Isoprene emissions in Africa inferred from OMI HCHO

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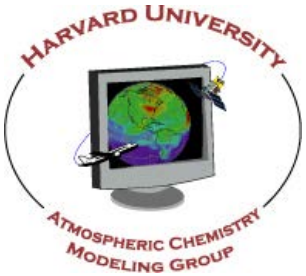
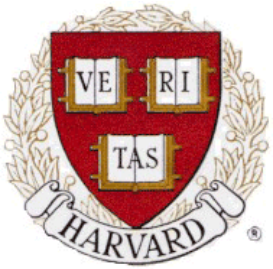
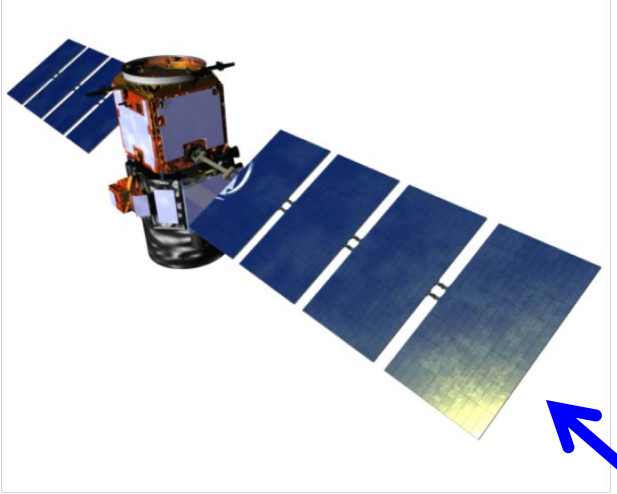




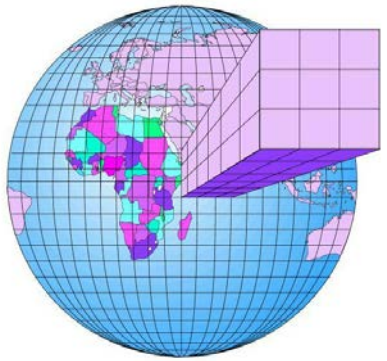
AMS Conference, Boston
29 May – 1 June 2012

Introduction

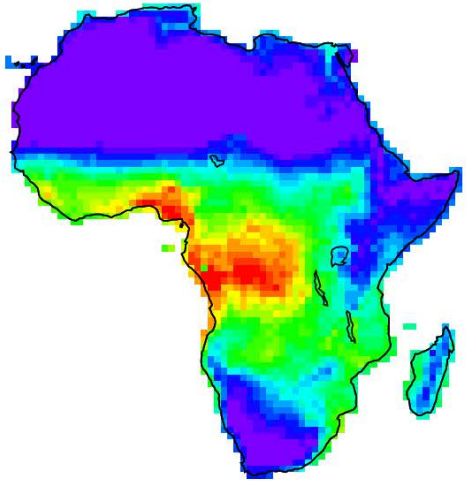


C_5H_8 $\xrightarrow{OH}$ ISOPOO $\dashrightarrow$ **HCHO**

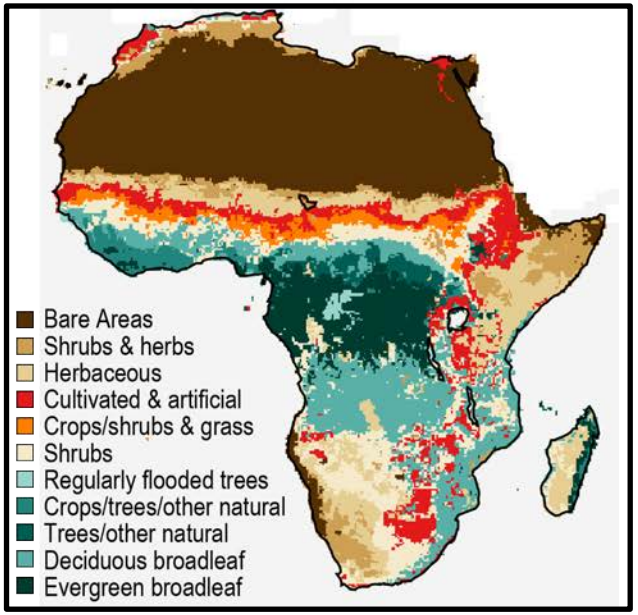
Y_{HCHO}

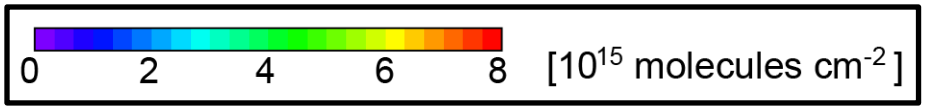


Original OMI slant column HCHO



GLC 2000 Landcover

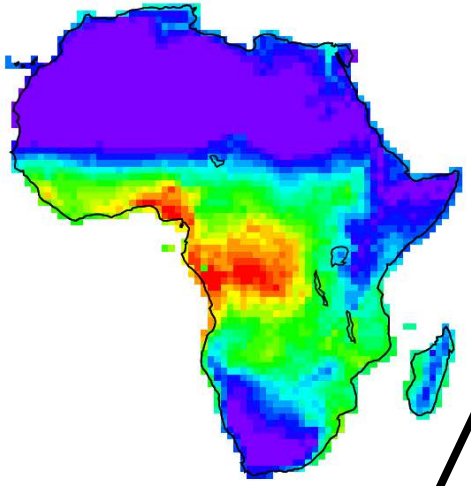




Steps One-Three:

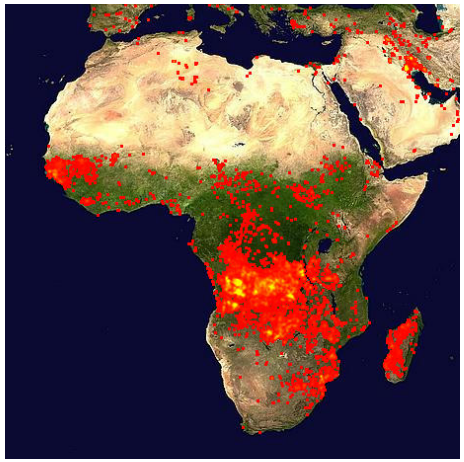
Filter for Biomass Burning and Anthropogenic Influences

