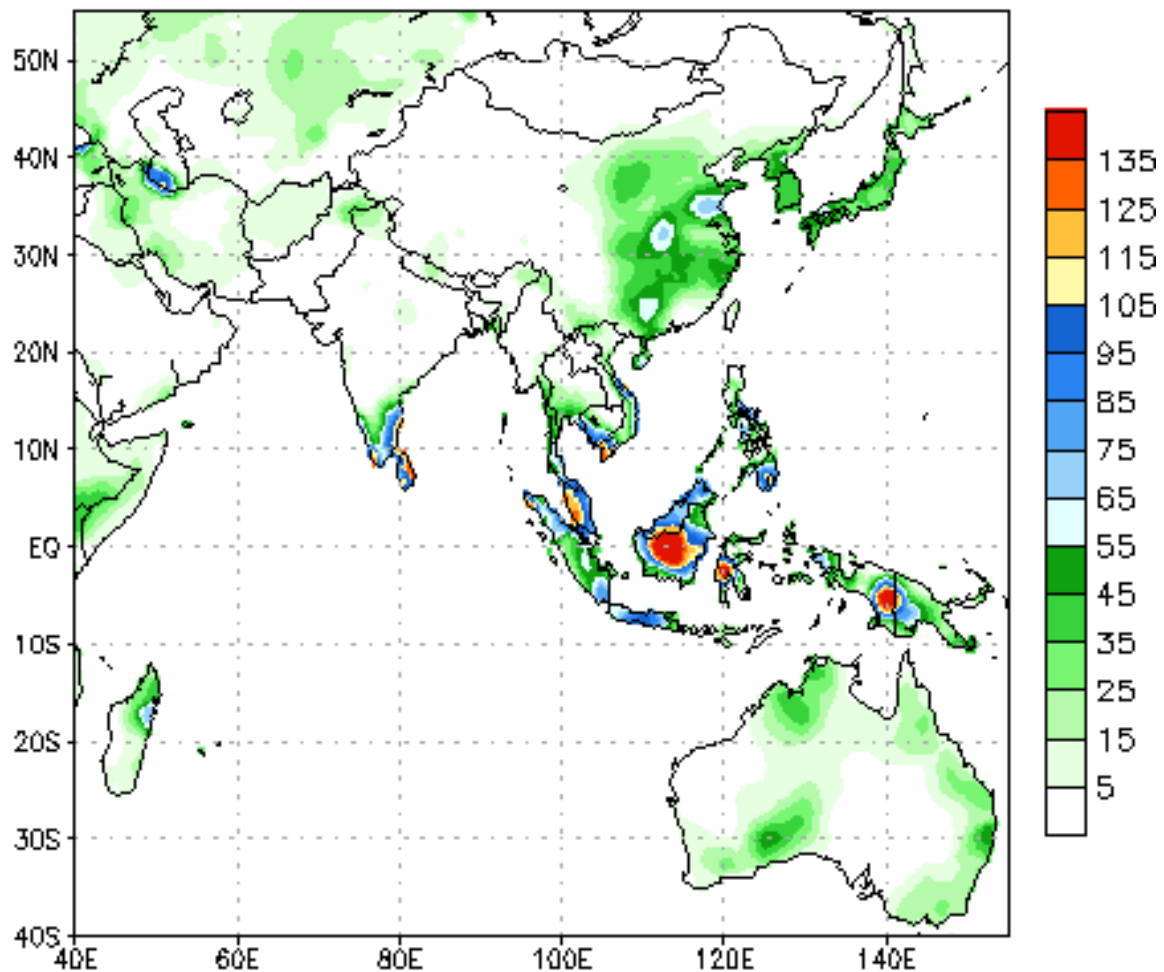
### Current outlook

Below are [NOAA Climate Prediction Center GEFS](#) forecasts for the next two weeks.

From November 4 to November 10, 2015, between over 100mm total precipitation is expected over the main burning regions of Kalimantan. Based on 2006 and 2014, this should end the fire and serious haze.

Between 50-100mm is now expected over southern Sumatra, during which time conditions should continue to improve.

