

Haze and El Niño in Indonesia

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Haze and El Niño in Indonesia

Haze caused by burning peat forests in Indonesia kills an average of 110,000 people per year and up to 300,000 during el Niño events, while releasing hundreds of millions of tons of greenhouse gases into the atmosphere, warns a new report from Greenpeace.

In Riau's case, there is a lot of carbon that could be lost into the atmosphere: by one estimate, its peat soils store nearly 60 billion tons of carbon, or 40 percent of the total stored across Indonesia's peatlands. That represents more than a year of current global greenhouse gas emissions.

28th May 2014 / Rhett A. Butler

<http://news.mongabay.com/2014/05/indonesias-haze-from-forest-fires-kills-110000-people-per-year/>

To protect peatlands in Indonesia, it is important to understand severe peat fire weather conditions.

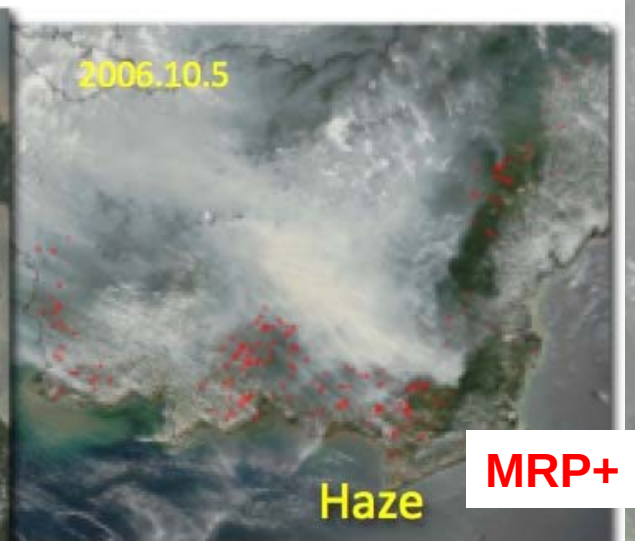
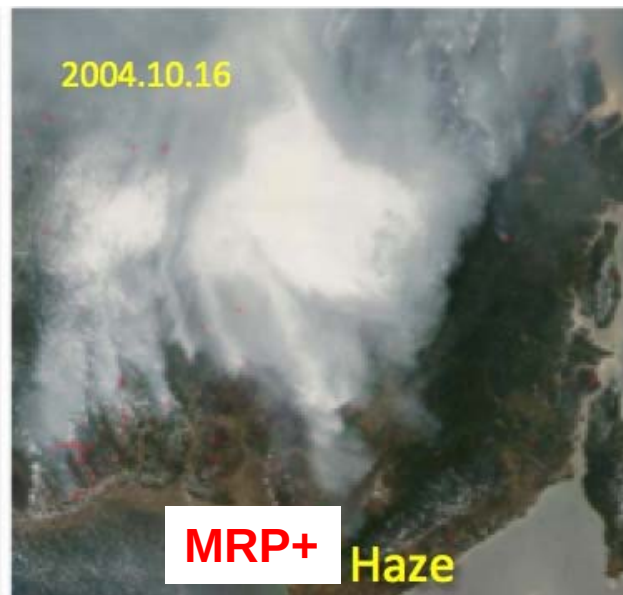
Recent Large Scale Wildland Fires in Kalimantan, Indonesia

2002

2004

2006

2009



Repeated severe fires every two years

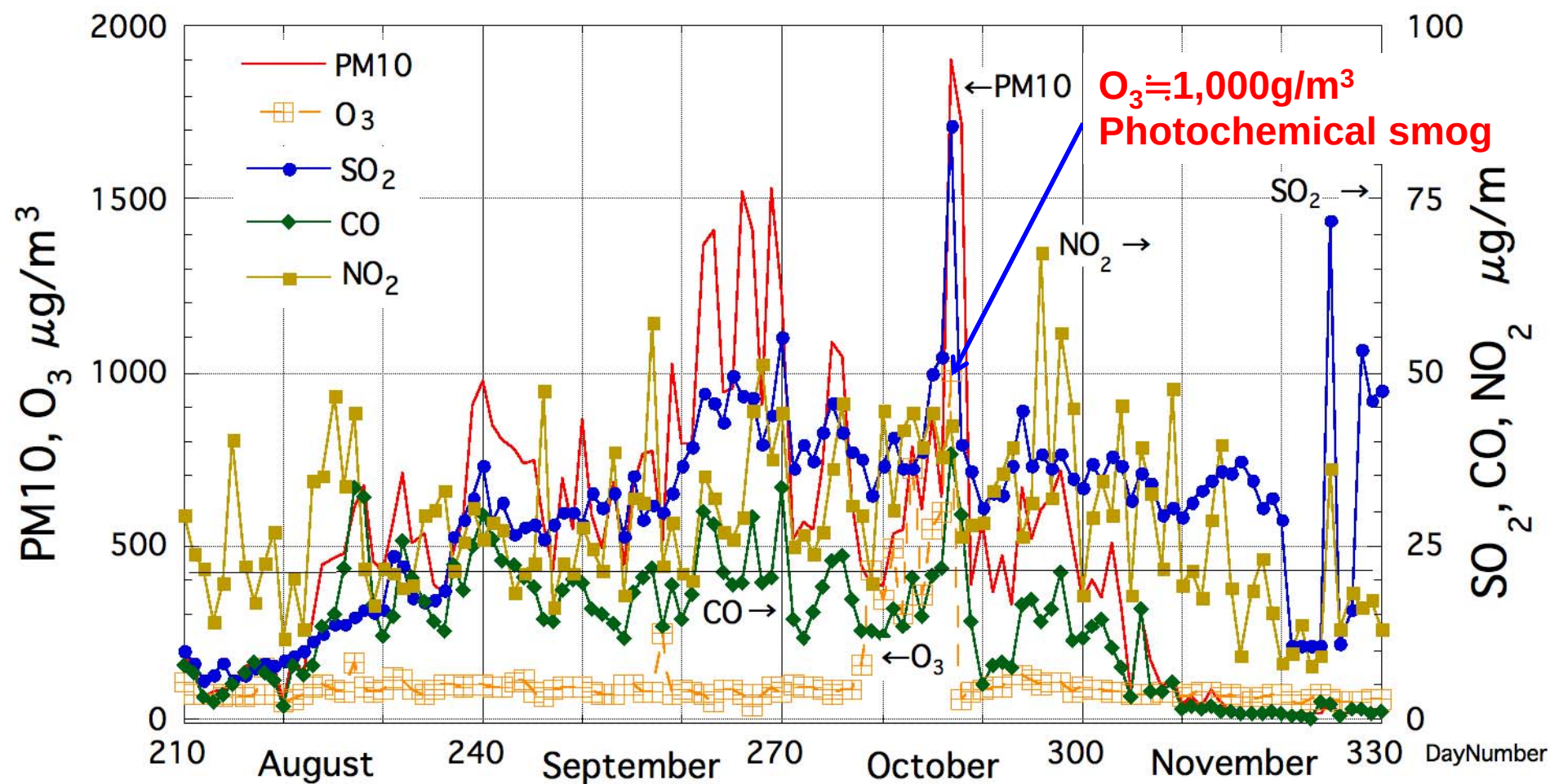


Air Pollution in Palangkaraya

Basic Knowledge



2002



PM10, SO₂, CO, O₃, and NO₂ in 2002



Peat-fire-related air pollution in Central Kalimantan, Indonesia

Hayasaka, H.; Noguchi, I.; Putra, E.I.; Yulianti, N.; Vadrevu, K.