Original OMI slant column HCHO

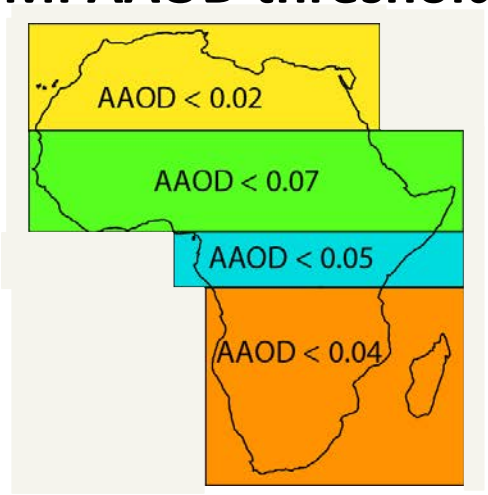


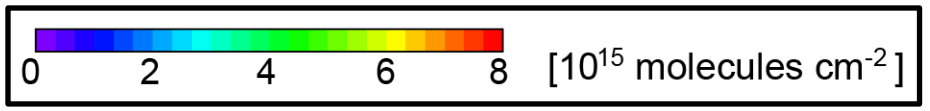
1

MODIS fire counts

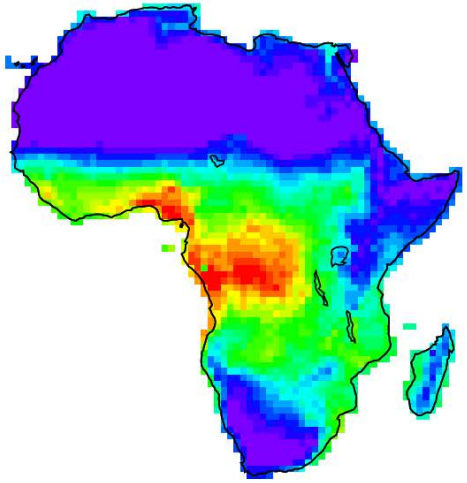


OMI AAOD thresholds



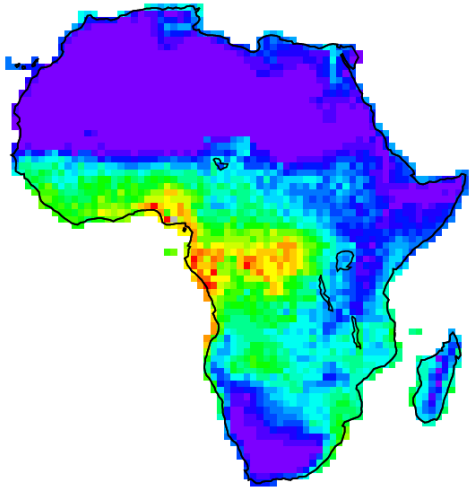


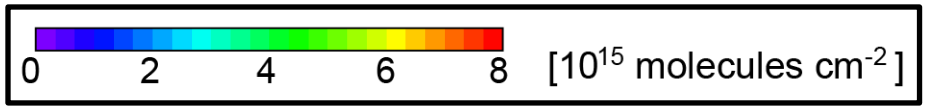
Original OMI slant column HCHO



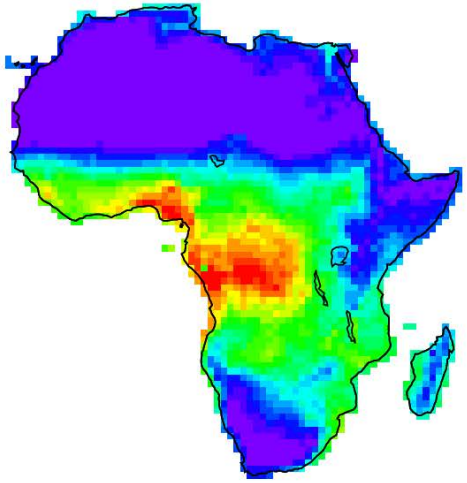
1

OMI HCHO (no biomass burning)



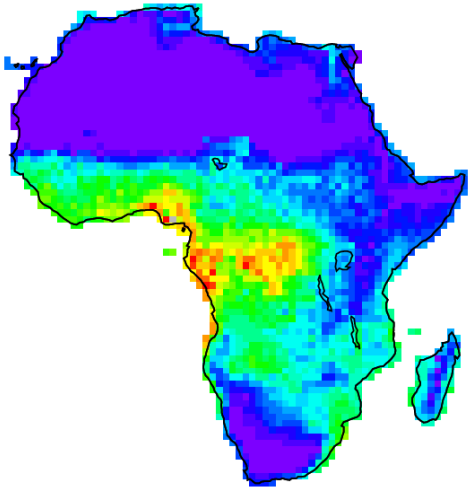


Original OMI slant column HCHO



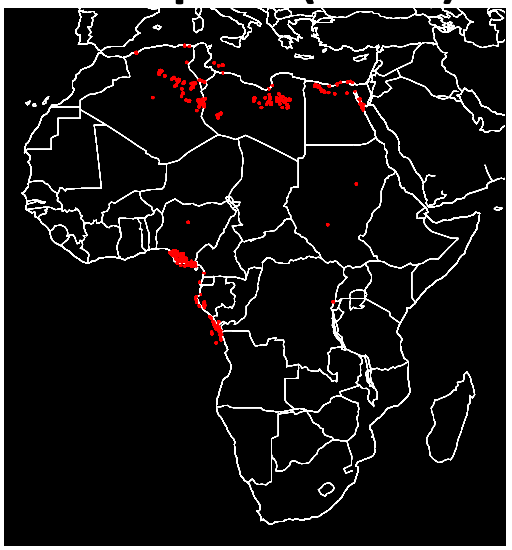
1

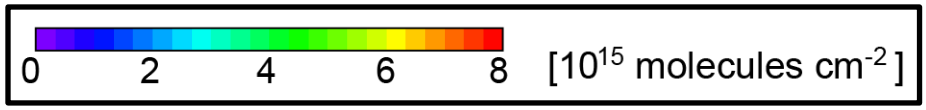
OMI HCHO (no biomass burning)

