

A first look at African aerosol and trace-gas emissions from the Bujumbura station

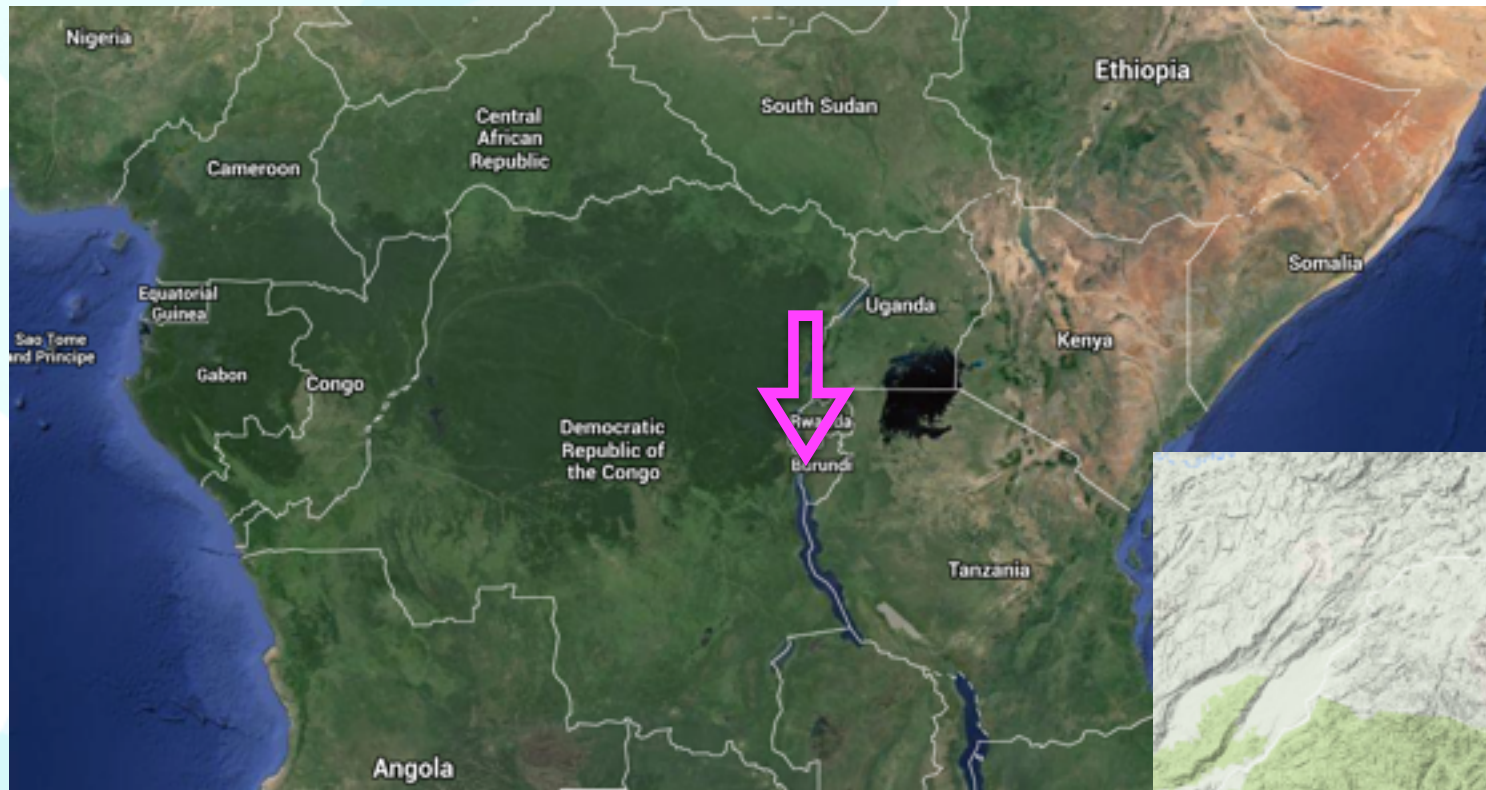
Clio Gielen

M. Van Roozendaal, F. Hendrick, G. Pinardi, I. De Smedt, C. Hermans, C. Fayt,
Y. Hu, E. Ndenzako, P. Nzohabonayo, R. Akimana

