Aerosol Study from Jambi Forest Fire

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Indonesia

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Outline of Presentation

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* Land Use and Land cover change in Jambi
* History of Fire episode in Jambi 2005 – 2014
* Forest Fire in Jambi and Climate (El Nino)
* October 2014 Fire episode in Jambi, particulate and aerosol characters and chemistry
* Forest Fire Danger Rating System product of BMKG
* Conclusions

Land Cover Jambi Province 1993

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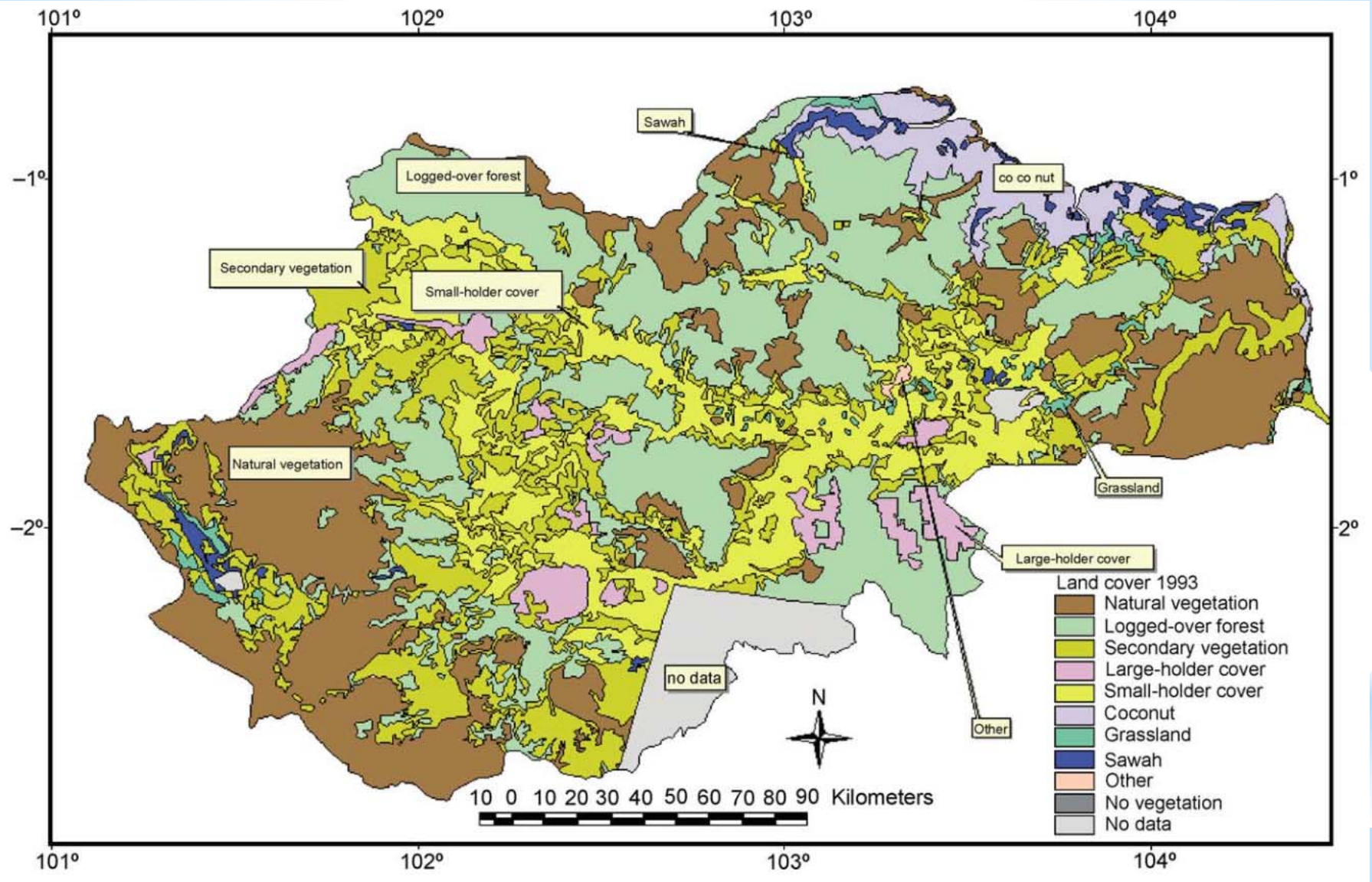
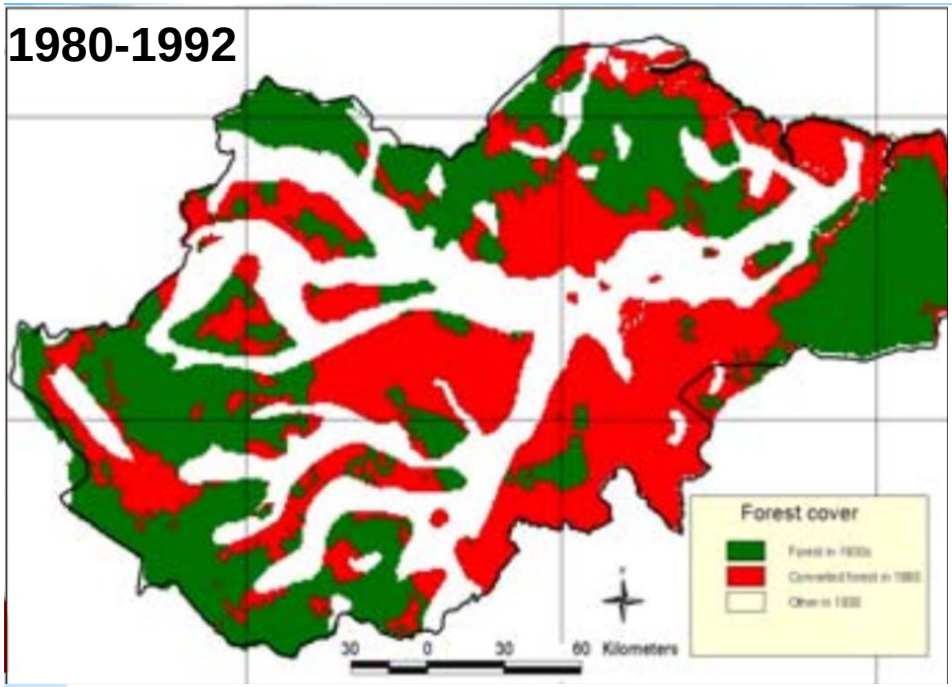


F. Stolle , K.M. Chomitz, E.F. Lambin, T.P. Tomich, 2003, **Land use and vegetation fires in Jambi Province, Sumatra, Indonesia** Forest Ecology and Management, Volume 179, Issues 1–3, 3 July 2003, Pages 277–292