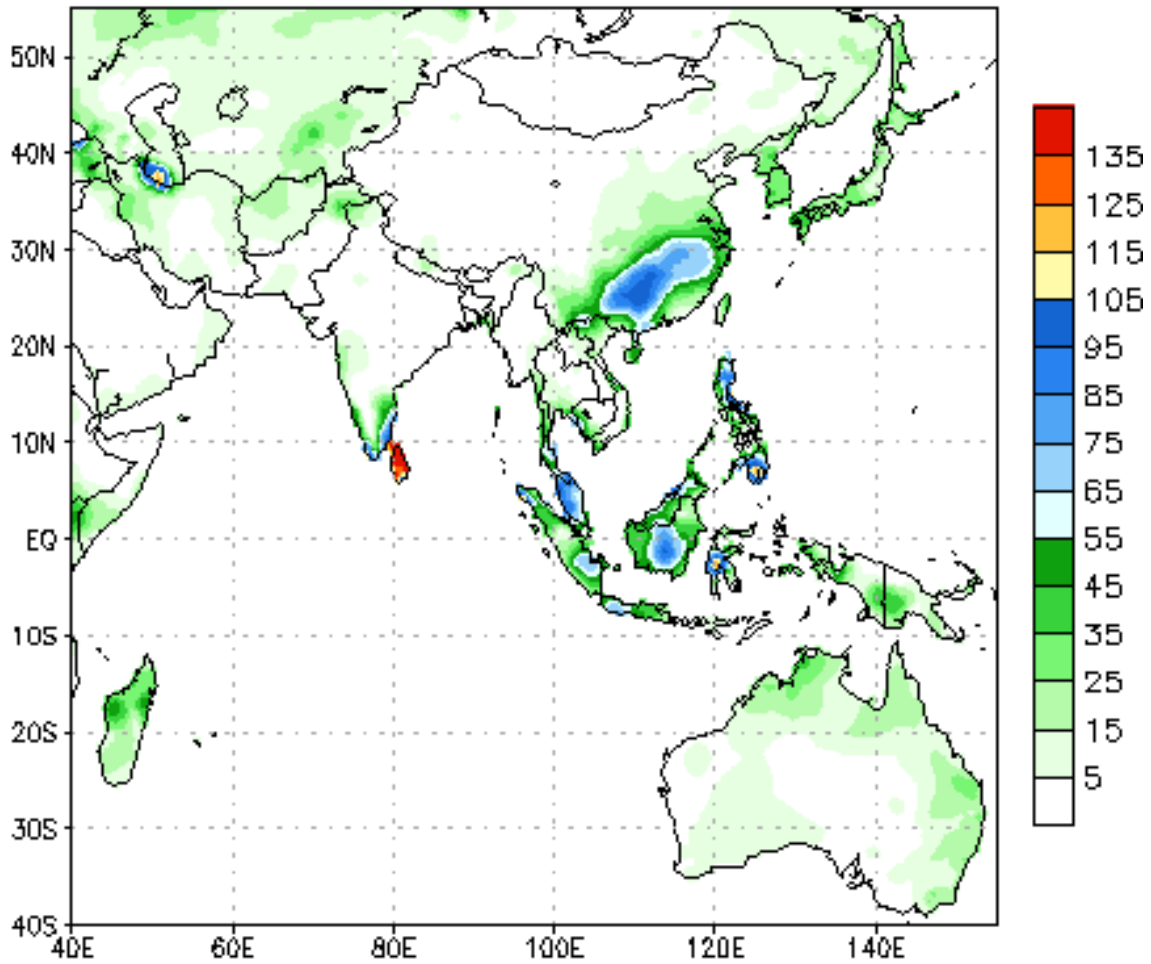
NCEP GFS Ensemble Forecast 1–7 Day Precipitation (mm)  
from: 04Nov2015  
04Nov2015–10Nov2015 Accumulation



Bias correction based on last 30-day forecast error

From November 11 to November 17, 50-100mm of precipitation is expected over the main burning regions of Sumatra and Kalimantan, which likely signals full monsoon onset.