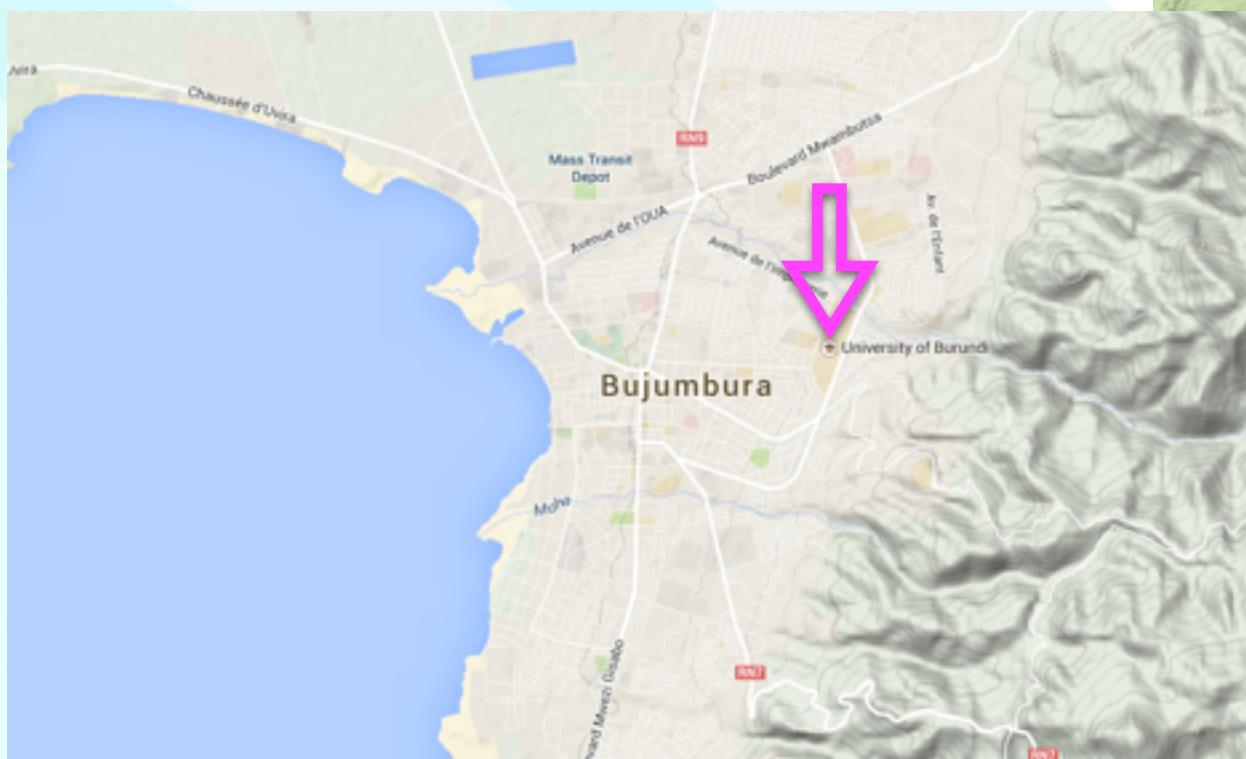
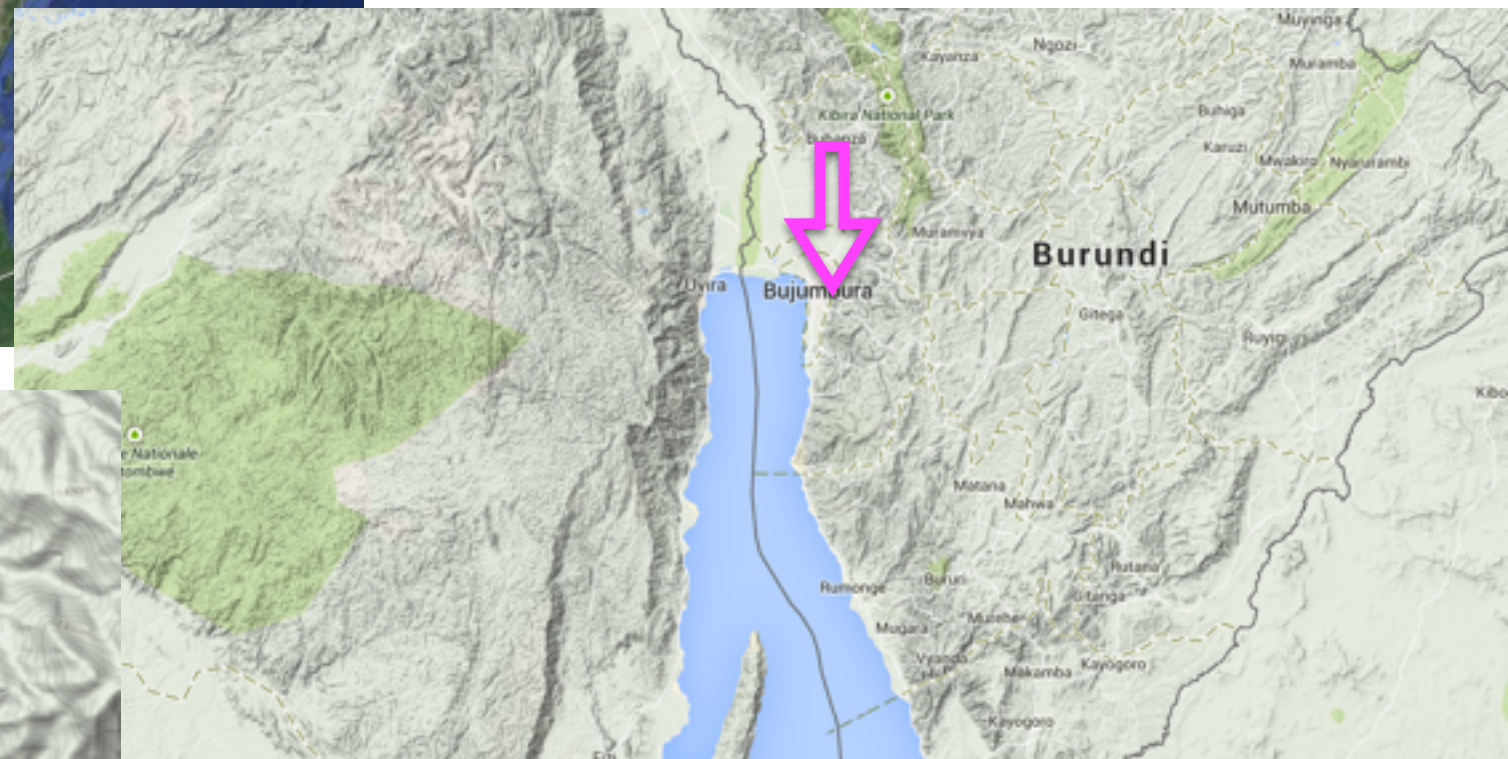
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The Bujumbura station