Environmental Pollution, Volume(s) 195, 30-Jul-2014, Pages 257-266

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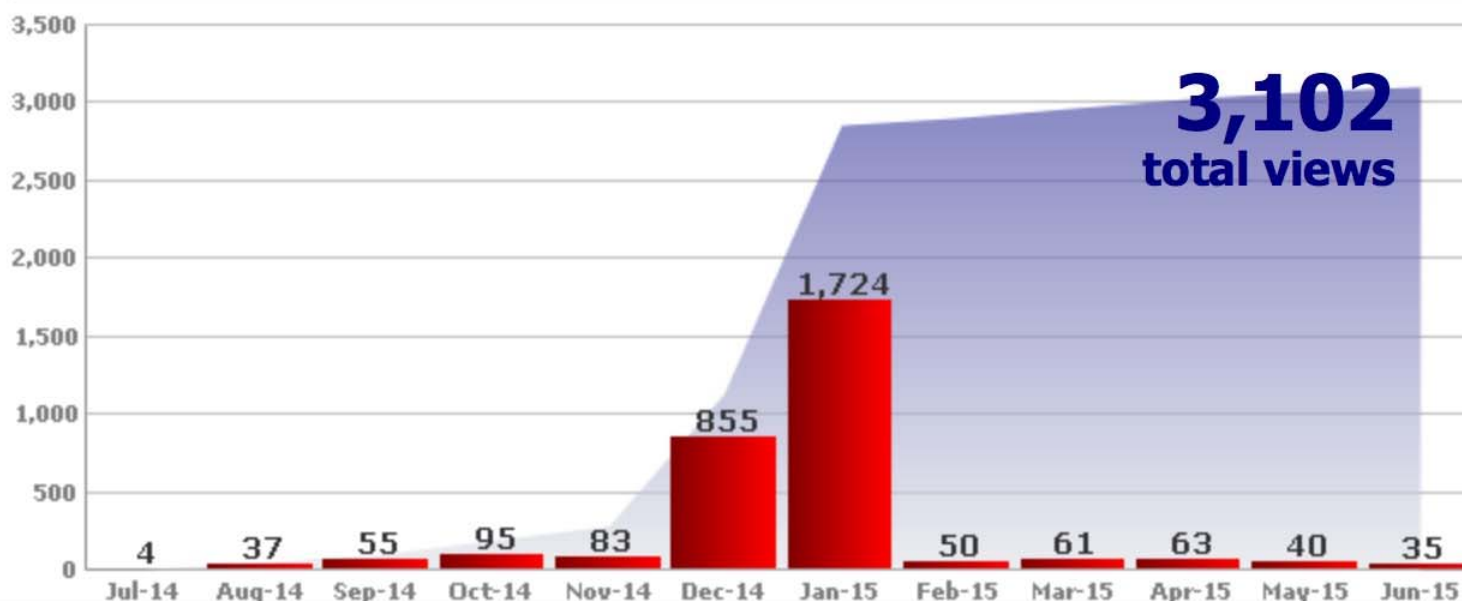
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Trend and cumulative views



Views



1 2

Top countries

Malaysia
Indonesia
Japan
China
Thailand

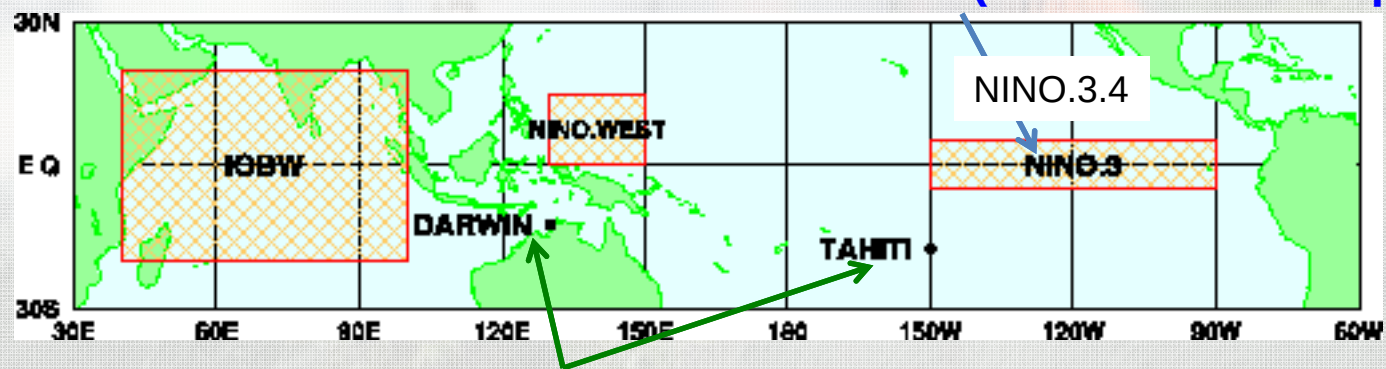
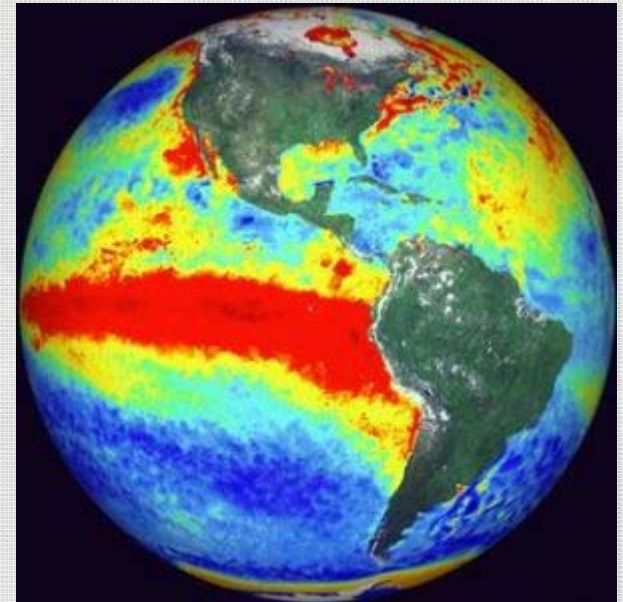
Corporate

Public ...
100%

El Niño Southern Oscillation (ENSO)

Reasons are still not clear.

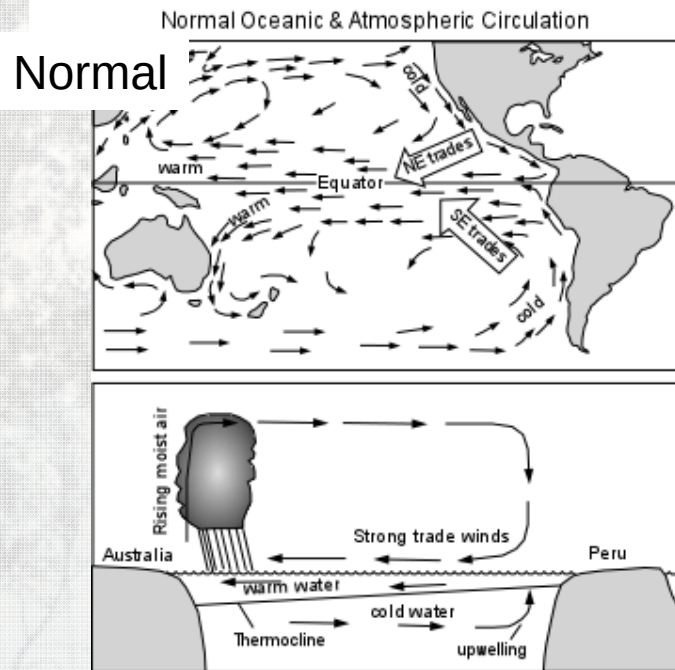
- It is a quasi-periodic climate pattern that occurs across the tropical Pacific Ocean almost every 6 years. (Range is 3-8 years)
- “Oscillation” refers to the variations in the temperature of the tropical eastern Pacific Ocean (the phenomenon of warming and cooling are “**El Niño**” and “La Niña”) and in air pressure in the tropical Western Pacific.
- “**El Niño**” term is used because the effects of the warming are noticed usually around Christmas in South America (“El Niño” means “the little boy”, referring to Jesus Christ birth).



SST (Sea Surface Temp.)