1980-1992



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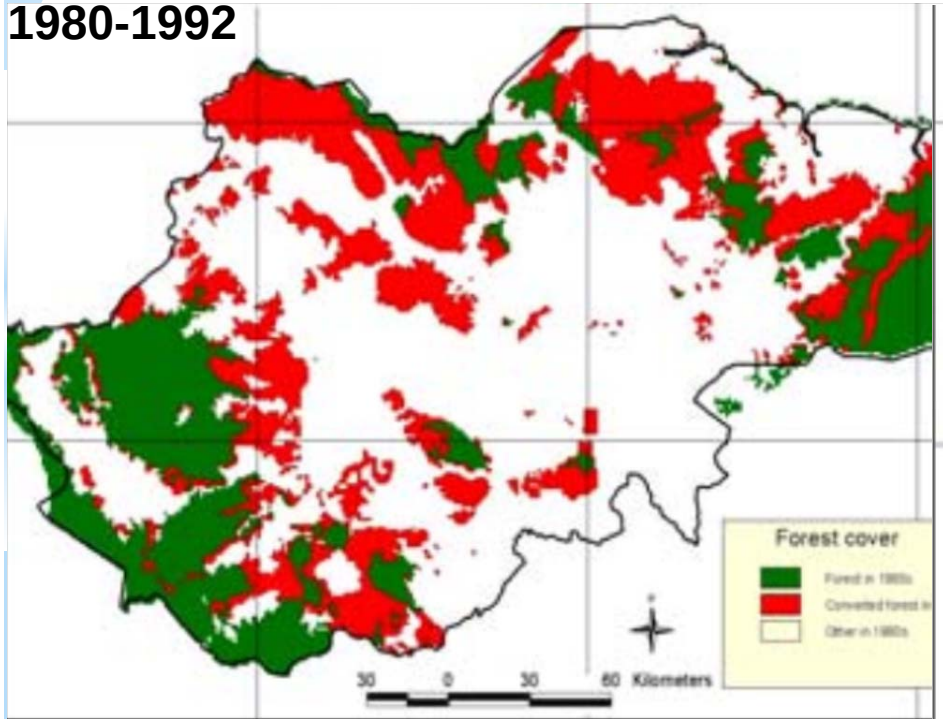
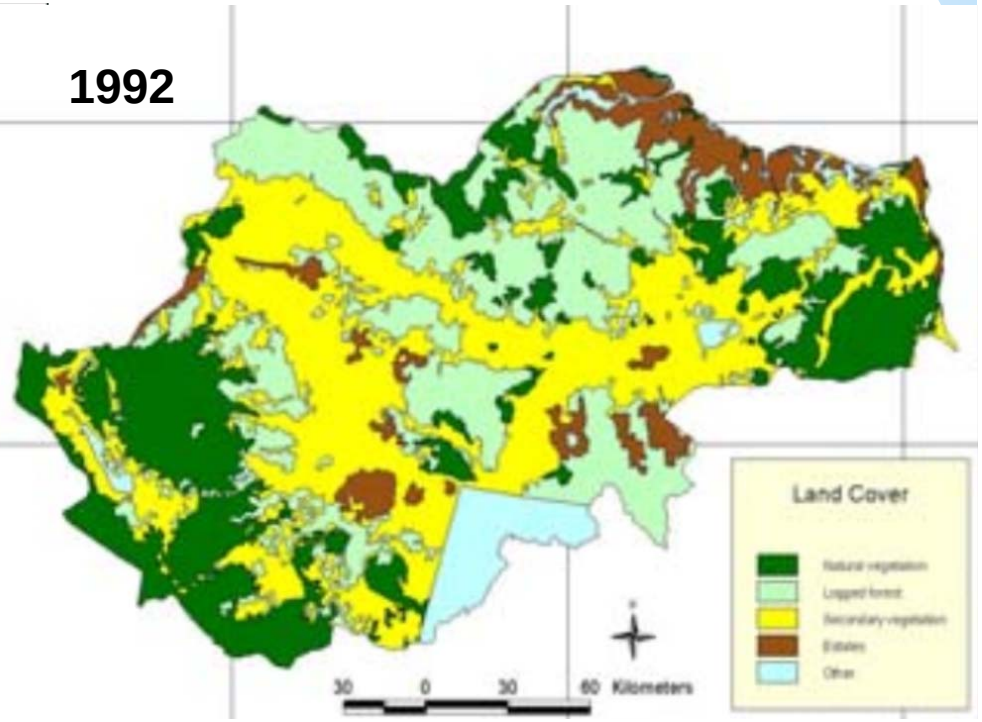
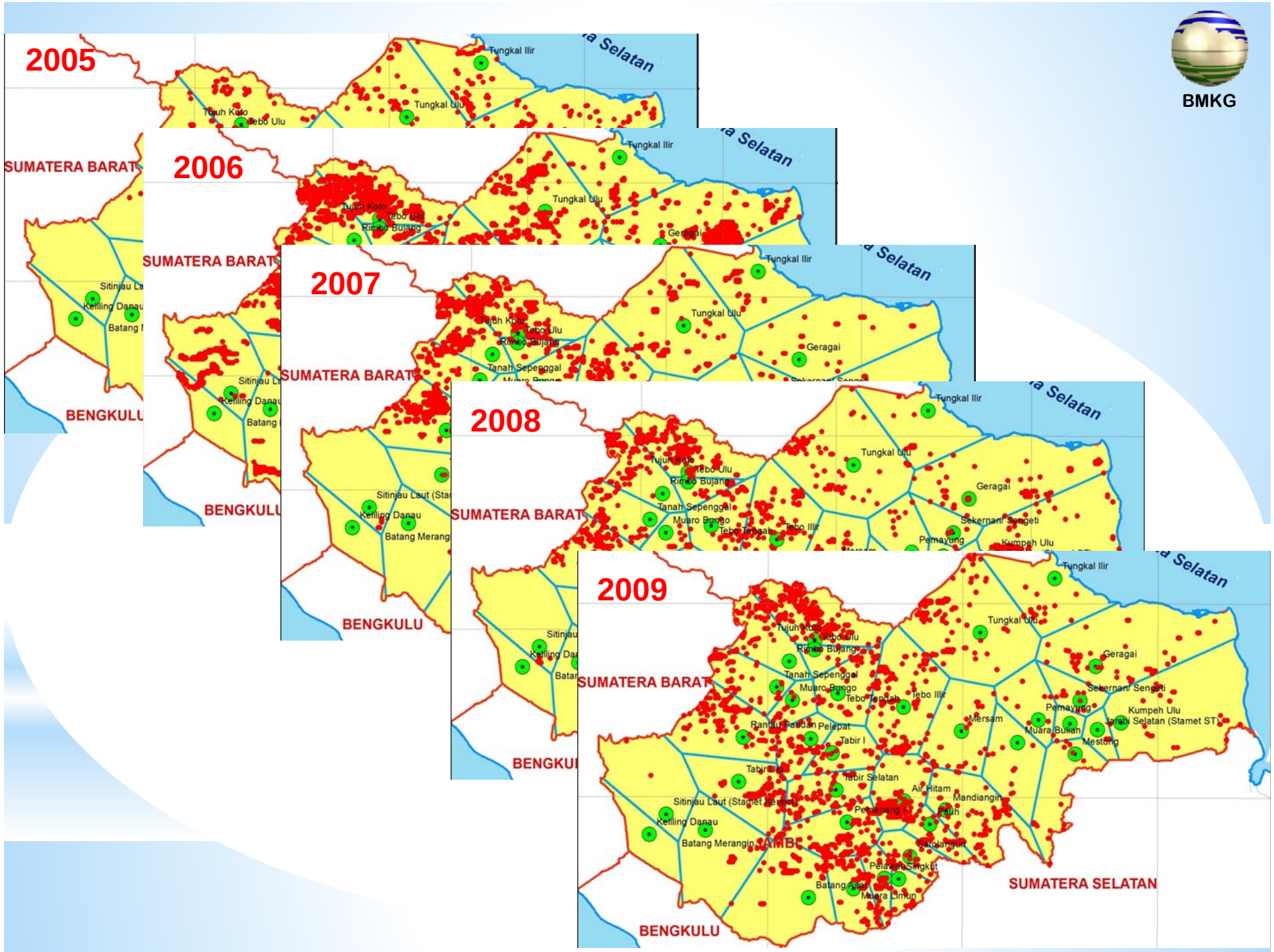
Chomitz KM and Gray DA. 1996. Roads, land use, and deforestation: a spatial model applied to Belize.
World Bank Economic Review
10 (3): 487-512.