NCEP GFS Ensemble Forecast 8-14 Day Precipitation (mm)  
from: 04Nov2015  
11Nov2015-17Nov2015 Accumulation



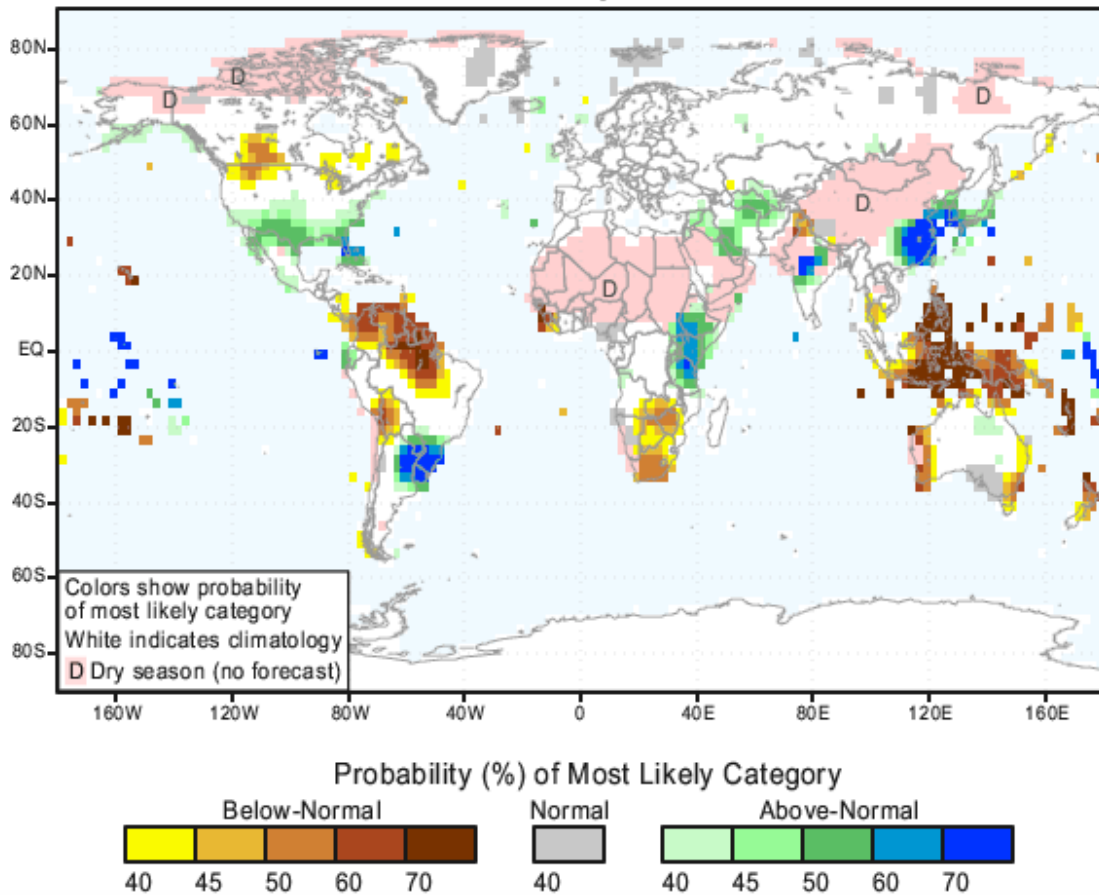
Bias correction based on last 30-day forecast error

## Outlook for 2016

Most current fire and haze is expected to end by mid-November of 2015. However, under sufficiently strong El Niño conditions, a localized drying can occur early in the following year in East and North Kalimantan, and Malaysian Borneo which is strong enough for severe burning to occur. This occurred in early 1983 and 1998 after the primary burning periods in 1982 and 1997, respectively.