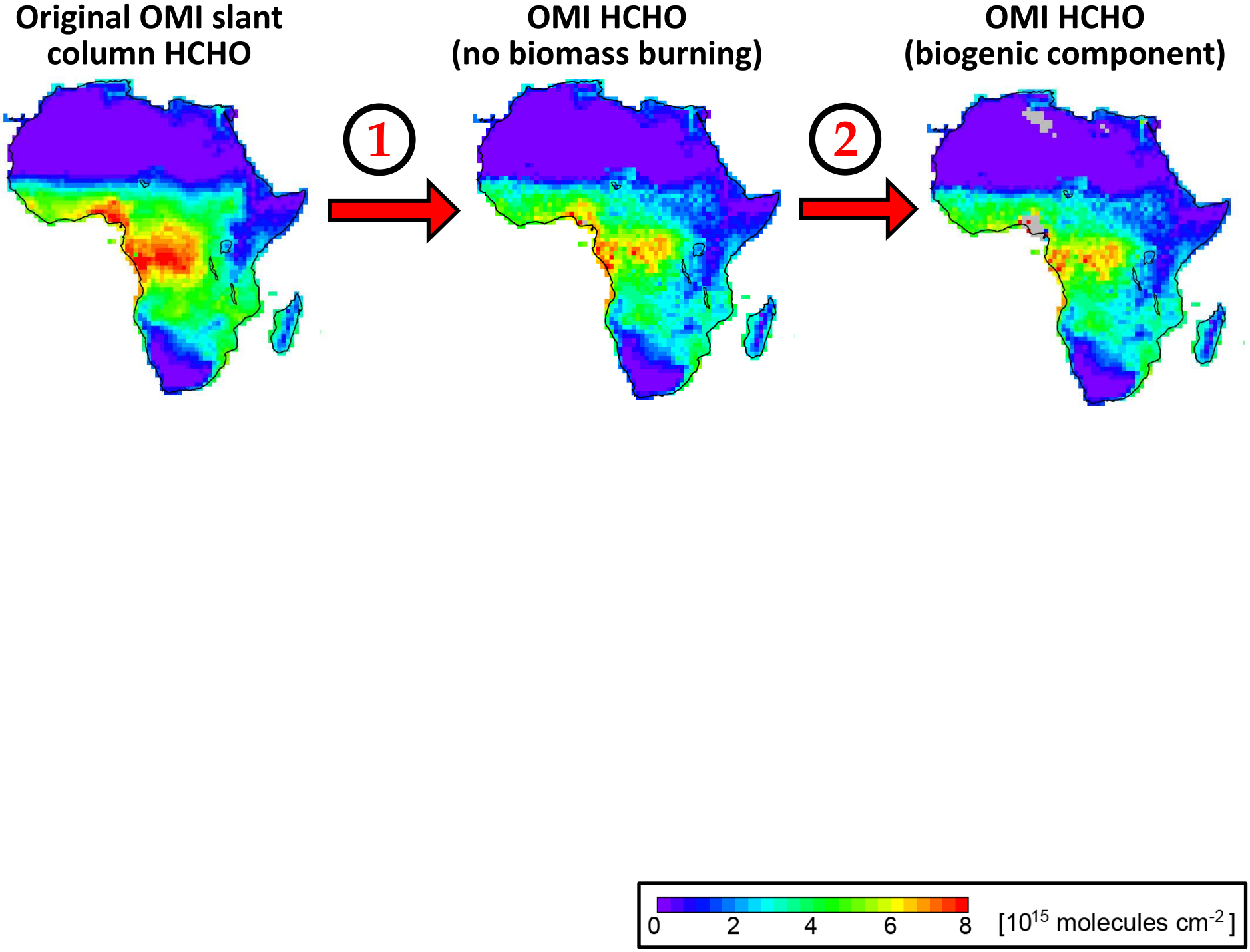


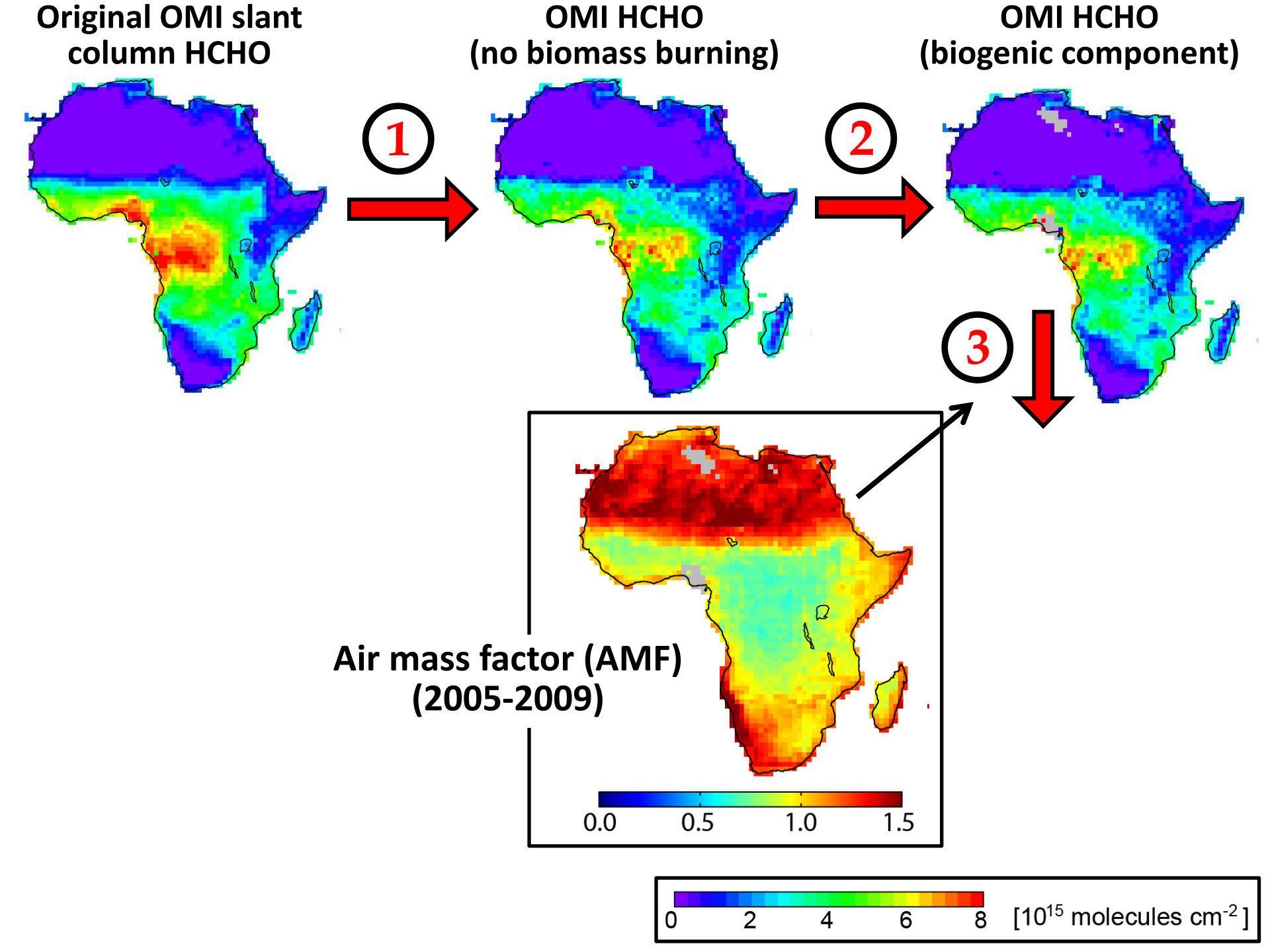
2

AATSR Algorithm 3 hotspots (2005)