1980-1992



1992




2005
2006
2007
2008
2009
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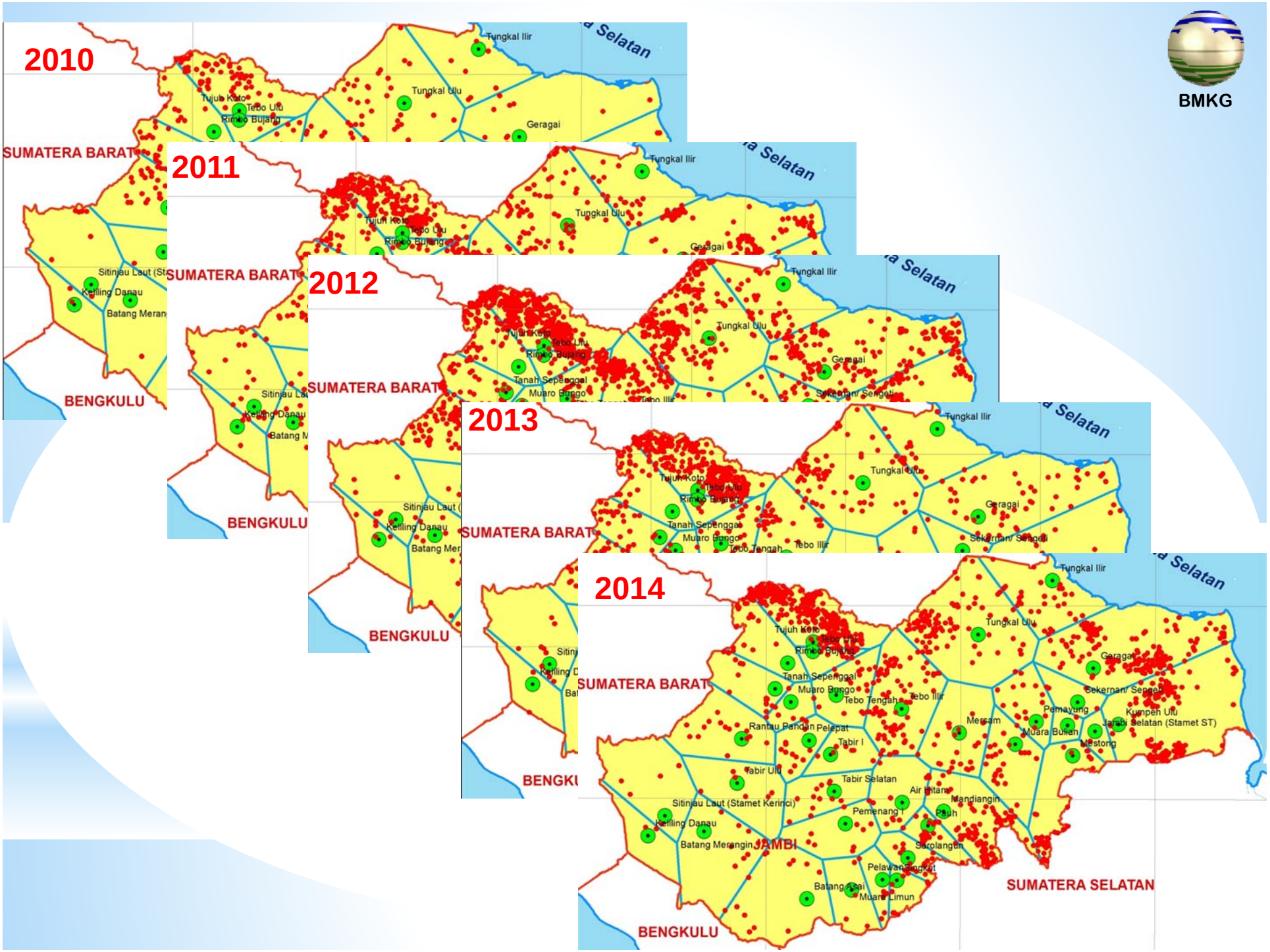
SUMATERA BARAT
BENGKULU
SUMATERA SELATAN
JAMBI
Tungkal Ilir
Tungkal Ulu
Tebo Ulu
Rimbo Bujang
Geragai
Tanah Sepenggal
Muaro Bungo
Tebo Tengah
Tebo Ilir
Pemayung
Kumpeh Ulu
Sekernan/ Sengeti
Mersam
Muara Bulian
Jambi Selatan (Stamet ST)
Mestong
Tabir
Tabir Ulu
Tabir Selatan
Tabir I
Pelepat
Rantau Pandan
Air Hitam
Mandiangin
Pauh
Pelayang Singkut
Batang Asai
Muara Limun
Sitinjau Laut (Stamet Kerinci)
Kerinci
Batang Merangin
Kelling Danau


2010
2011
2012
2013
2014
BMKG
SUMATERA BARAT
BENGKULU
JAMBI
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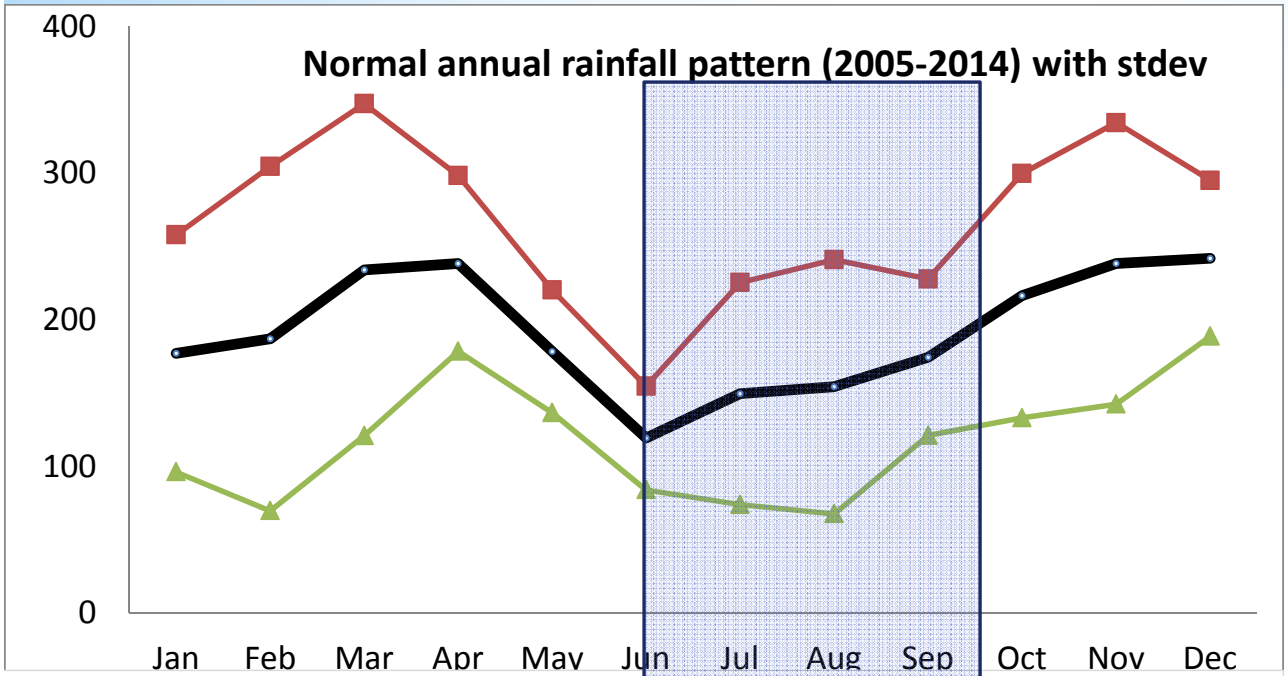