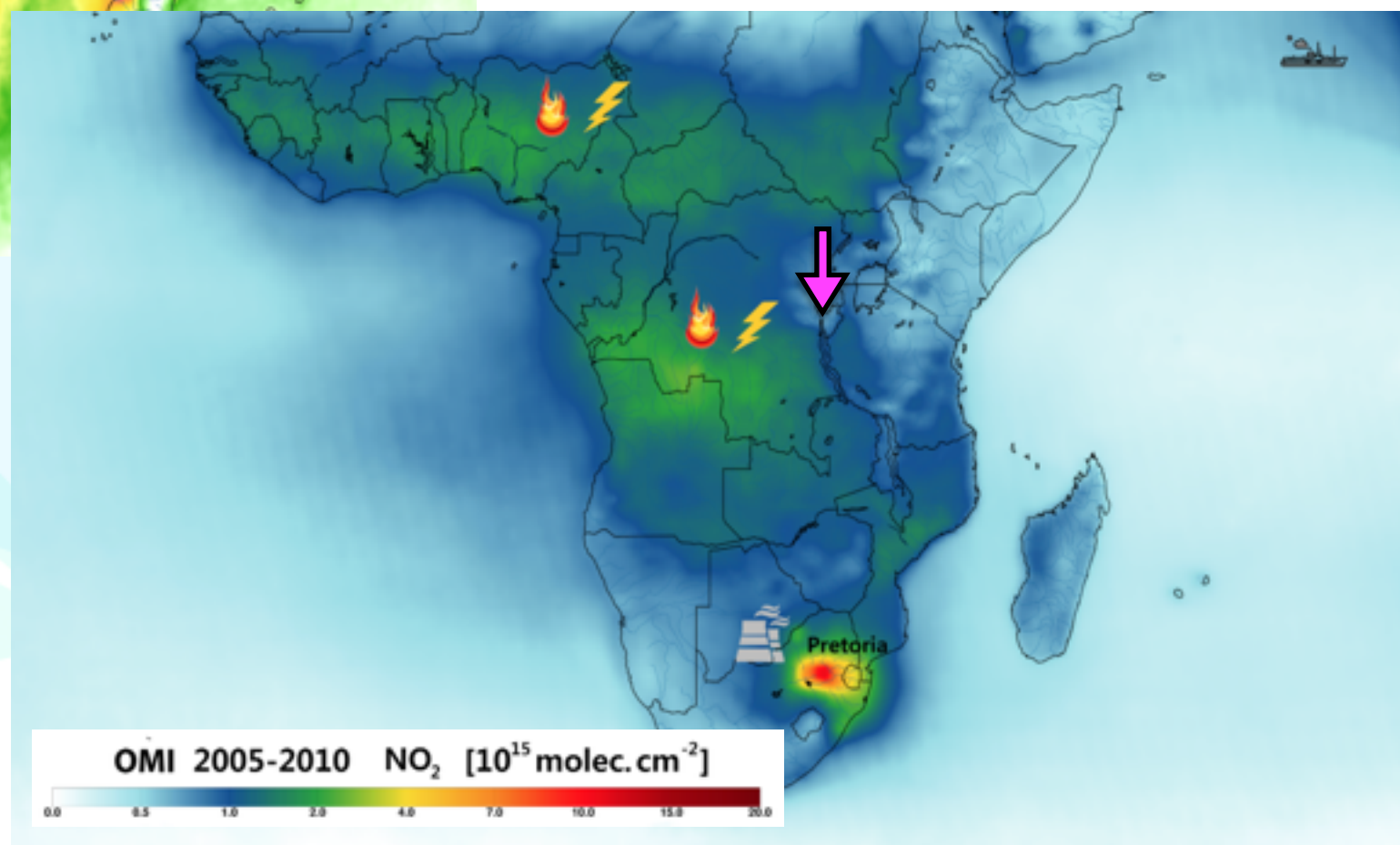
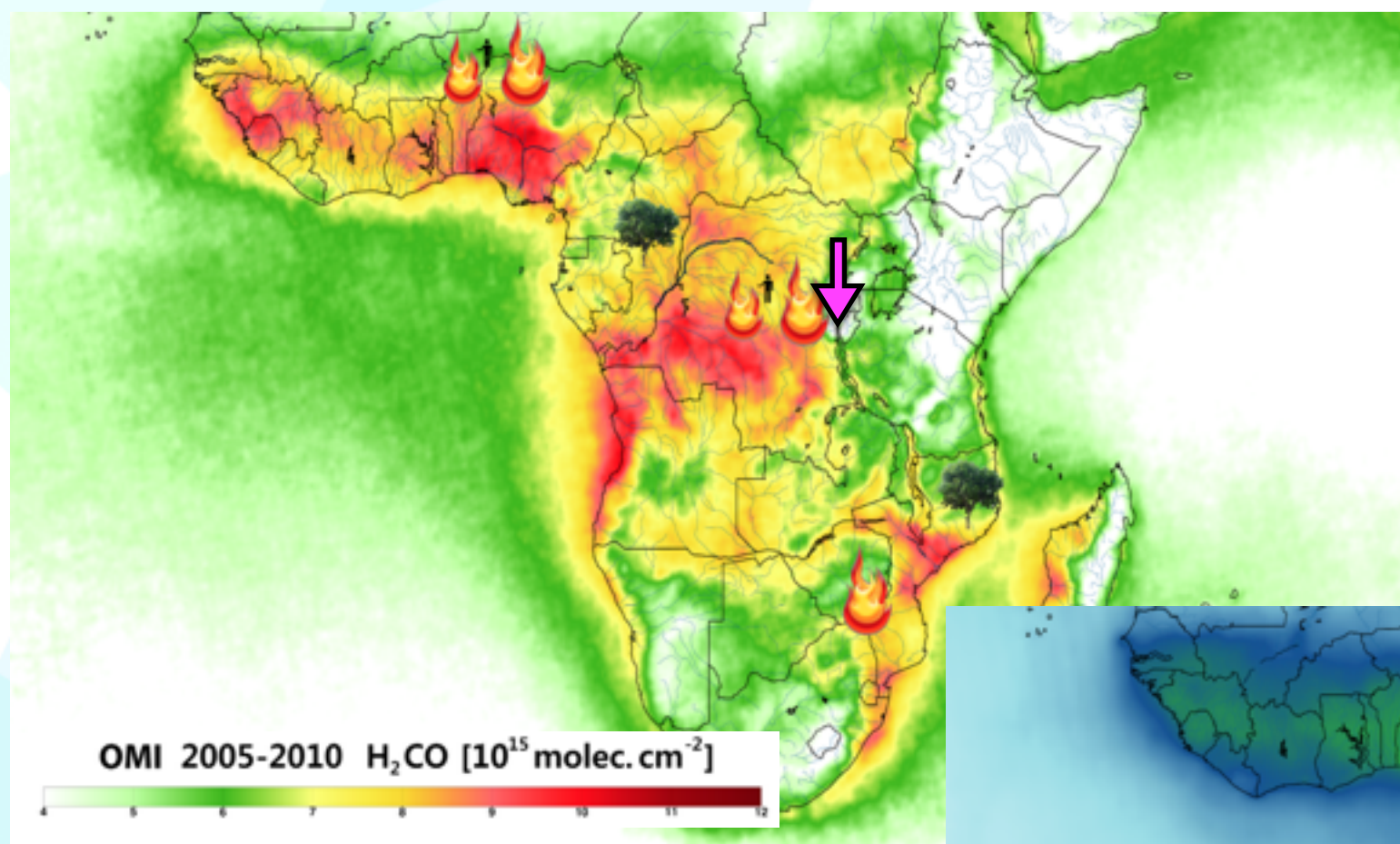
$3.38^{\circ}\text{S} - 29.38^{\circ}\text{E}$
height = 860m