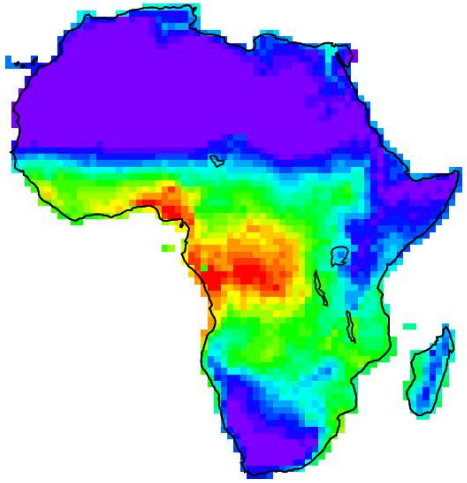

Original OMI slant column HCHO
1
OMI HCHO (no biomass burning)
2
OMI HCHO (biogenic component)
0
2
4
6
8
[10^15 molecules cm^-2]


Original OMI slant column HCHO
OMI HCHO (no biomass burning)
OMI HCHO (biogenic component)
1
2
3
Air mass factor (AMF) (2005-2009)
0.0
0.5
1.0
1.5
0
2
4
6
8
[10^15 molecules cm^-2]

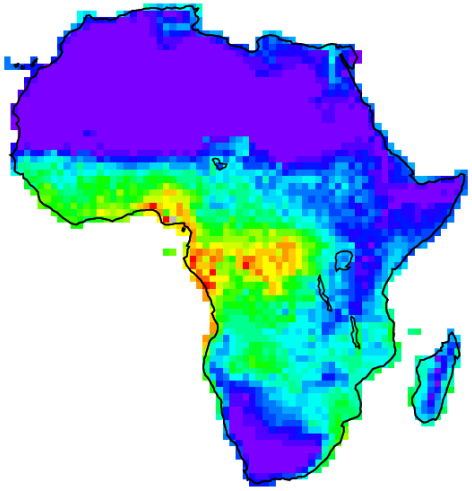
Original OMI slant column HCHO

OMI HCHO (no biomass burning)

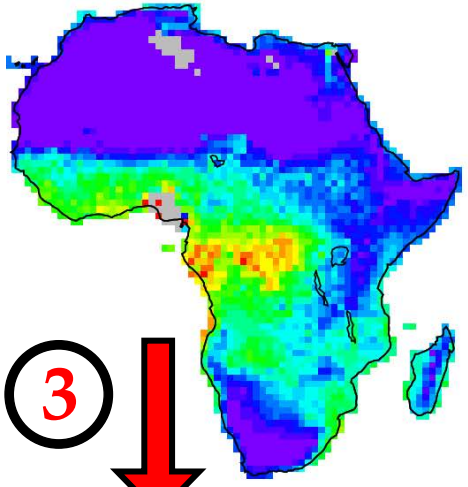
OMI HCHO (biogenic component)



1

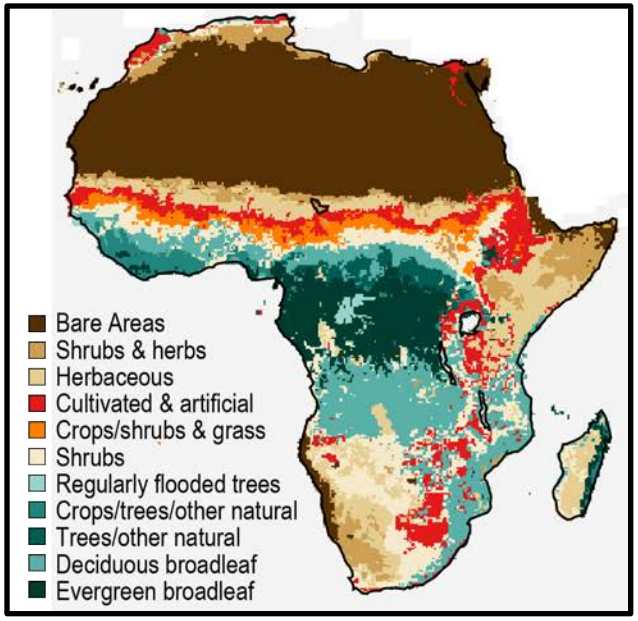


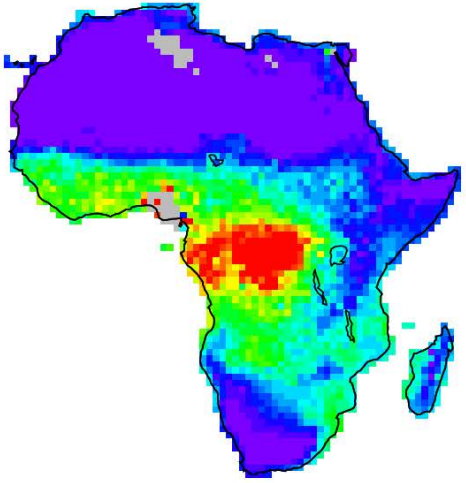
2

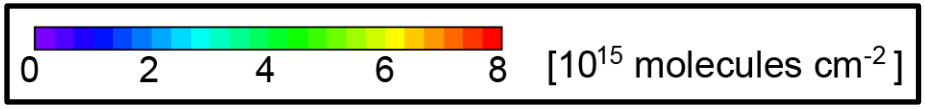


3

OMI vertical column HCHO (biogenic)