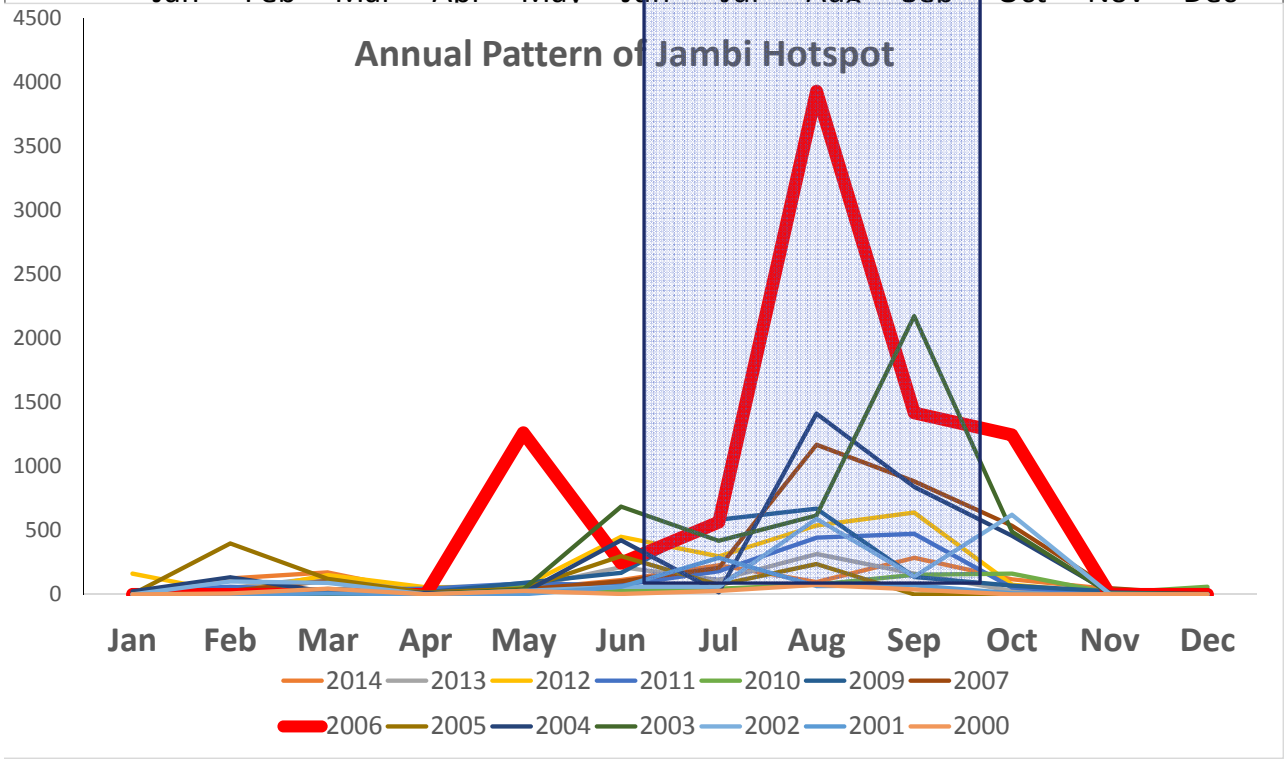

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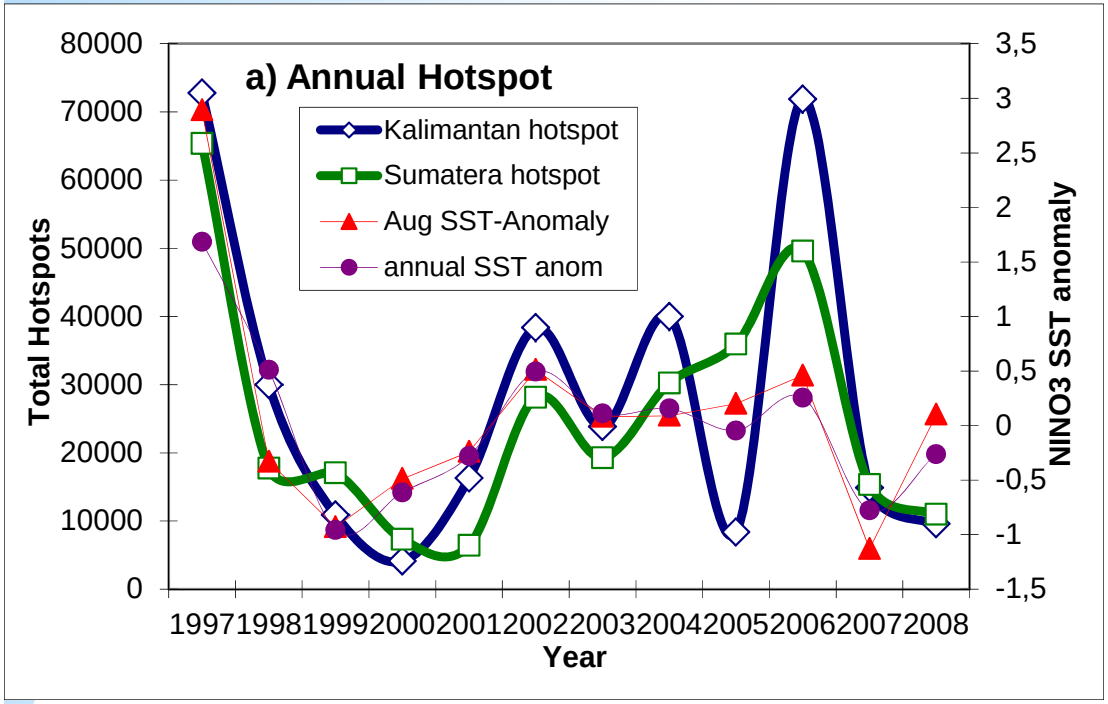
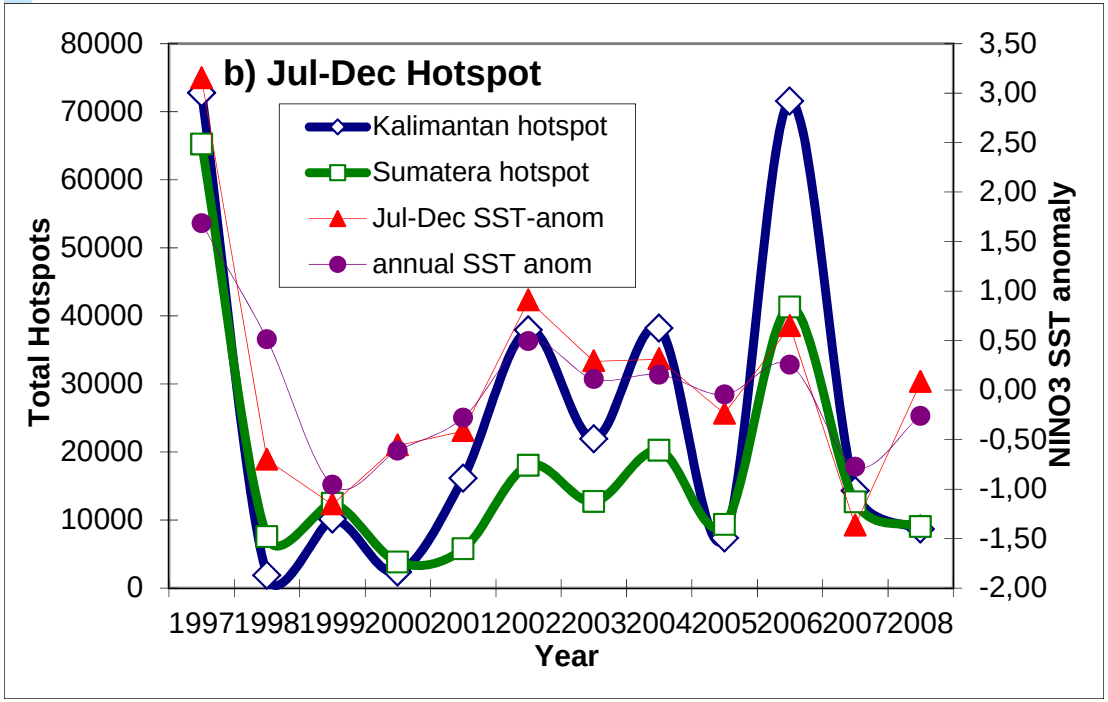
Climatology of Jambi Rainfall in comparison to annual pattern of hotpsot in Jambi