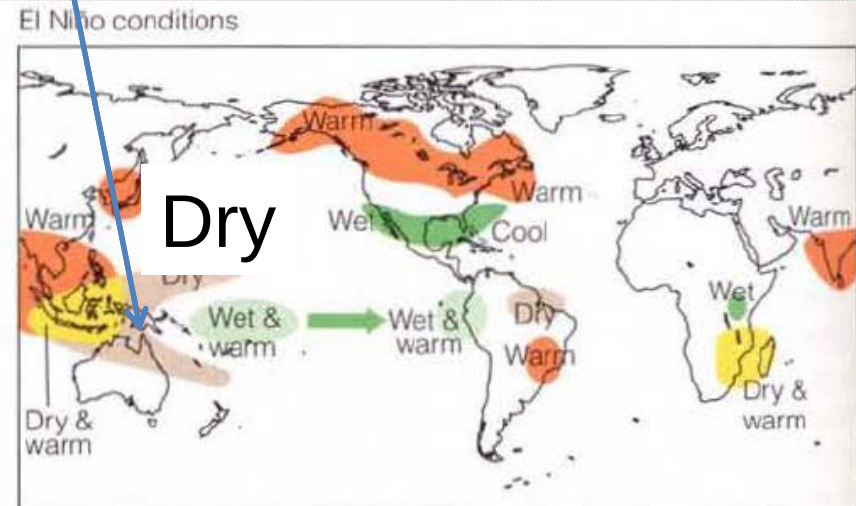
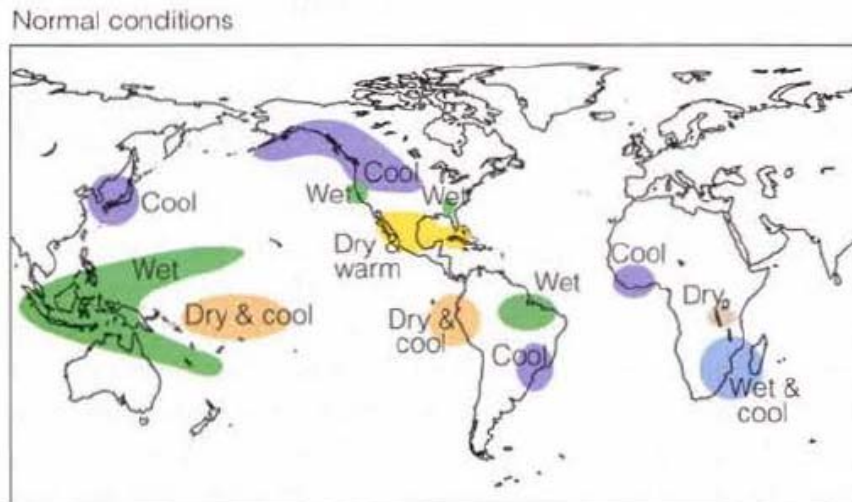
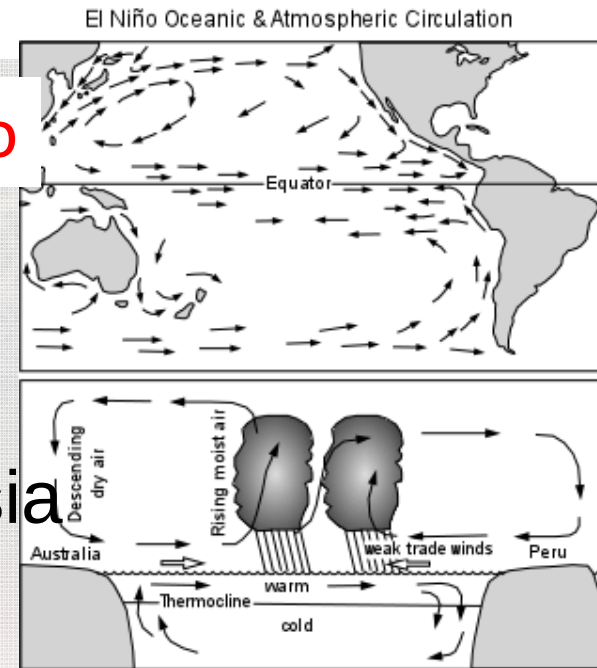
SOI (Southern Oscillation Index: Sea Level Pressure)