population \approx 500.000

NORS capacity building station

Satellite data: HCHO - NO_2



The Bujumbura station

MAX-DOAS viewing angle =
 85.5° NtoW

→ towards lake

UV and VIS channel

→ aerosols, NO_2 , HCHO, ...

high aerosol conc.



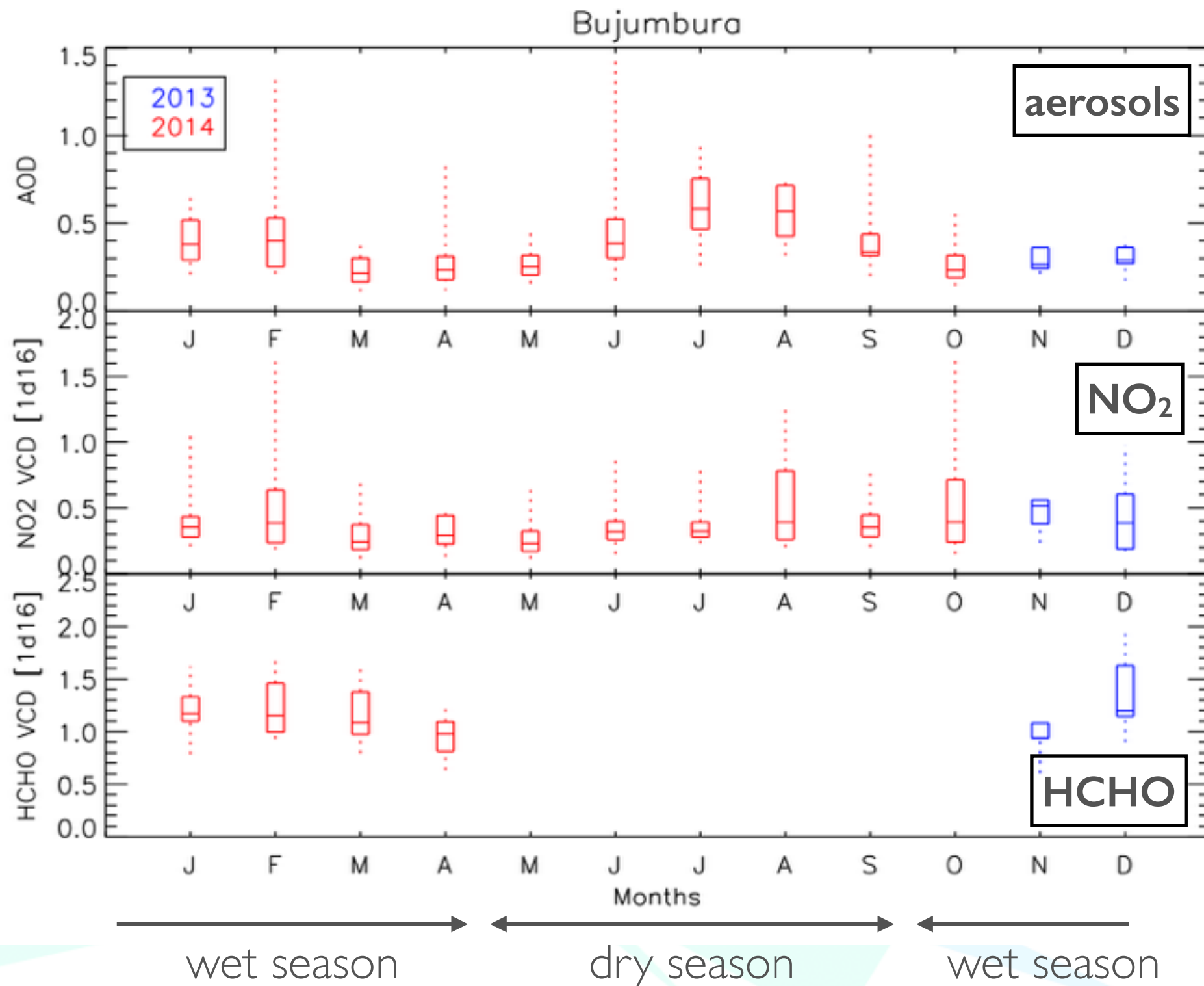
low aerosol conc.