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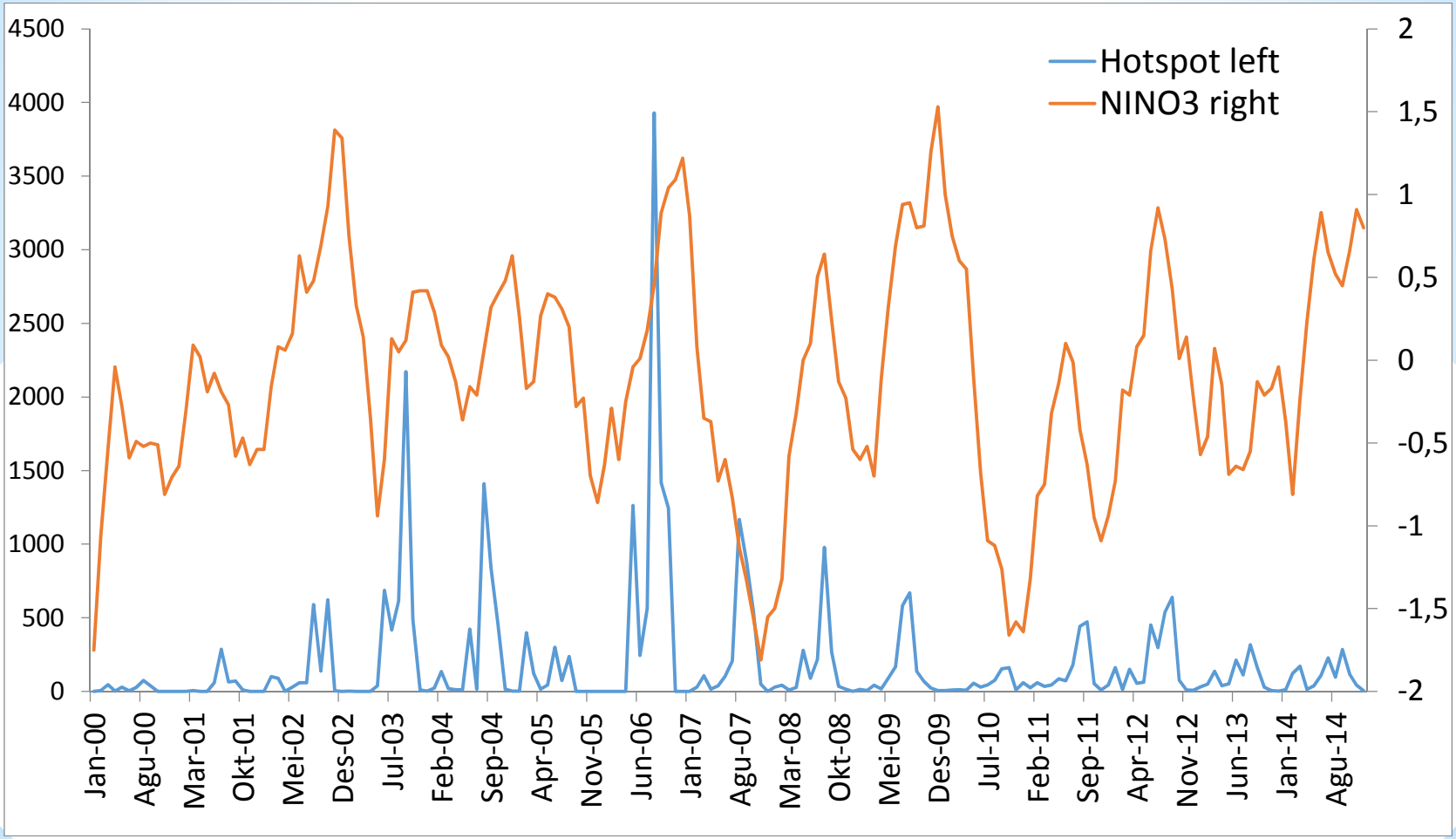
Relationship between fires in Sumatera and Kalimantan with the El Nino

1997-2004	0,944131	0,853339
1997-2005	0,915013	0,811452
1997-2006	0,782837	0,763103
1997-2007	0,788869	0,769799

1997-2004	0,95127	0,927696
1997-2005	0,943819	0,928492
1997-2006	0,836894	0,895059
1997-2007	0,824523	0,576533

Hotspots in Jambi and El Nino



Eventhough there is a clear relationship between fire or hotspot number in Sumatera and Kalimantan with El Nino episode, however the relationship is somewhat inobvious for Jambi

Hotspot in Sumatera 1 October 2014

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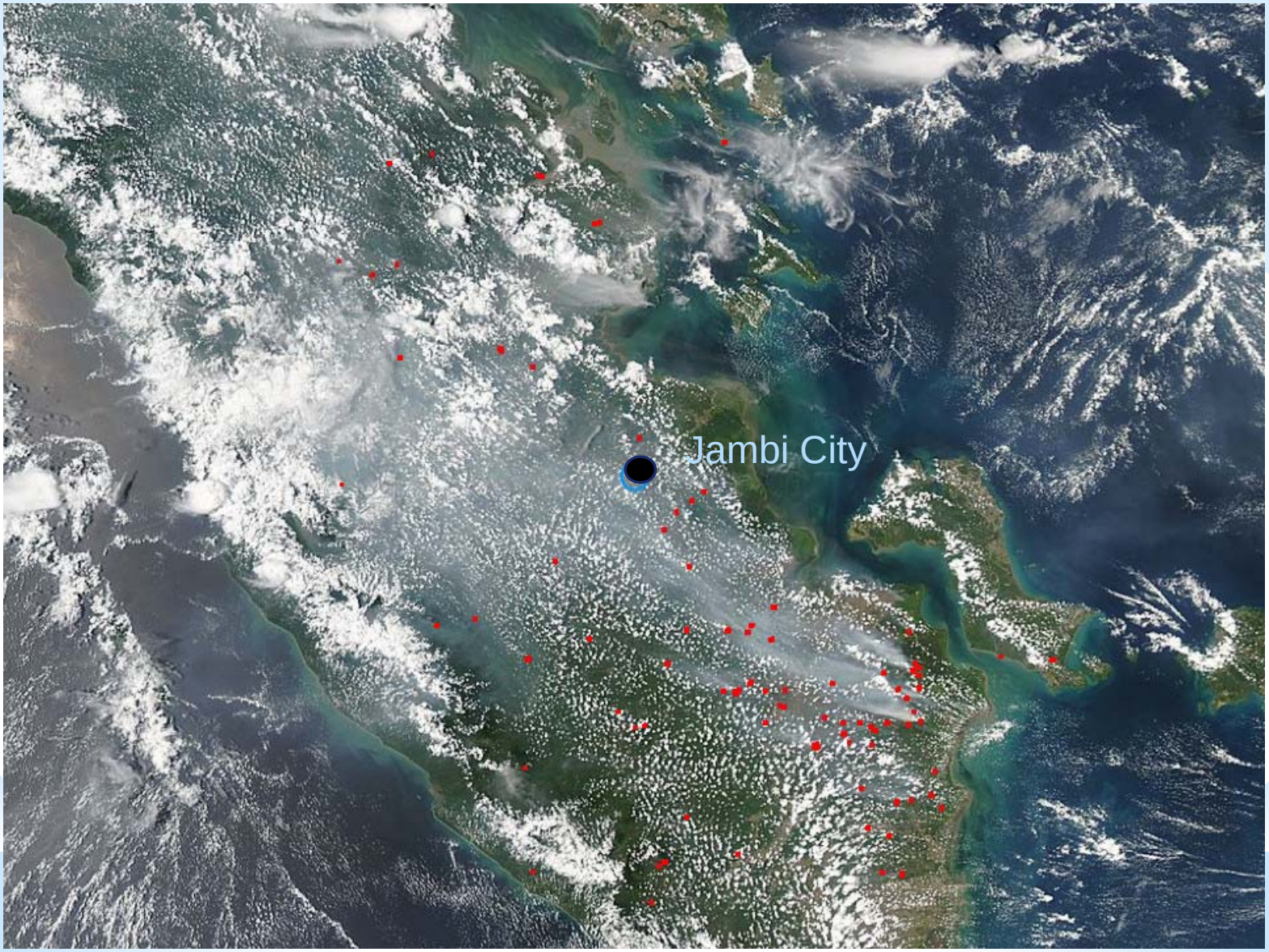