Global Impacts of El Niño

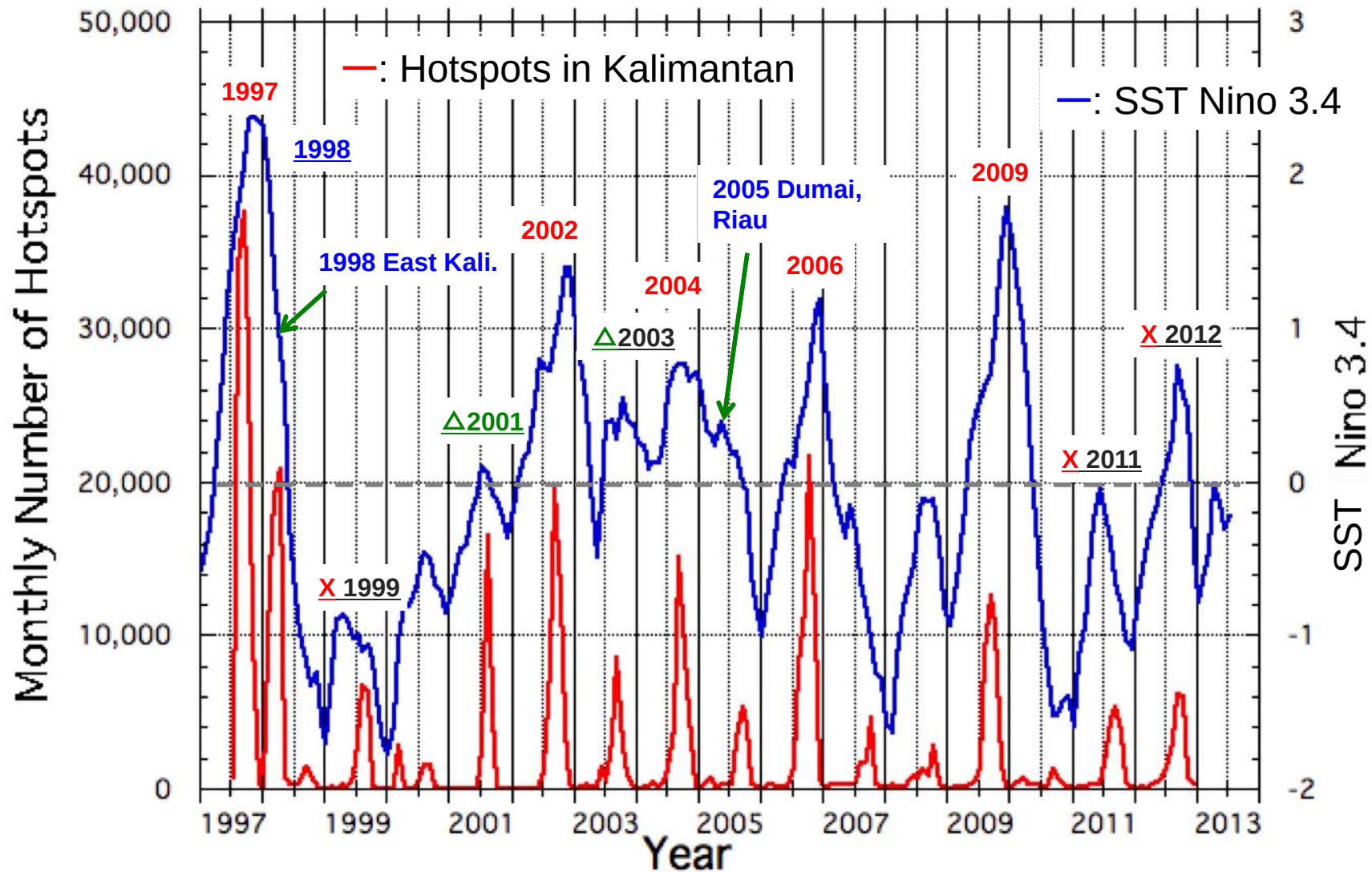


El Niño

Indonesia

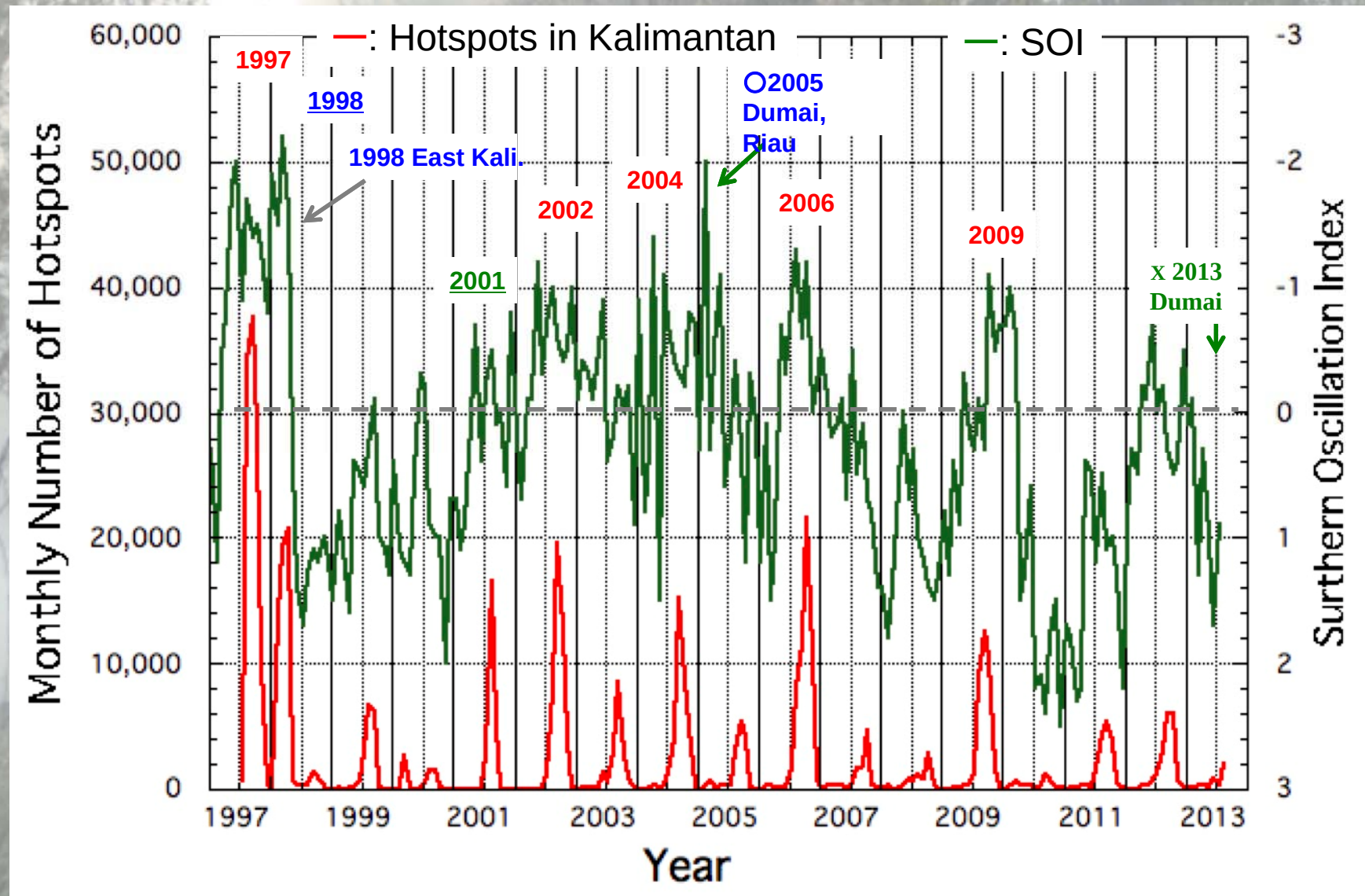


Fire Occurrence and El Nino (SST Anomalies : Nino 3.4)



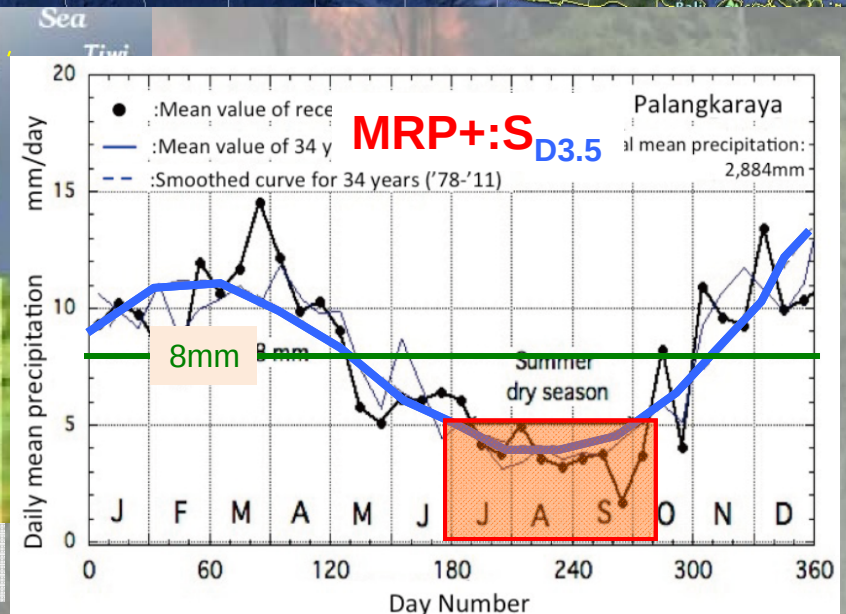
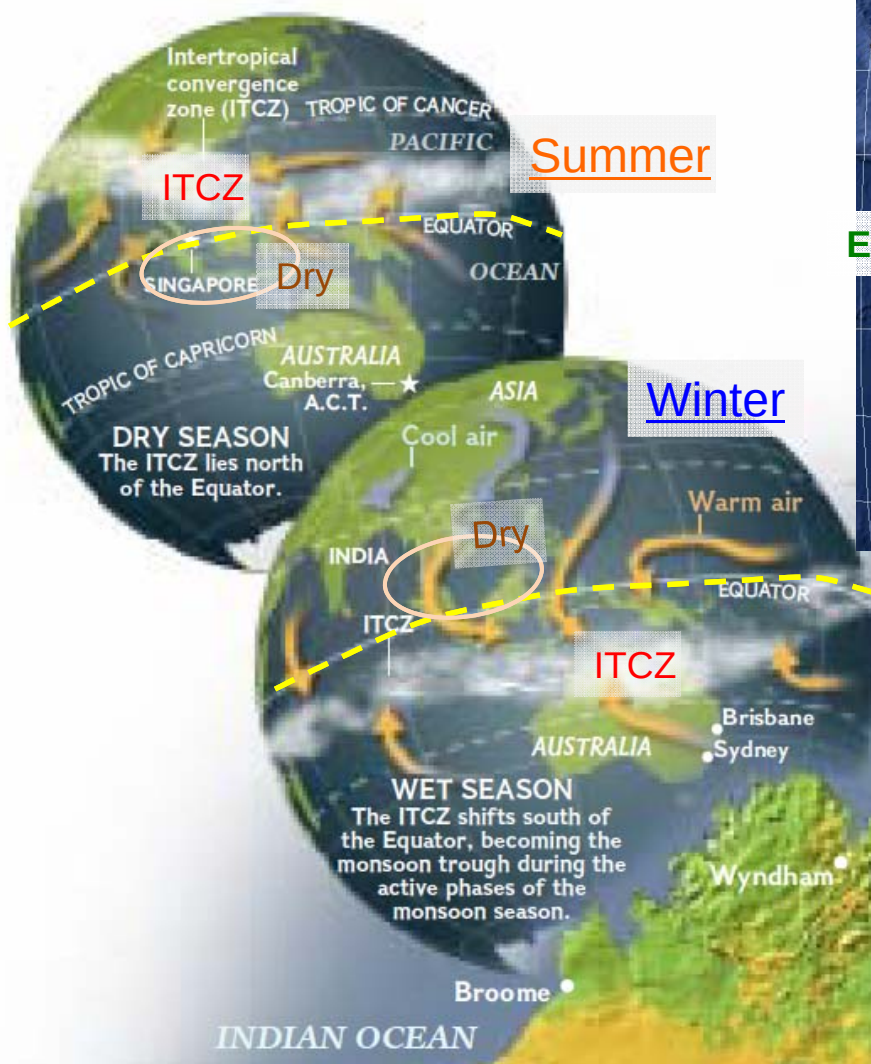
Fire Occurrence and SOI

SOI (Southern Oscillation Index: Sea Level Pressure)