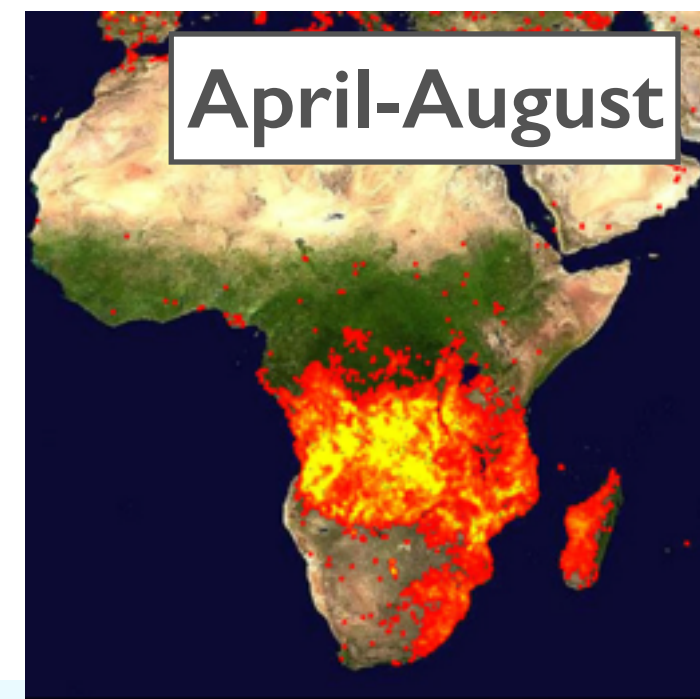
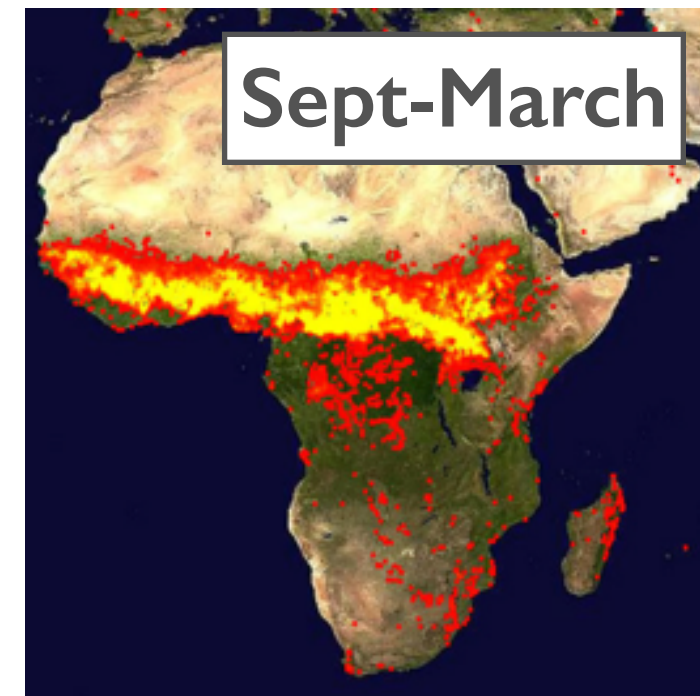
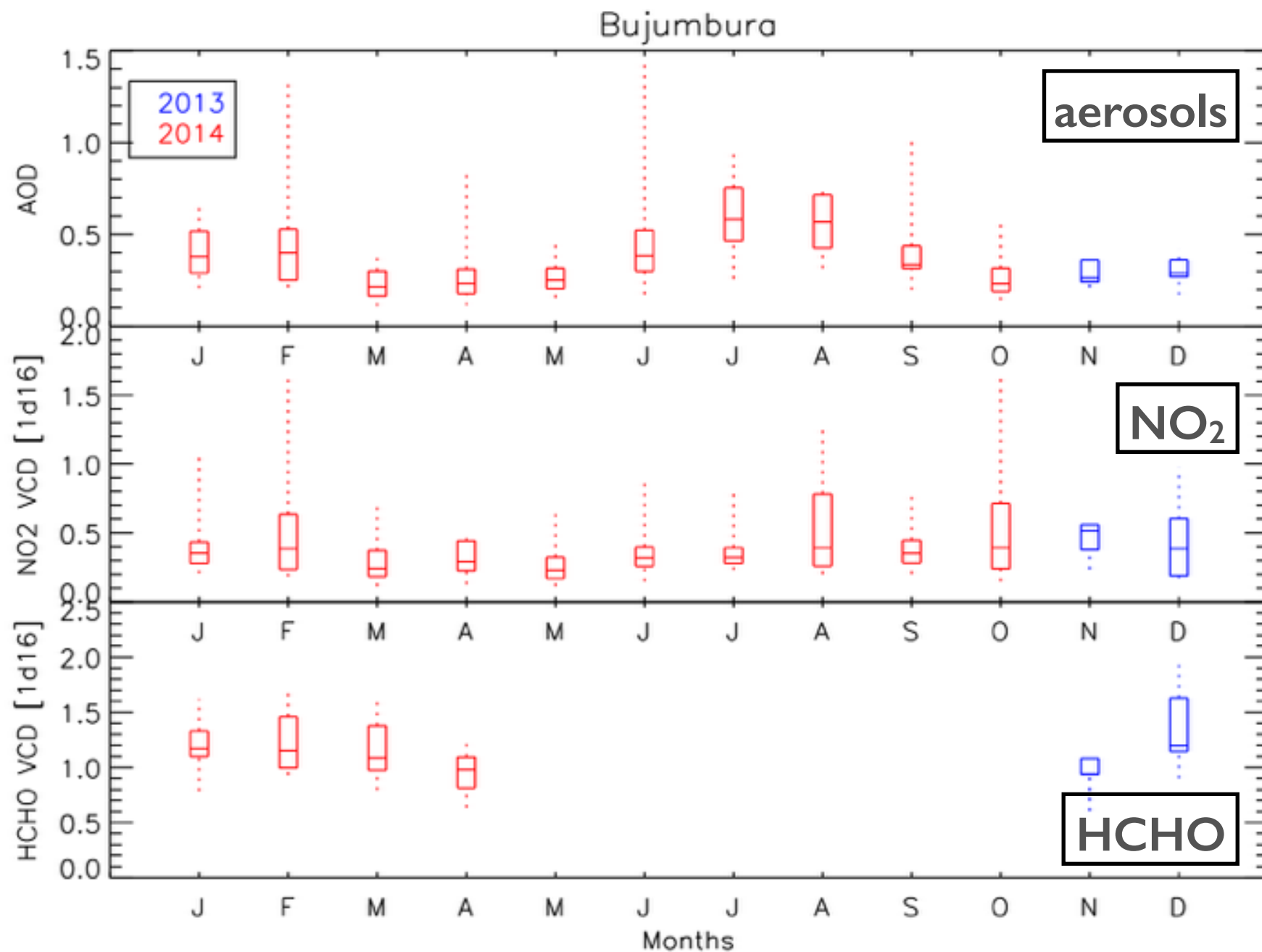
Strong cloud formation
above the lake