Particulate (PM10) vs visibility during Fire episode October 2014

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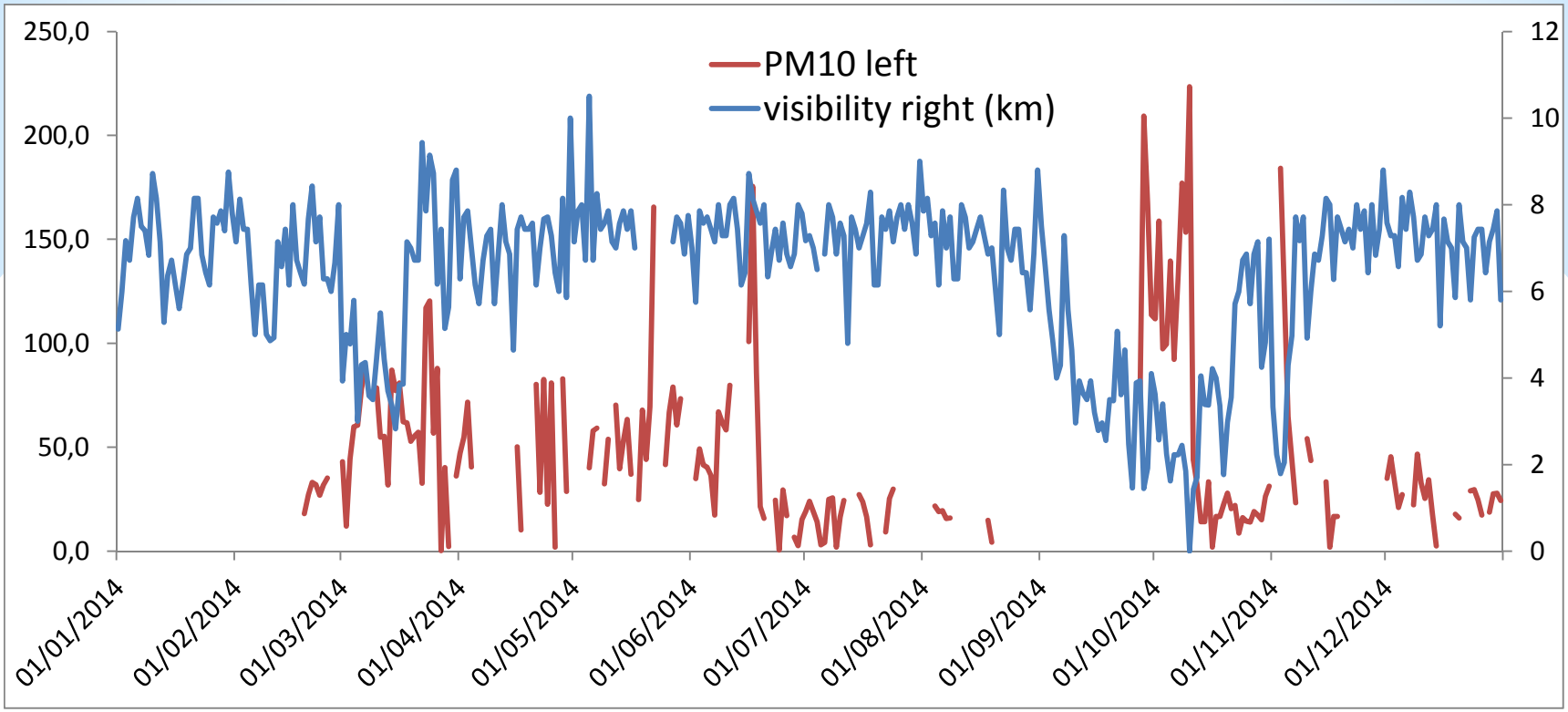

Certainly there is a clear relationship between particulate concentration and visibility, however, some reduction of visibility is due to fire in some other parts outside Jambi

October 2014 AOD vs AE

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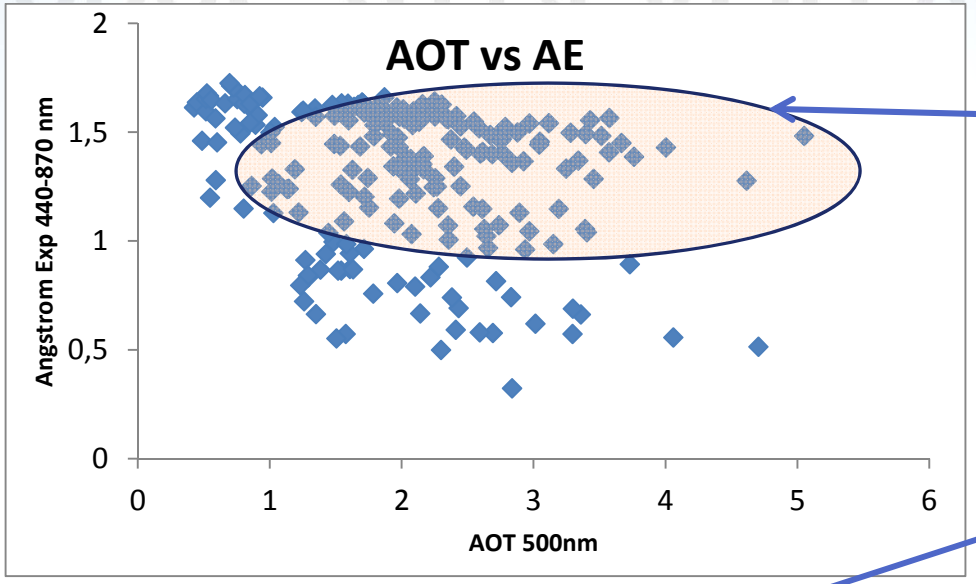
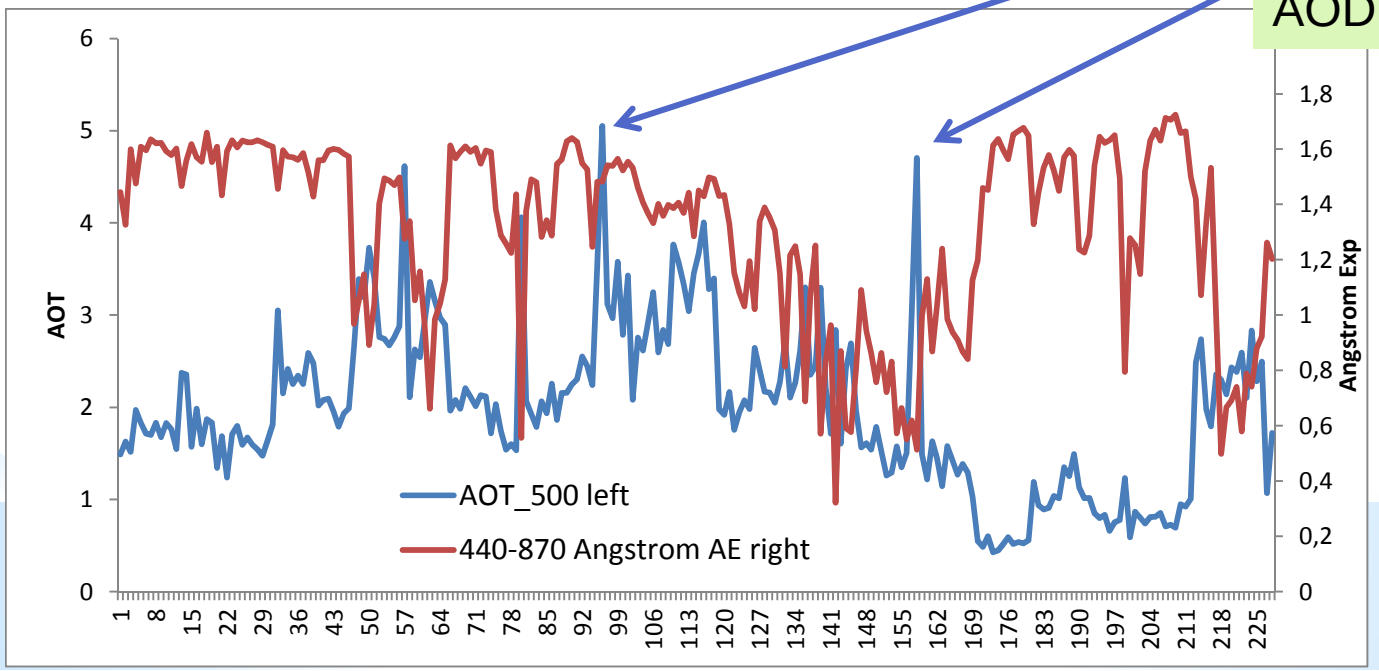