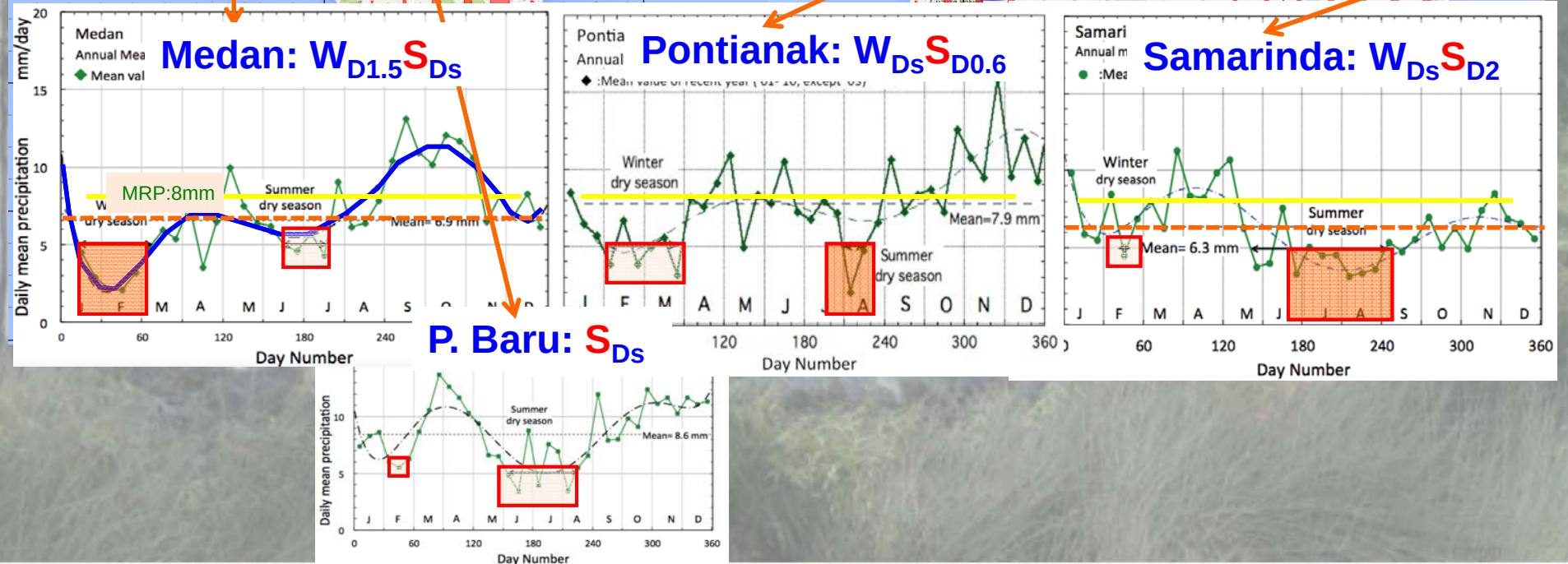
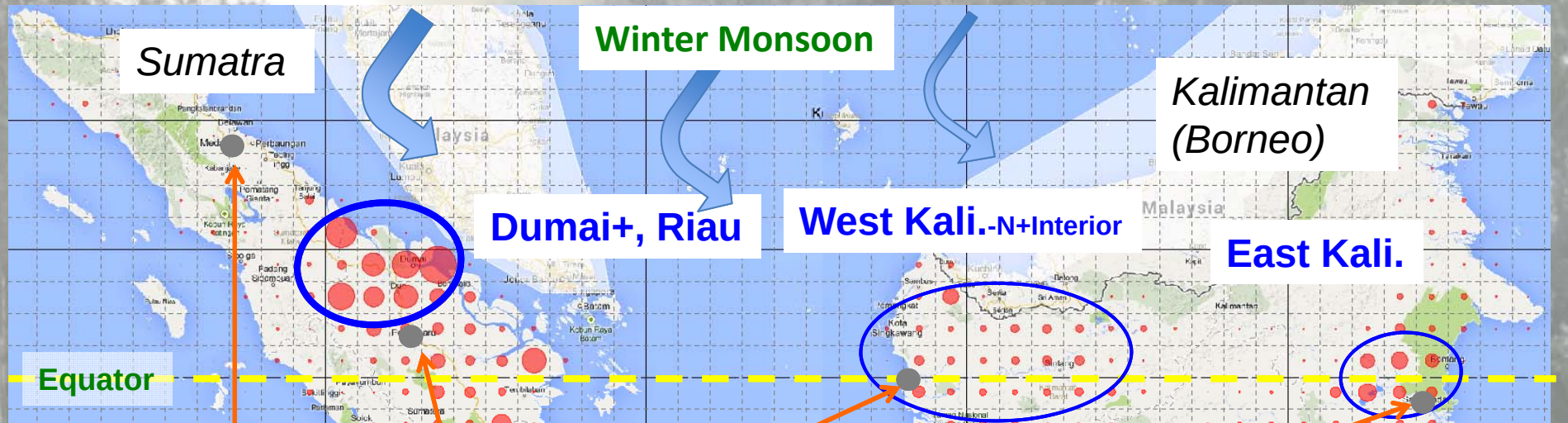
Monsoon, ITCZ, Precipitation Pattern

$S_{D1}W_{D2}$ (S: Sumer fire, W: Winter fire, D: Dry season, 1,2:Month)

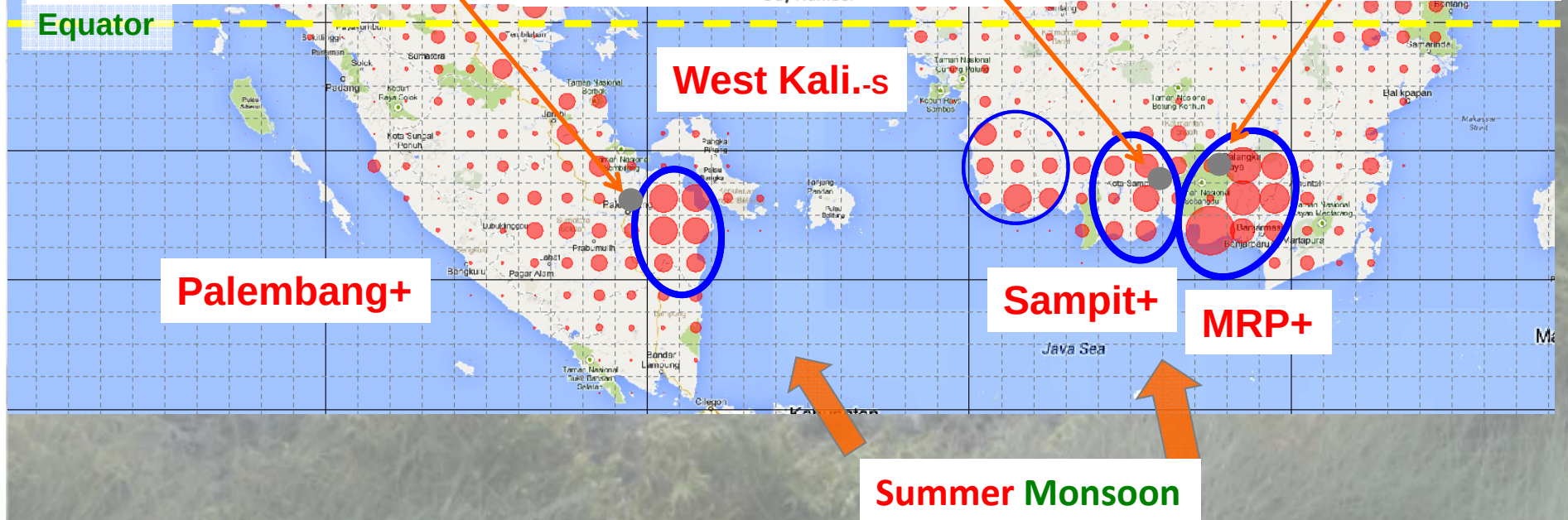
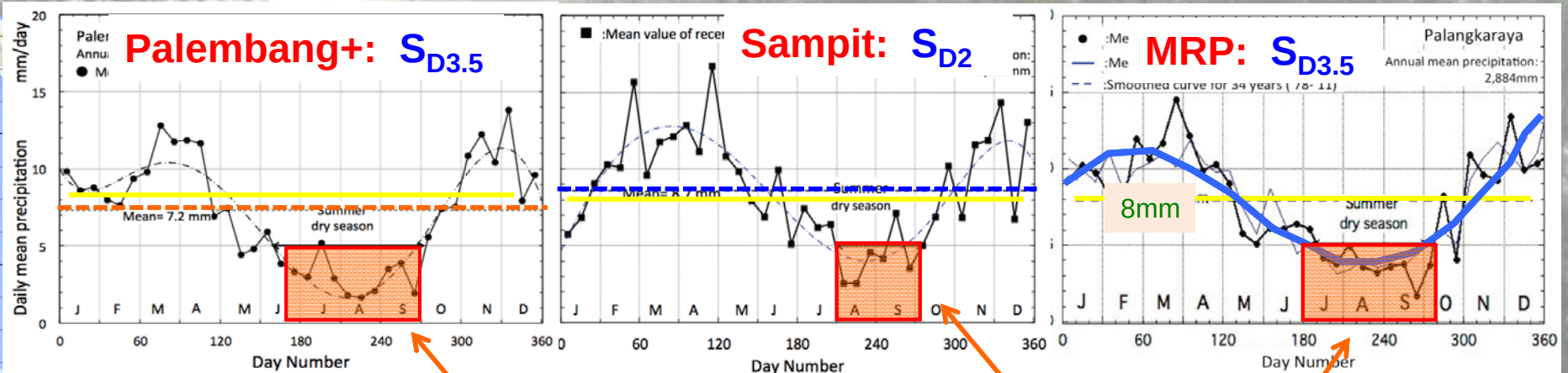