Retrievals made using bePRO
OEM radiative transfer code
(Clémer et al., AMT, 2010)

max-DOAS retrievals: Yearly

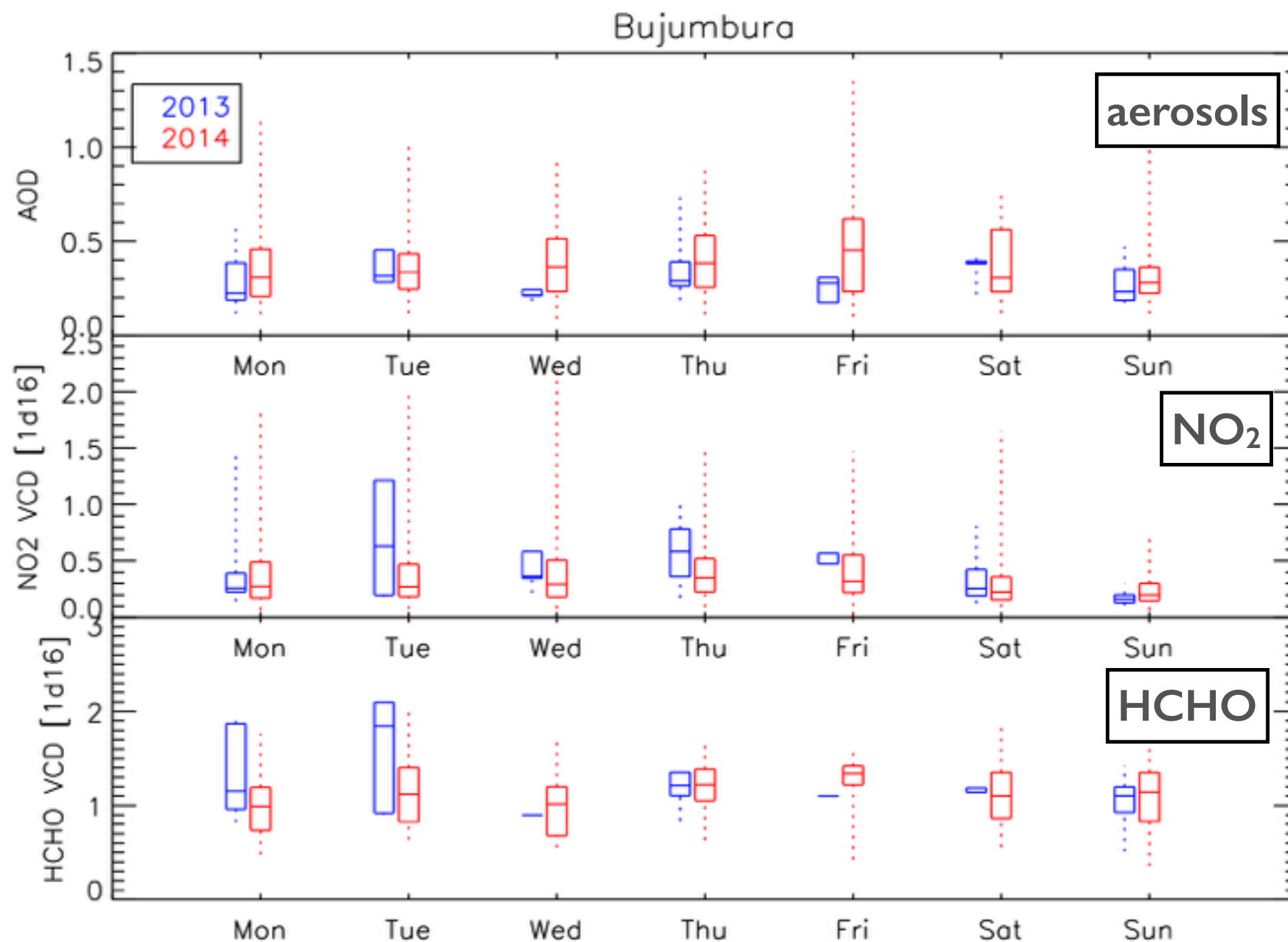


max-DOAS retrievals: Yearly