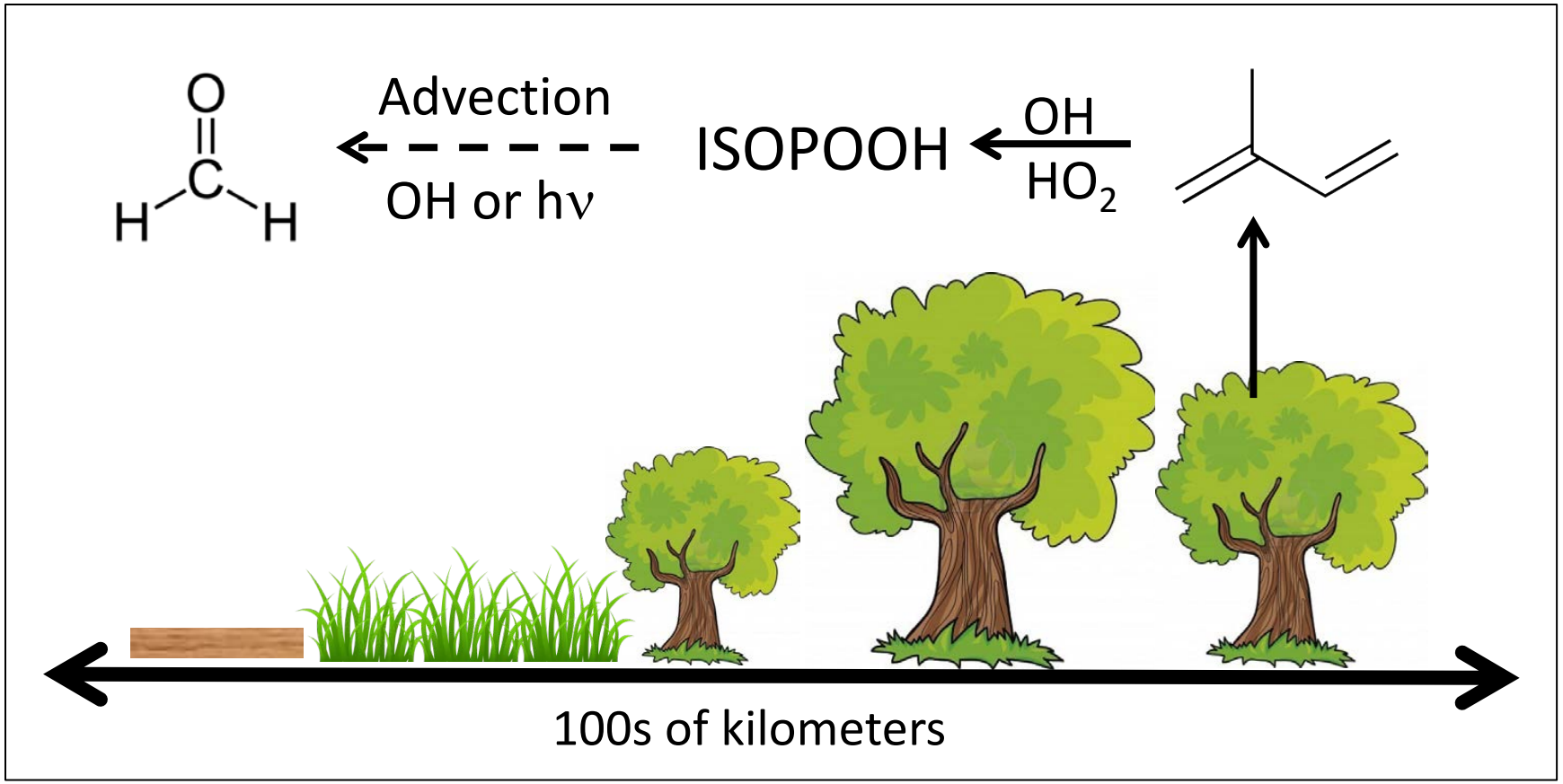




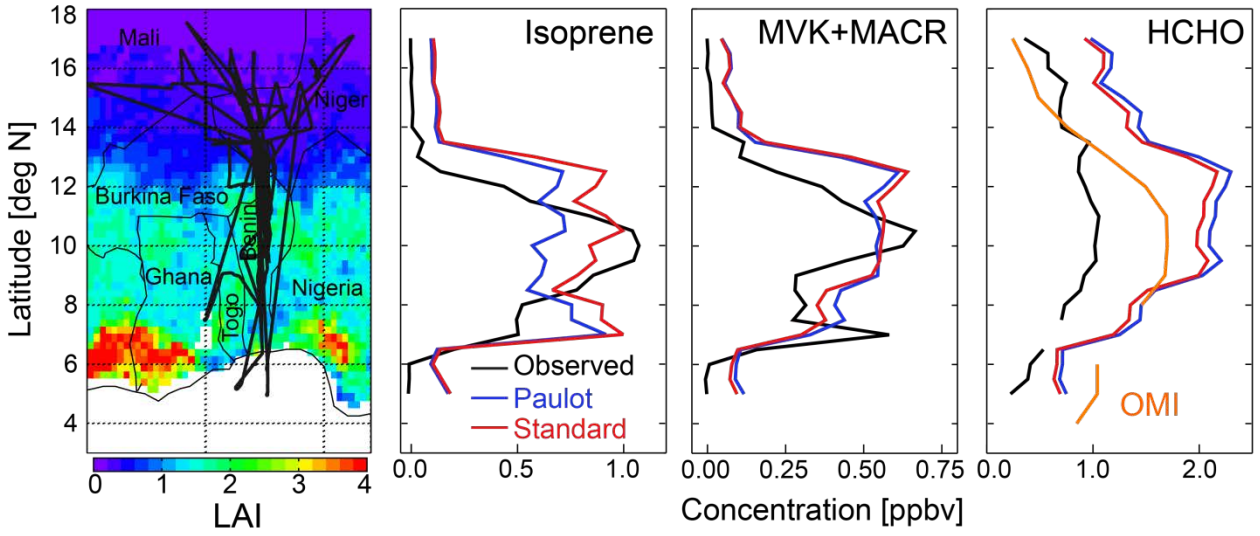


Step Four:

Remove the influence of smearing

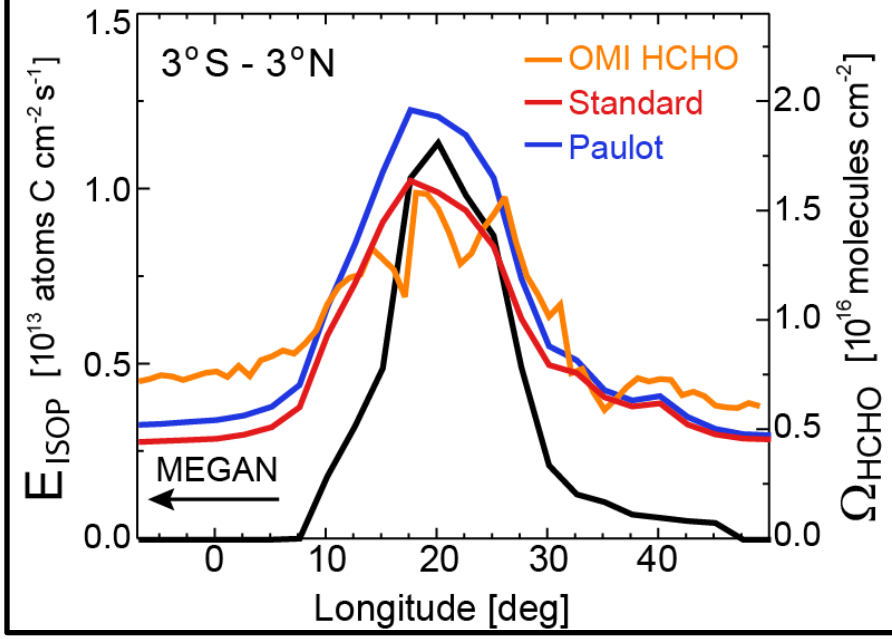


Quantify HCHO smearing in Africa:



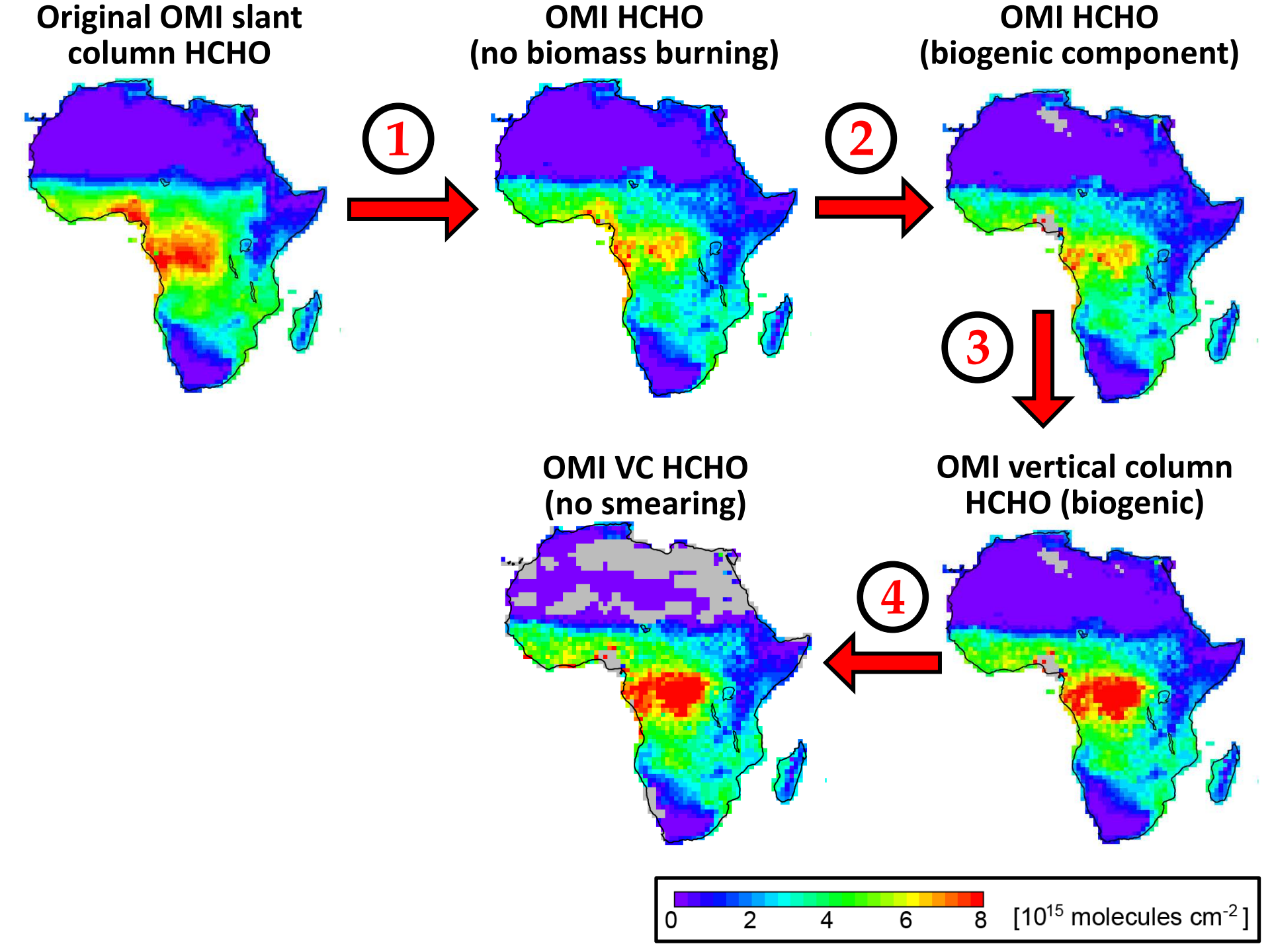
Smearing **< 100 km** in AMMA domain

(low isoprene emissions; high NO_x)