ITCZ: The Inter-Tropical Convergence Zone

Winter Fire Areas in the Northern Hemisphere

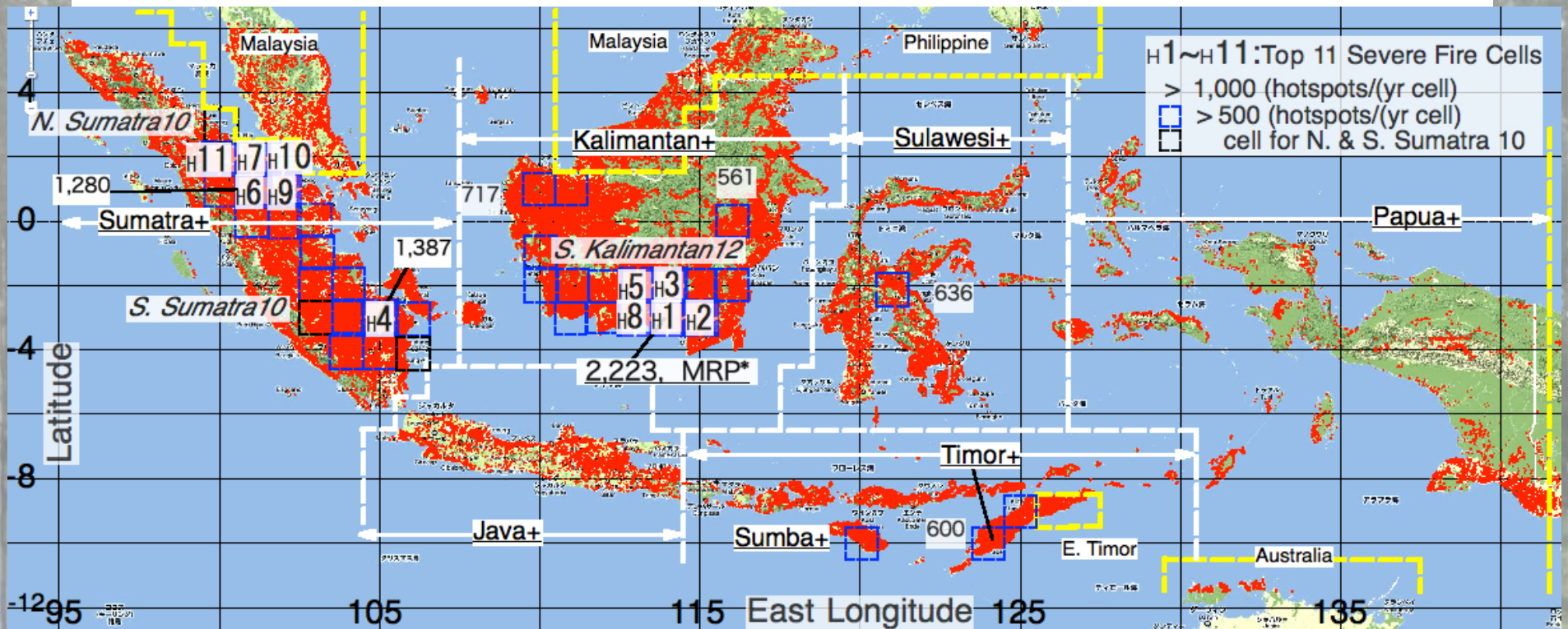


Summer Fire Areas in the Southern Hemisphere



Result : Hotspot Distribution (1 x 1 Deg. Grid)

High Hotspot Areas in Indonesia Recent Ten Years (2002-2011)



6 regions:

Sumatra+, Kalimantan+
Java+, Sumba+ & Timor+
Sulawesi+, Papua+

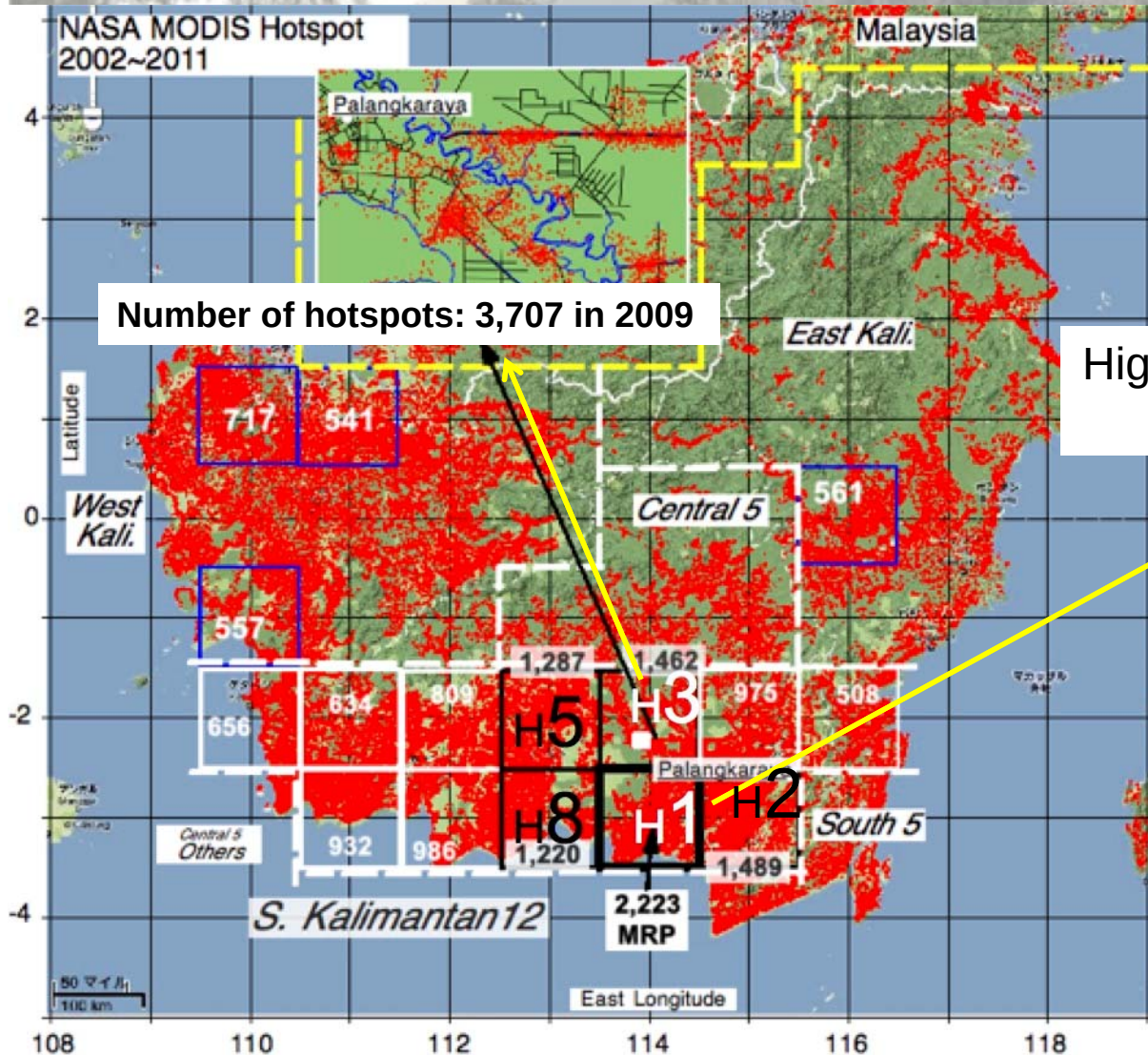
MRP*



Highest number of hotspots: 2,223/yr.
Hotspot density: 0.182 fires/(km²·yr.)
Grid center: S -3, E 114