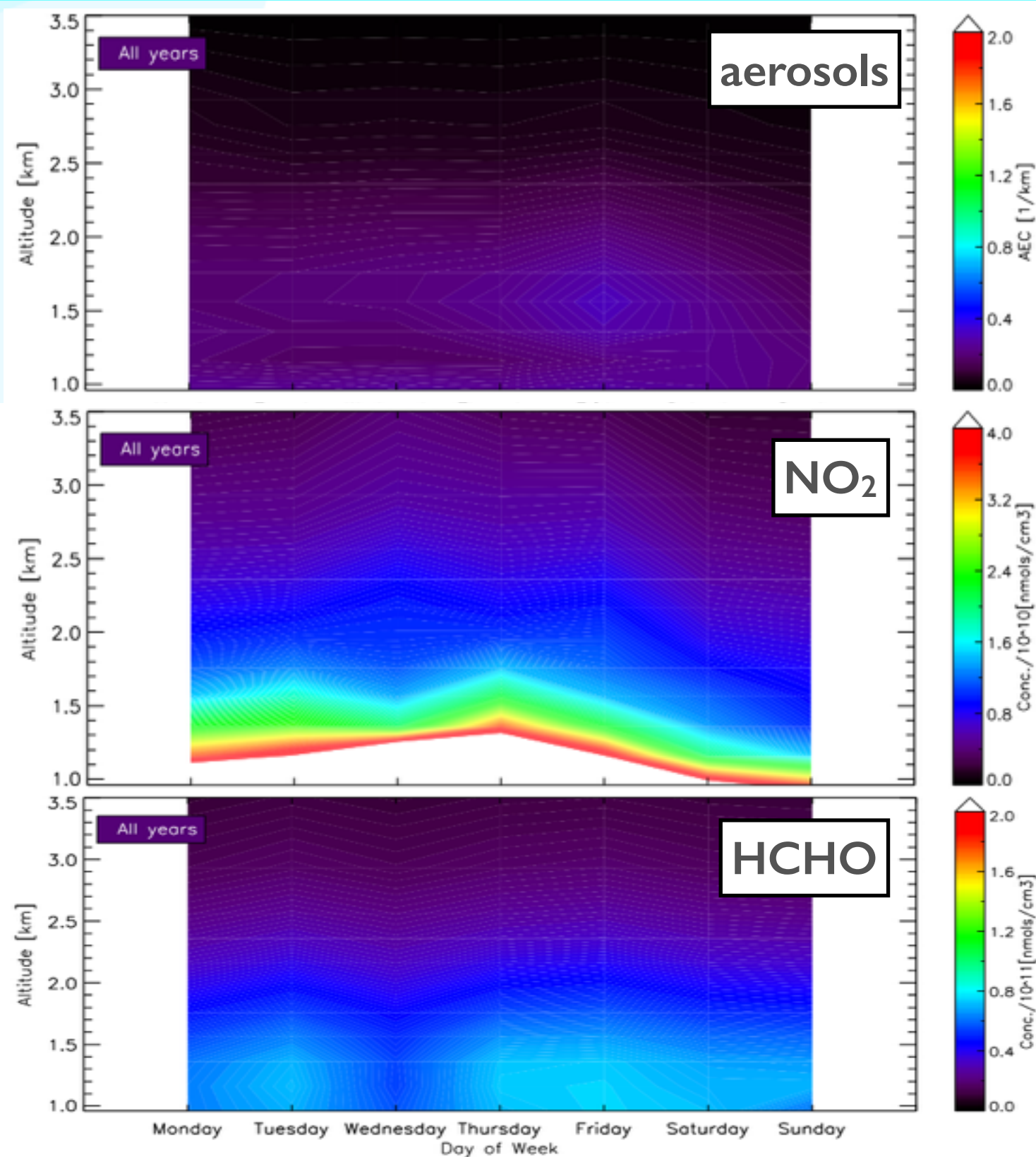


max-DOAS retrievals: Weekly

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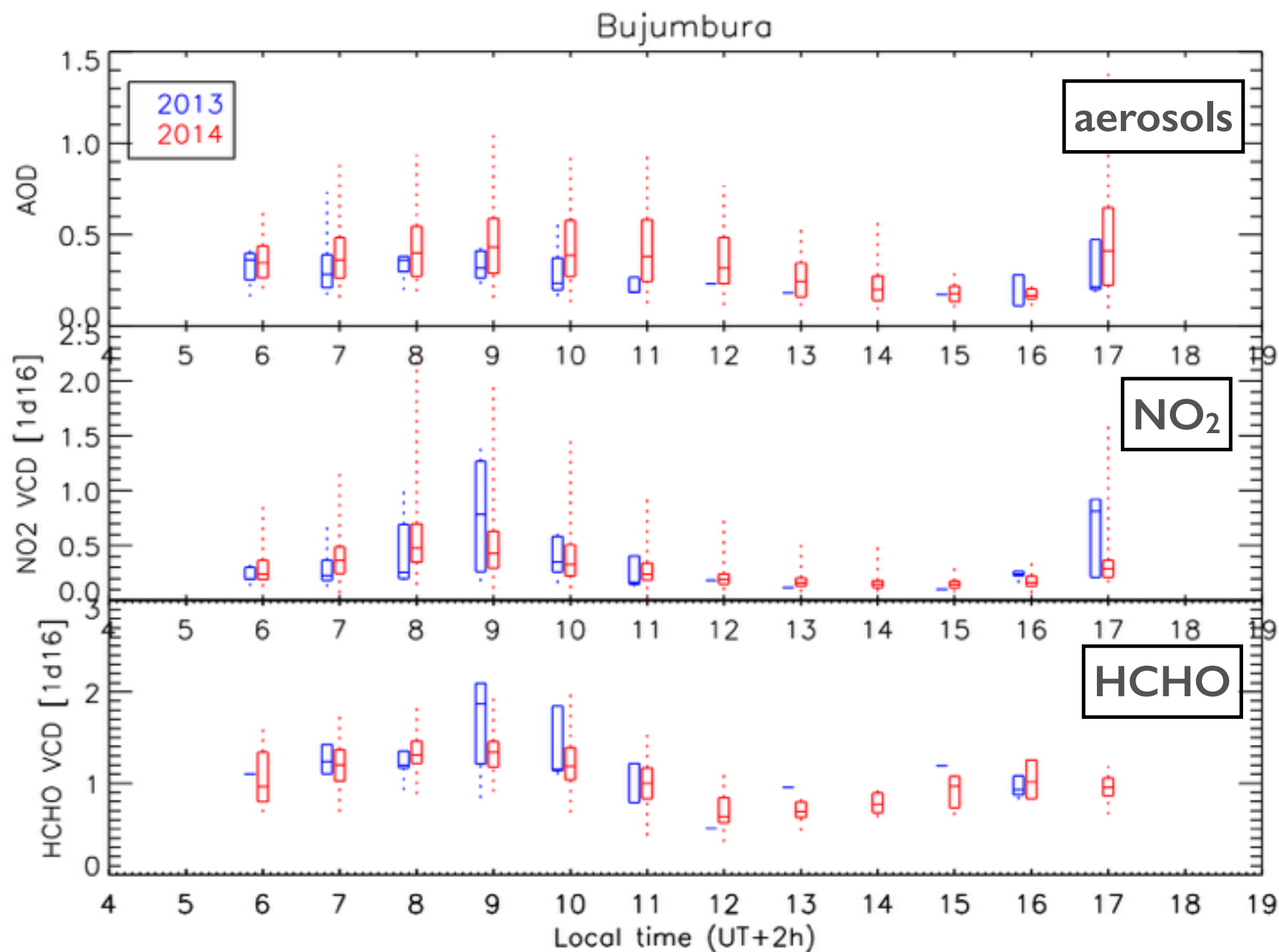