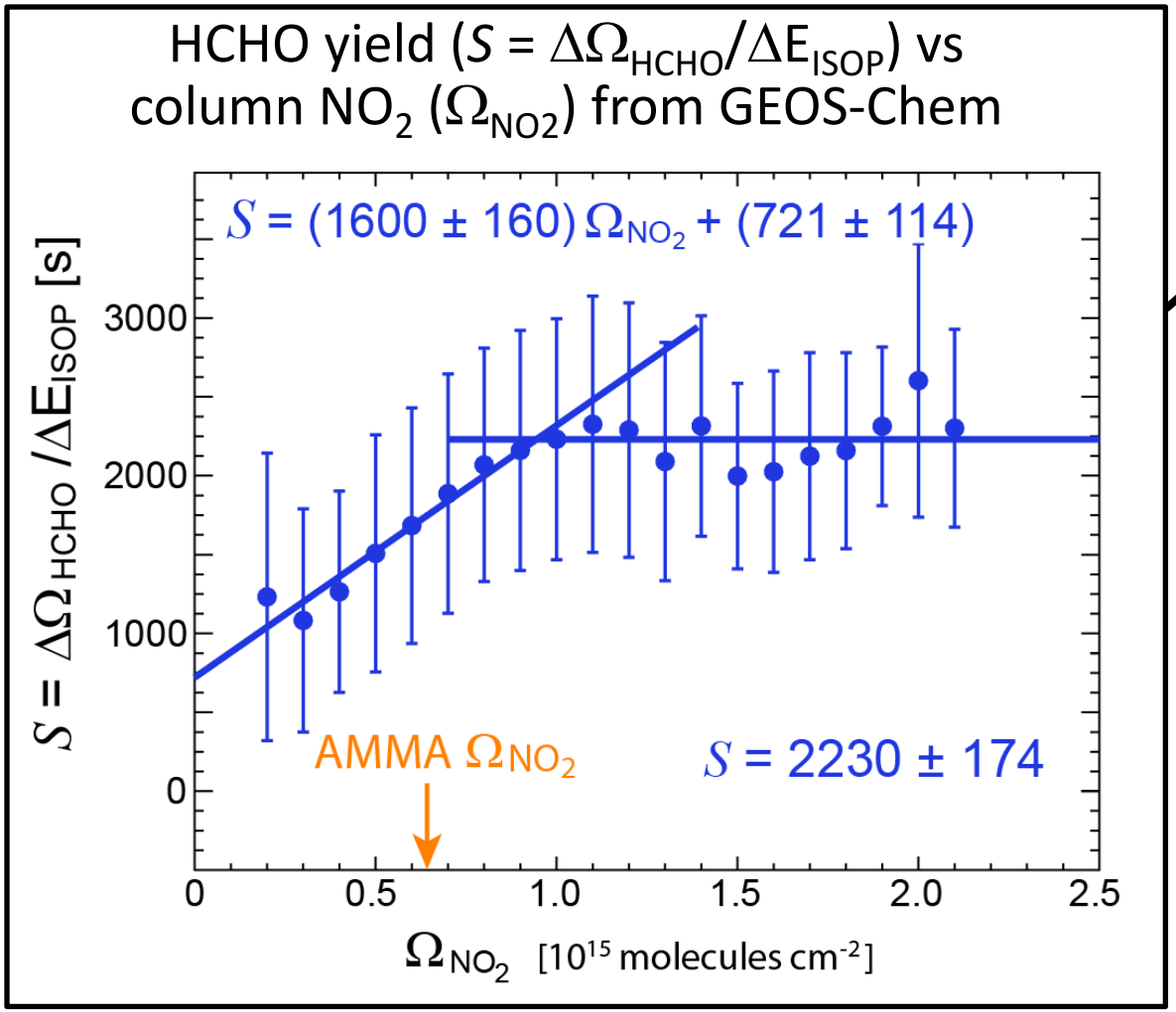
~200-300 km smearing to the west in central Africa

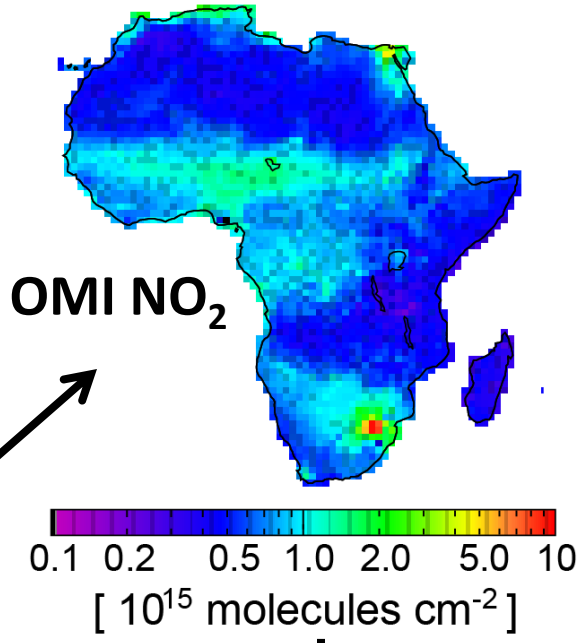
(high isoprene emissions and dominance of low-NO_x reaction pathway)

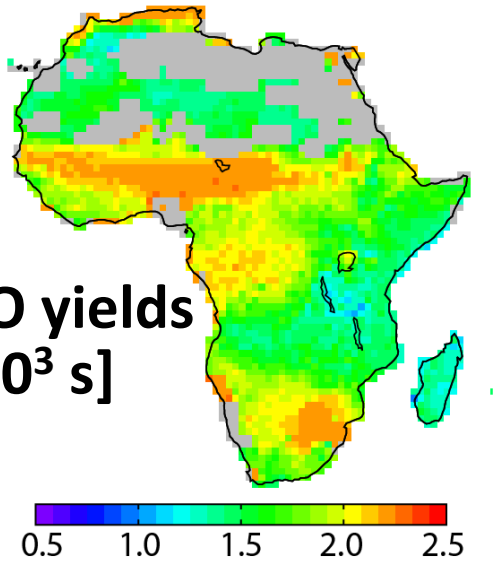

Original OMI slant column HCHO
1
OMI HCHO (no biomass burning)
2
OMI HCHO (biogenic component)
3
OMI vertical column HCHO (biogenic)
4
OMI VC HCHO (no smearing)
0
2
4
6
8
[10^15 molecules cm^-2]