Result : Hotspot Distribution in Kalimantan (1 x 1 Deg. Grid)

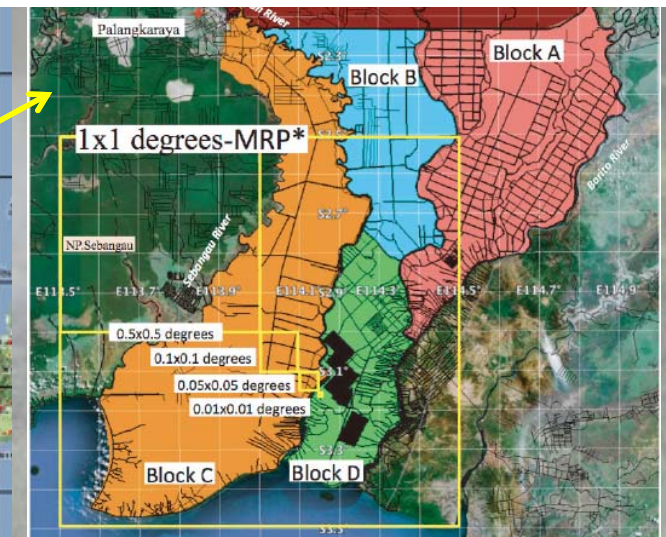
Hotspot Distribution and 5 Highest Hotspot Areas in Kalimantan



5 regions:

S. Kalimantan12
West & East Kali.
Central 5
South 5

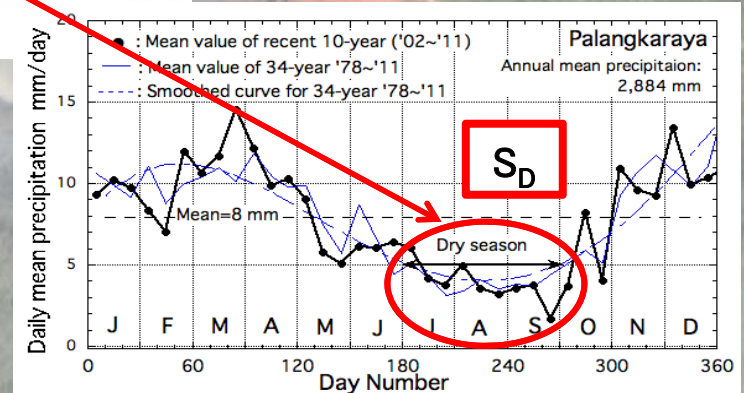
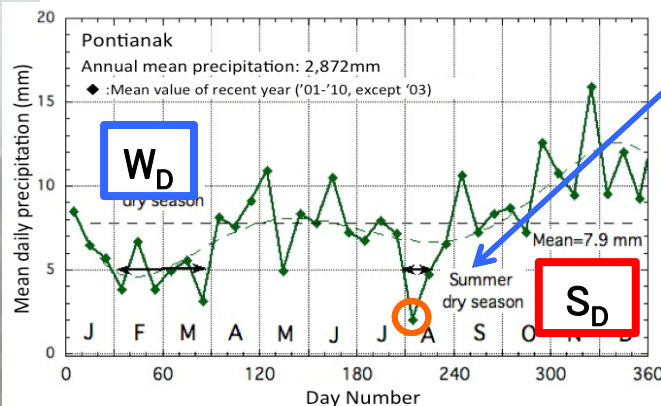
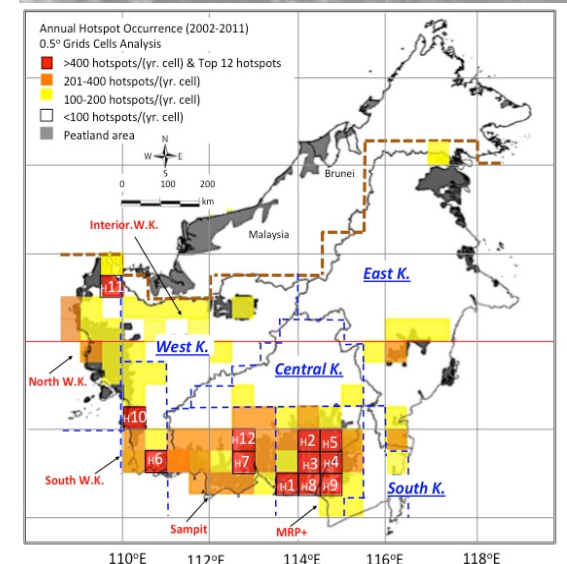
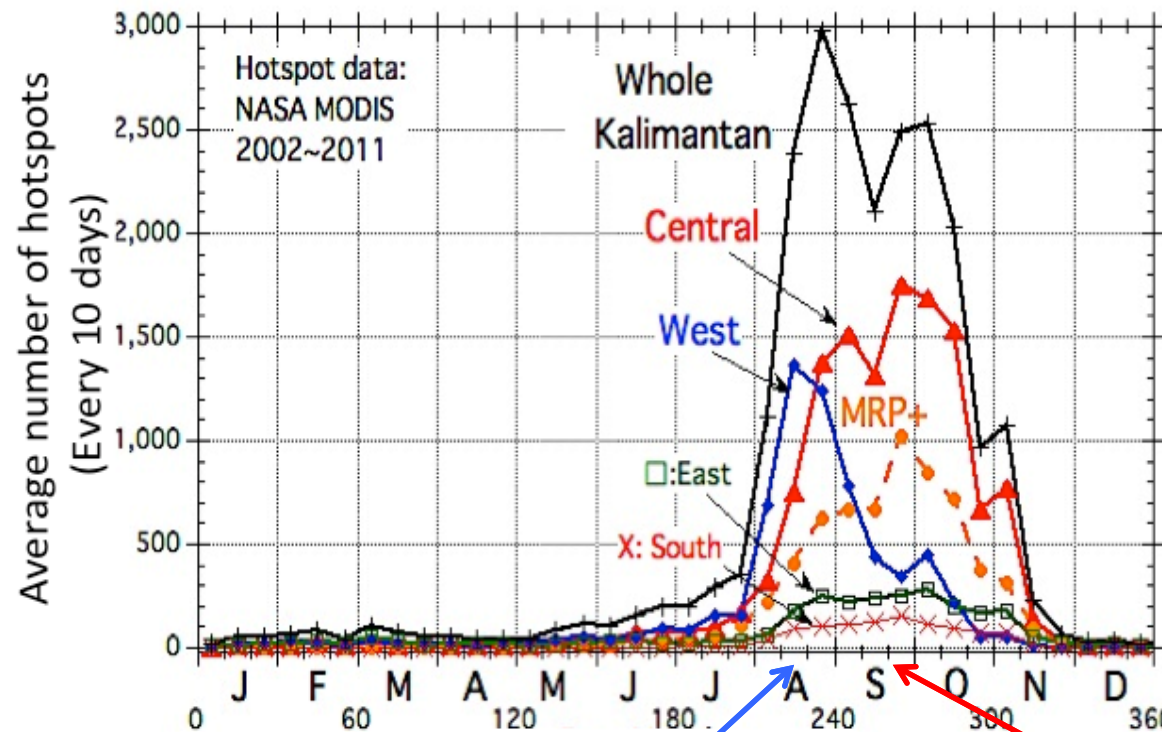
Highest number of hotspots: 5,382
in 2006