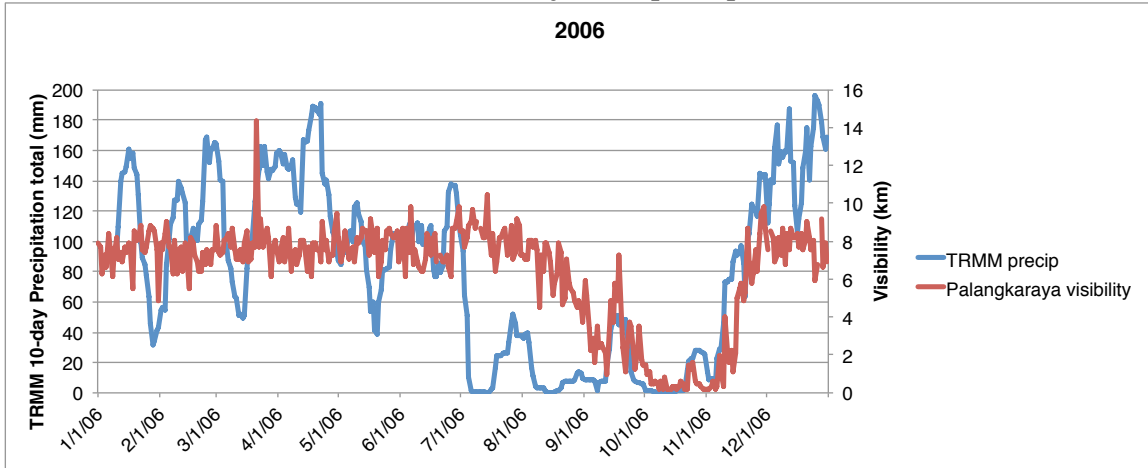
The [Columbia IRI](#) multi model forecast suggests the possibility of such an event in early 2016. Forecasts over those regions should continue to be monitored closely.

### IRI Multi-Model Probability Forecast for Precipitation for November-December-January 2016, Issued October 2015



## 2006 haze

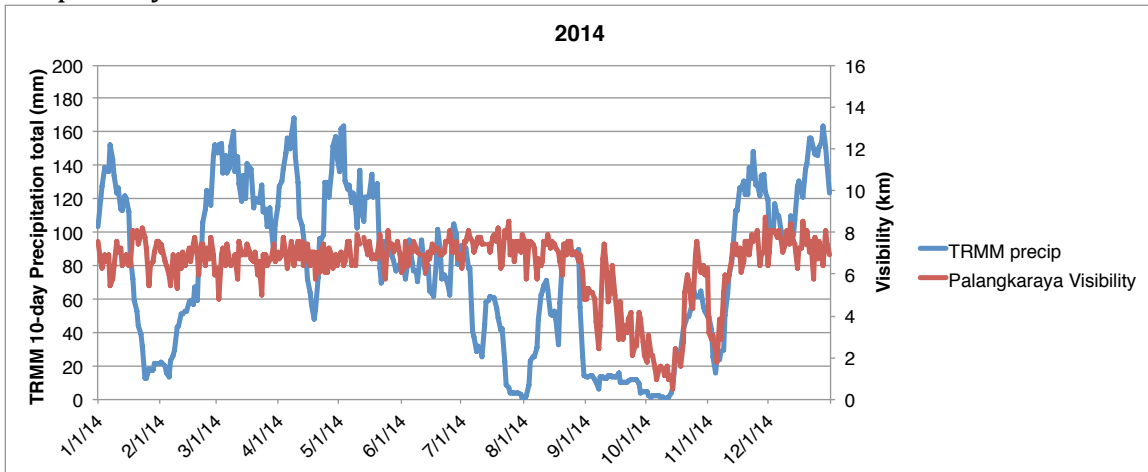
The 2006 haze began in August following below normal precipitation in July. There was significant rain in mid-September, but with increased fire and haze afterward. In late October, there were brief periods of rain, but followed by deteriorations in visibility, either due to continuation of burning and/or to the lingering haze not being removed by precipitation or wind. The full termination of the event was around November 14th when the **10-day total precipitation exceeded ~80mm**.



TRMM data are not available for 1997, but for reference, the deterioration in visibility began in late July and was much more rapid than 2006. The 1997 event ended in mid-November after precipitation comparable to 2006 with the return of the northeast monsoon.

## 2014 haze

In 2014, the haze began in late August. The full termination was when the 10-day, ~80mm total was reached, also in the second week of November. 2-weeks prior, there was significant (60mm over 10 days of rain) which reduced the haze, but which was followed by a brief dry period during which moderate haze returned temporarily.



Other stations near Palangkaraya show similar timing for 2006 and 2014.