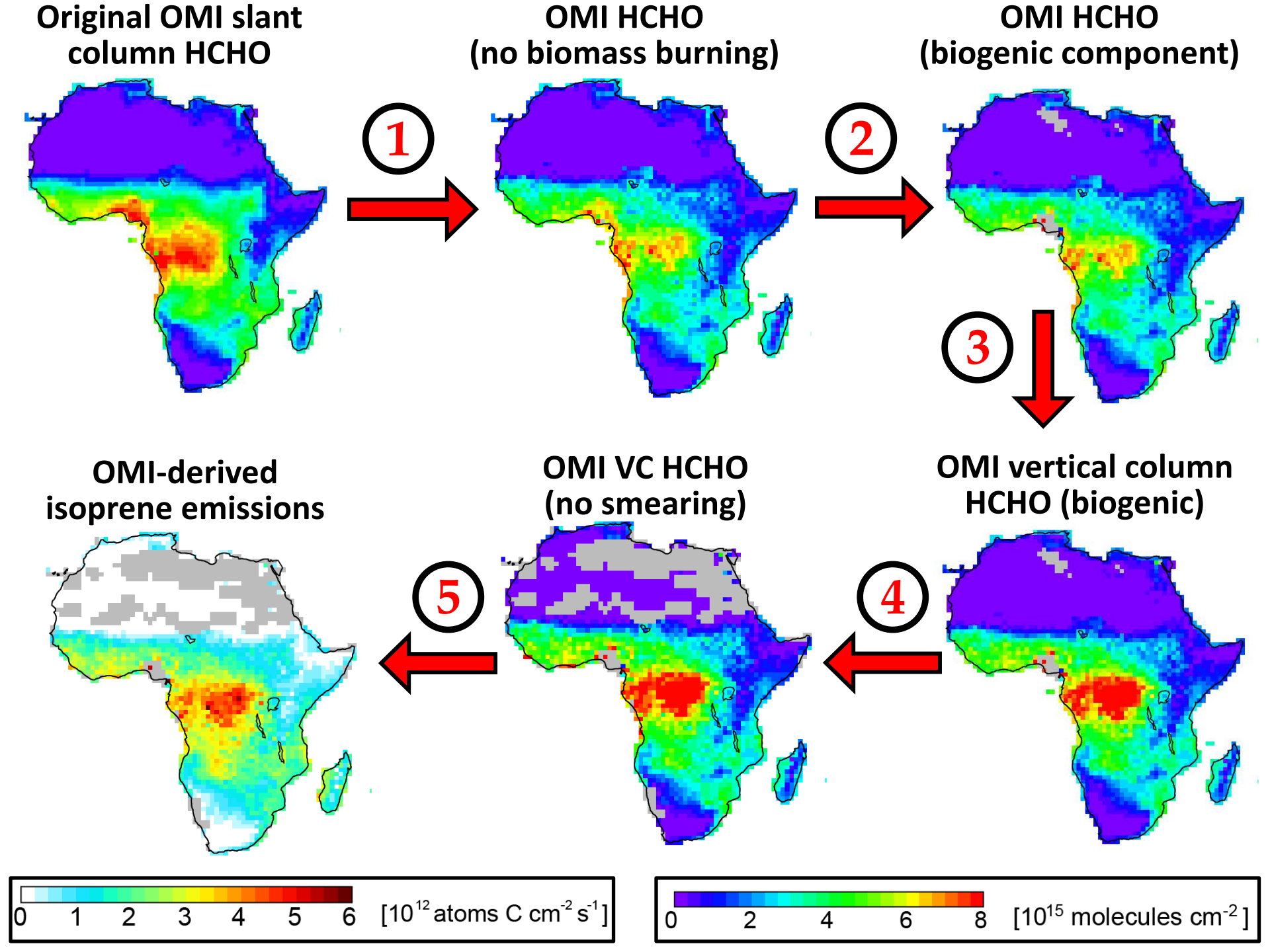
Step Five:

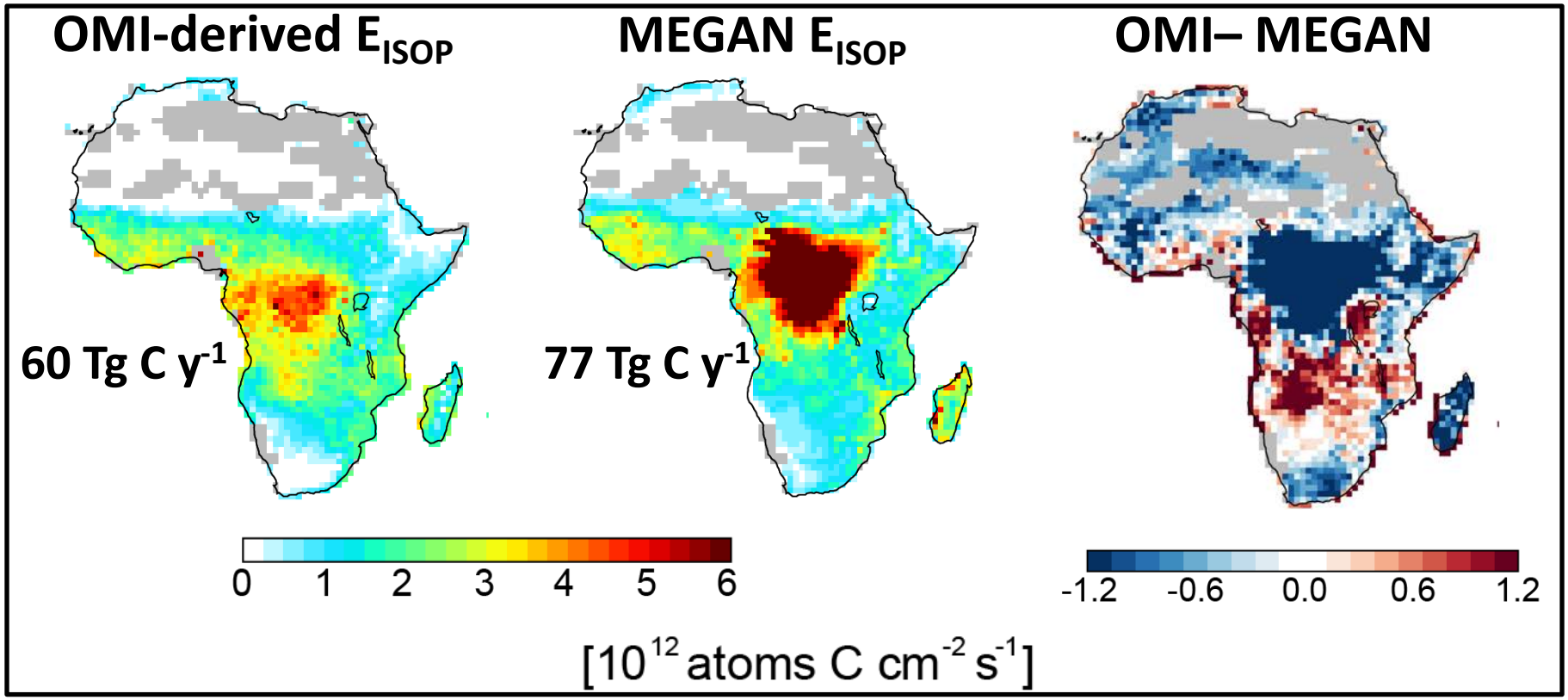
Estimate isoprene emissions








Original OMI slant column HCHO
1
OMI HCHO (no biomass burning)
2
OMI HCHO (biogenic component)
3
OMI vertical column HCHO (biogenic)
4
OMI VC HCHO (no smearing)
5
OMI-derived isoprene emissions
0 1 2 3 4 5 6 [10^12 atoms C cm^-2 s^-1]
0 2 4 6 8 [10^15 molecules cm^-2]



Future Directions

Use the OMI-derived isoprene emissions to understand seasonal and spatial variability of isoprene in Africa

Also assess the role of meteorological variables (such as temperature, soil moisture, LAI) on isoprene emissions in Africa