H1: Highest Hotspot Density Area

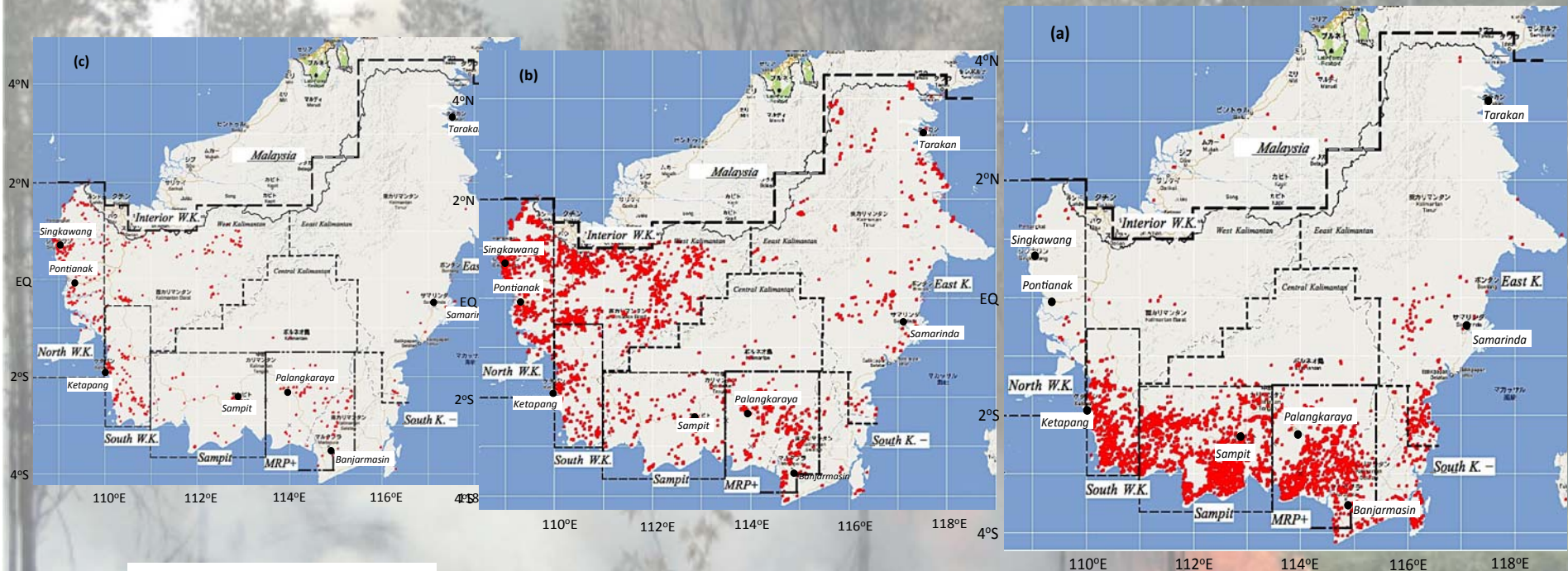
Result : Fire Season in Kalimantan (0.5 x 0.5 Deg. Grid, 10-day Analysis)

Average Seasonal (Every-10 day) Fire Occurrence in Kalimantan



Result 8 : Fire Occurrence in Kalimantan (0.5 x 0.5 Deg. Grid, 10-day Analysis)

Fire Starts from North W.K.



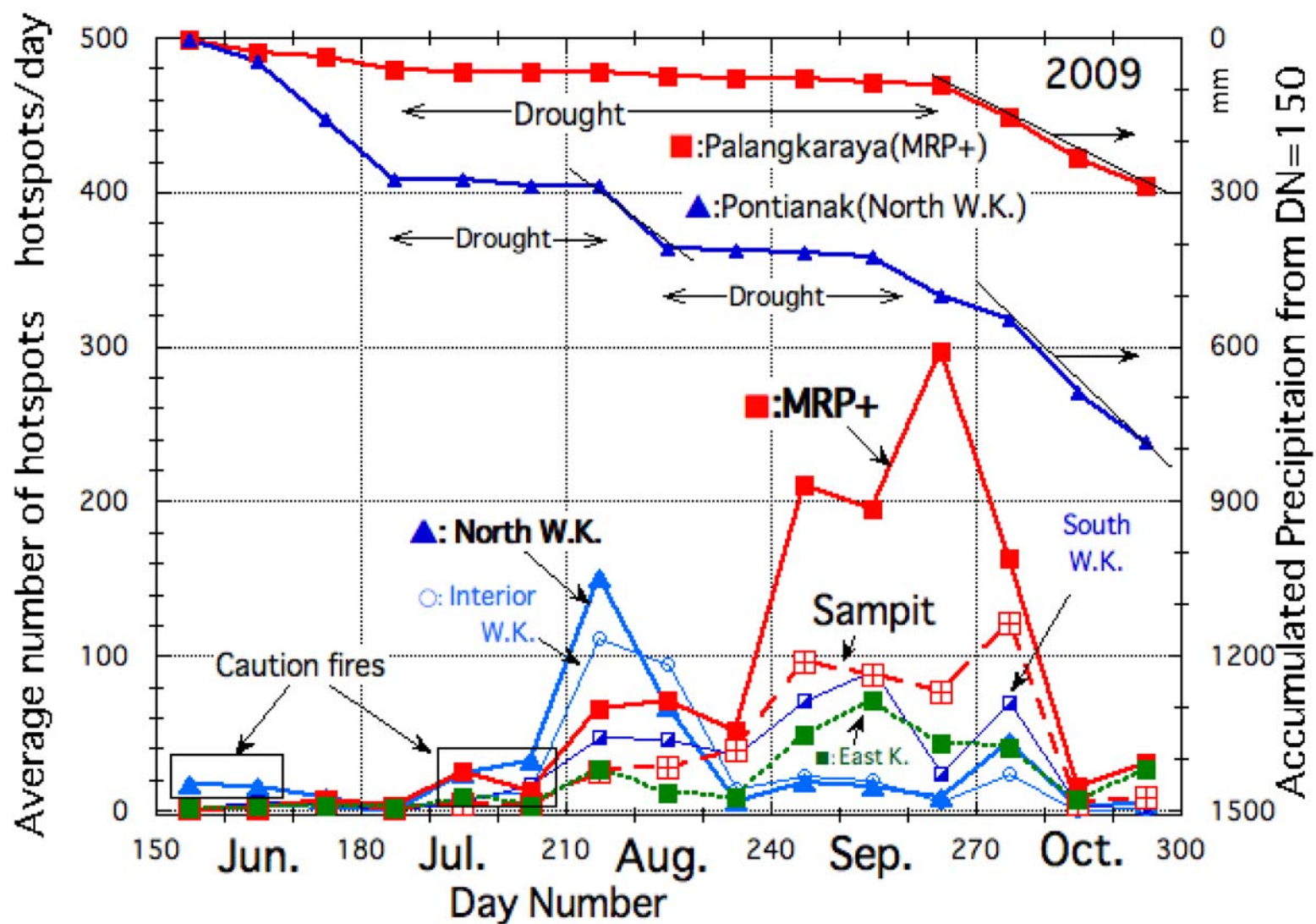
Pre-dry season
(warning) fire
distribution
in late July
(2009)

West Kalimantan
fire distribution
in early August
(2009)

Severe fire distribution
in mid October (2006)

Kalimantan fire belt located in the
southern coastal peatlands from West to
Central Kalimantan

2009 Seasonal (Every-10 day) Fire Occurrence in Kalimantan



Effective Firebreak— Ditch & Clear-Cut Saved Dr. Aswin's Camp



MRP+

2009 Severe Surface Fires

Strong surface fire occurred due to Pyrophyte vegetation?

Purun, Hawuk, Karakai, Gakugan, Tsumi, Fern and etc.

Fire line with a deep ditch

Deep ditch was proven effective for fire.



Deep and wide!



Conclusions

MODIS hotspot data of recent years showed recent most fire prone areas in Indonesia and their relation with weather conditions (dry seasons).

1. Two areas in both Kalimantan and Sumatra.

2. They were: **MRP** and **Sampit** area in Central Kalimantan, **Dumai, Riau** area in N. Sumatra, and **Palembang** area in S. Sumatra

3. Worst place was **MRP** area due to dried peat made during its longer summer dry season (S_{D3}).

4. **SOI** is useful index to forecast sever dry season under El Nino conditions.

5. **Precaution or warning fires** in West Kalimantan should be used smartly to reduce fires or haze in MRP area of Central Kalimantan.