Small size aerosol from forest fire

Peatland source aerosol with high AOD above 4.5



Monthly AOD vs AE

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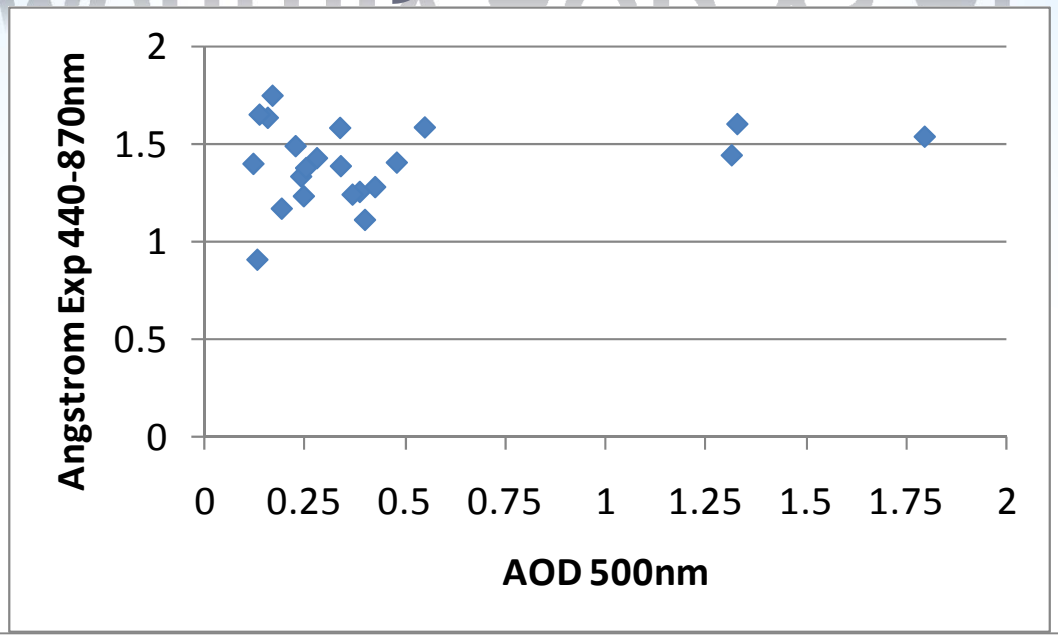

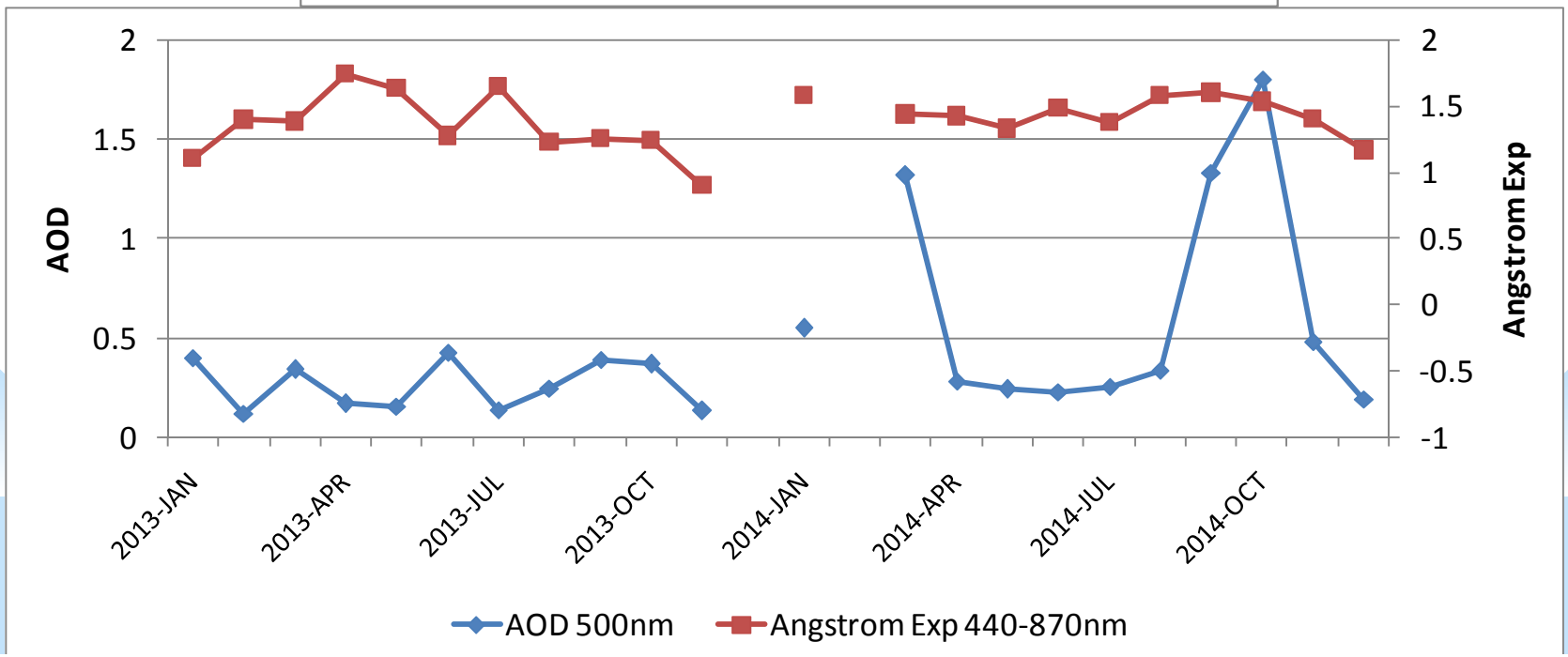

Aerosol Chemistry from Rain water chemistry

Fire episode

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October 2014

Parameters	concentration (mg/l)
Ca	0,077 - 0,216
Mg	0,028 - 0,055
Na	0,129 - 0,277
K	0,059 - 0,133
NH4	0,523 - 0,779
Cl	0,522 - 0,855
SO4	1,992 - 3,386
NO3	0,809 - 1,672
Total base	0,116 – 0,272
Alkalinity	26,7 – 26,05 (µeg/l)

pH: 5,28 – 6,05

January 2015

Parameters	concentration (mg/l)
Ca	0,042 – 0,388
Mg	0,010 – 0,018
Na	0,016 – 2,383
K	0,02 – 0,344
NH4	0,001 – 0,073
Cl	0,035 – 1,144
SO4	0,306 – 1,279
NO3	0,162 – 0,841
Total base	0,051 – 0,558
Acidity	13,413 – 26,827 (µeg/l)

pH: 4,4 – 4,78

Concentration of sulfate, chlorin and nitrate are higher during fire episode, strangely pH numbers do not associate with the same fashion

