Biomass burning signatures in GOSAT XCO<sub>2</sub> Correlation with IASI XCO anomalies over Asia

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TM5 Meeting, Wageningen April 26, 2013 I use TM5 4DVAR to estimate surface  $CO_2$  fluxes globally from satellite (GOSAT) measurements of total column  $CO_2$  (XCO<sub>2</sub>)



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- Monthly, grid-scale fluxes (and uncertainties) which can be aggregated to longer times and larger areas
- Global coverage by the observations, as opposed to the surface flask network
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### ... and some limitations

- Vulnerable to errors in modeled vertical transport
- Vulnerable to biases in XCO<sub>2</sub> retrievals arising from aerosols, land surface type, albedo, viewing geometry...

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## Land bias = -0.14 ppm

### Ocean bias = 0.79 ppm



A land-sea bias of 0.93 ppm turns the carbon cycle topsy turvy

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The interannual variability of flux estimates over one region should be less sensitive to time-independent biases in XCO<sub>2</sub>



## Can GOSAT better constrain tropical fluxes?





Is the 2010 outgassing of CO<sub>2</sub> seen by GOSAT over tropical Asia "real"?



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Is the outgassing secific to 2010, or always happens during Mar-May?

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## There are peat fires in Feb-Apr over Tropical Asia



# FIRMS web fire mapper

## Does total column CO show this fire signal?



# FIRMS web fire mapper

- IASI measures XCO globally, sensitive to upper troposphere
- Zoom region over Equatorial Asia



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- In the global  $6^{\circ} \times 4^{\circ}$  region, one category, optimized weekly
- In the Eq. Asia 3°×2° and 1°×1° regions, biomass burning optimized 3-daily, rest (monthly) not
- GFEDv3 daily variations added, not optimized
- IASI XCO + background NOAA stations assimilated, from Jan 1 to Aug 1, optimized fluxes analyzed from Feb 1

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# 2009 shows some biomass burning in February





# 2009 shows some biomass burning in February

# 2010 shows biomass burning from February to April



# 2009 shows some biomass burning in February

# 2010 shows biomass burning2011 shows very littlefrom February to Aprilbiomass burning







# Most of the CO signal seems to be from SE Asia, not Equatorial Asia

### The fires were actually over continental SE Asia ©



## FIRMS web fire mapper

## New project: put zoom region over SE Asia



Results in the next TM5 meeting!