Example of Fire Danger Rating System product of BMKG

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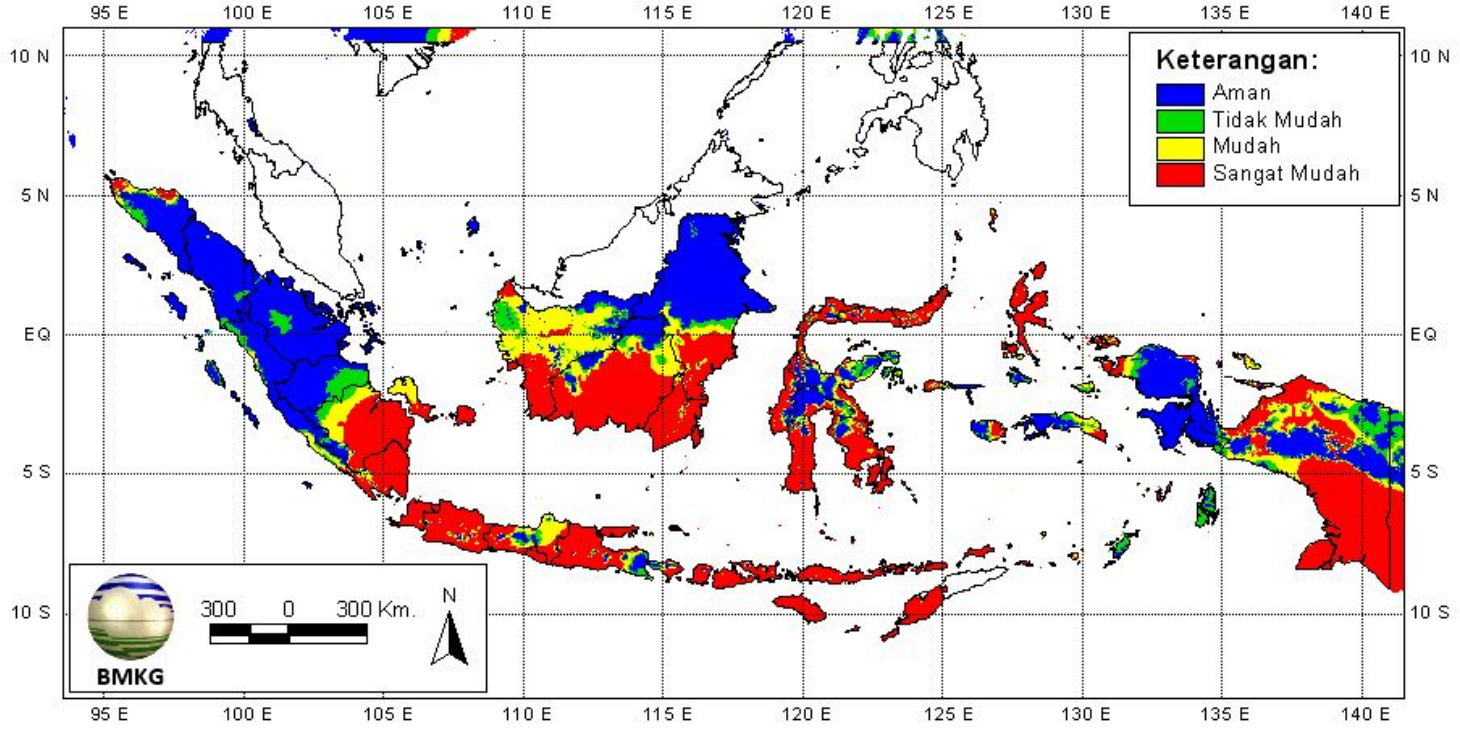
POTENSI KEMUDAHAN TERJADINYA KEBAKARAN
DITINJAU DARI ANALISA PARAMETER CUACA

Fine Fuel Moisture Code

Berlaku untuk : 05 Agustus 2015 ----- Wilayah Indonesia

Today, Jambi is still save !!



Subid Cuaca Ekstrim Bidang Peringatan Dini BMKG
Sumber Data : Data Realtime Pengamatan Sinoptik BMKG

Example of Fire Danger Rating System product of BMKG

BMKG

POTENSI TINGKAT KESULITAN PENGENDALIAN
APABILA TERJADI KEBAKARAN HUTAN DAN LAHAN

Fire Weather Index

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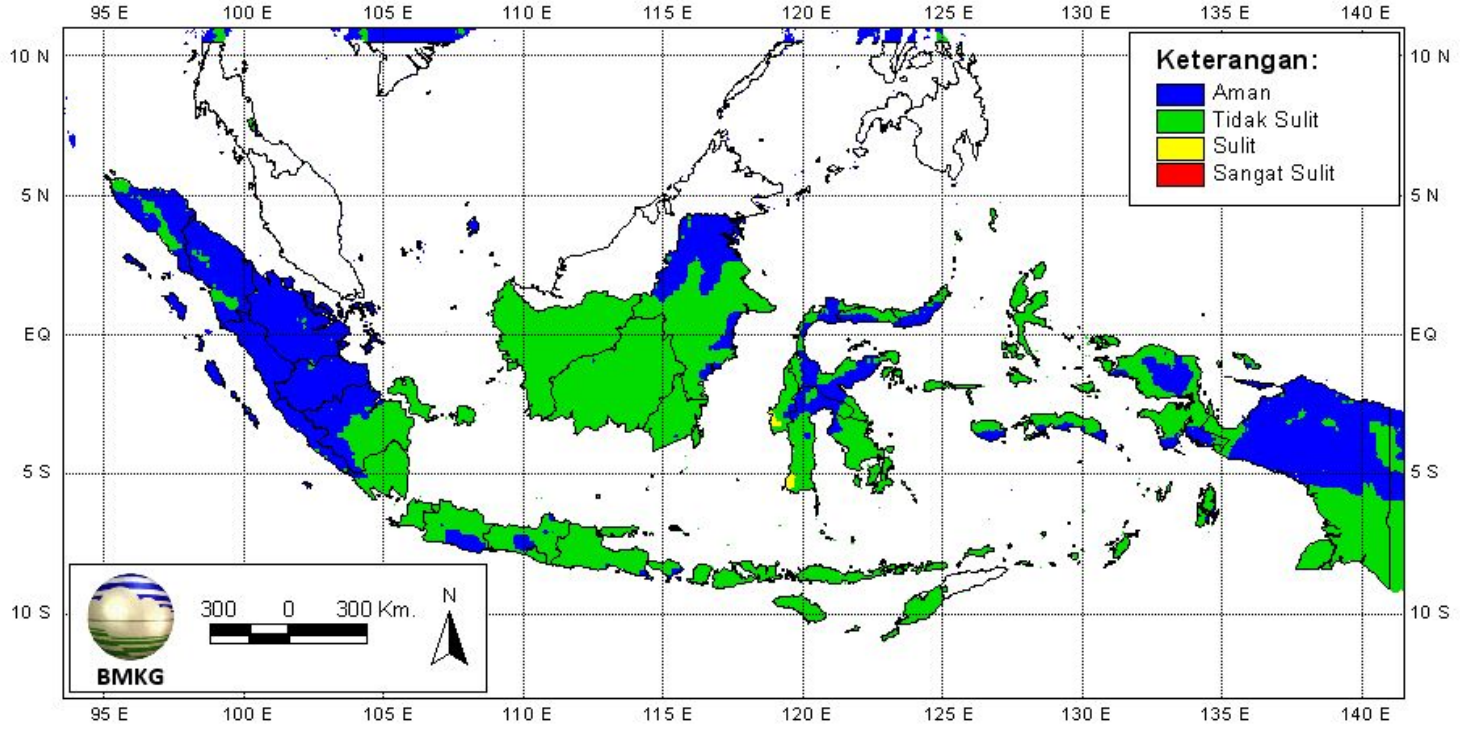
Today, Jambi is still save !!



Subid Cuaca Ekstrim Bidang Peringatan Dini BMKG
Sumber Data : Data Prakiraan (MODEL WRF)

*Conclusions

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1. Degraded land use change and deforestation in Jambi province have been studied and detected
2. There is a significant relationship between forest fire as indicated with the hotspot number with climate annually or interannually
3. PM10 and AOD during fire episodes increase significantly and eventually reduce visibility
4. Significantly high AOD number above 5.0 may related to peat fires in the eastern coast of Sumatera
5. Sulfate and nitrate concentration increase during the fire episode

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*Thank You very much for you kind attention