max-DOAS profiles: Weekly

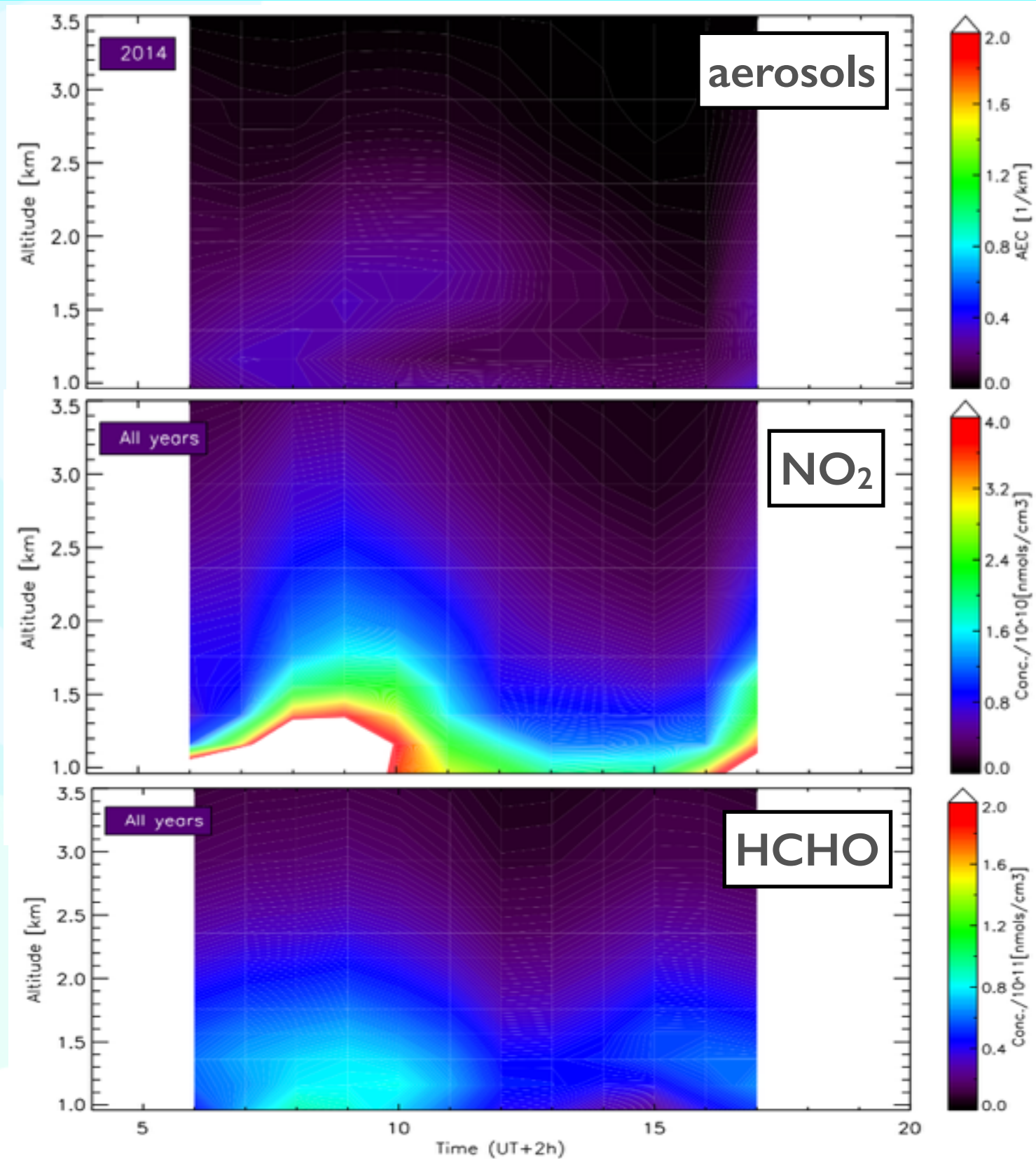


max-DOAS retrievals: Daily

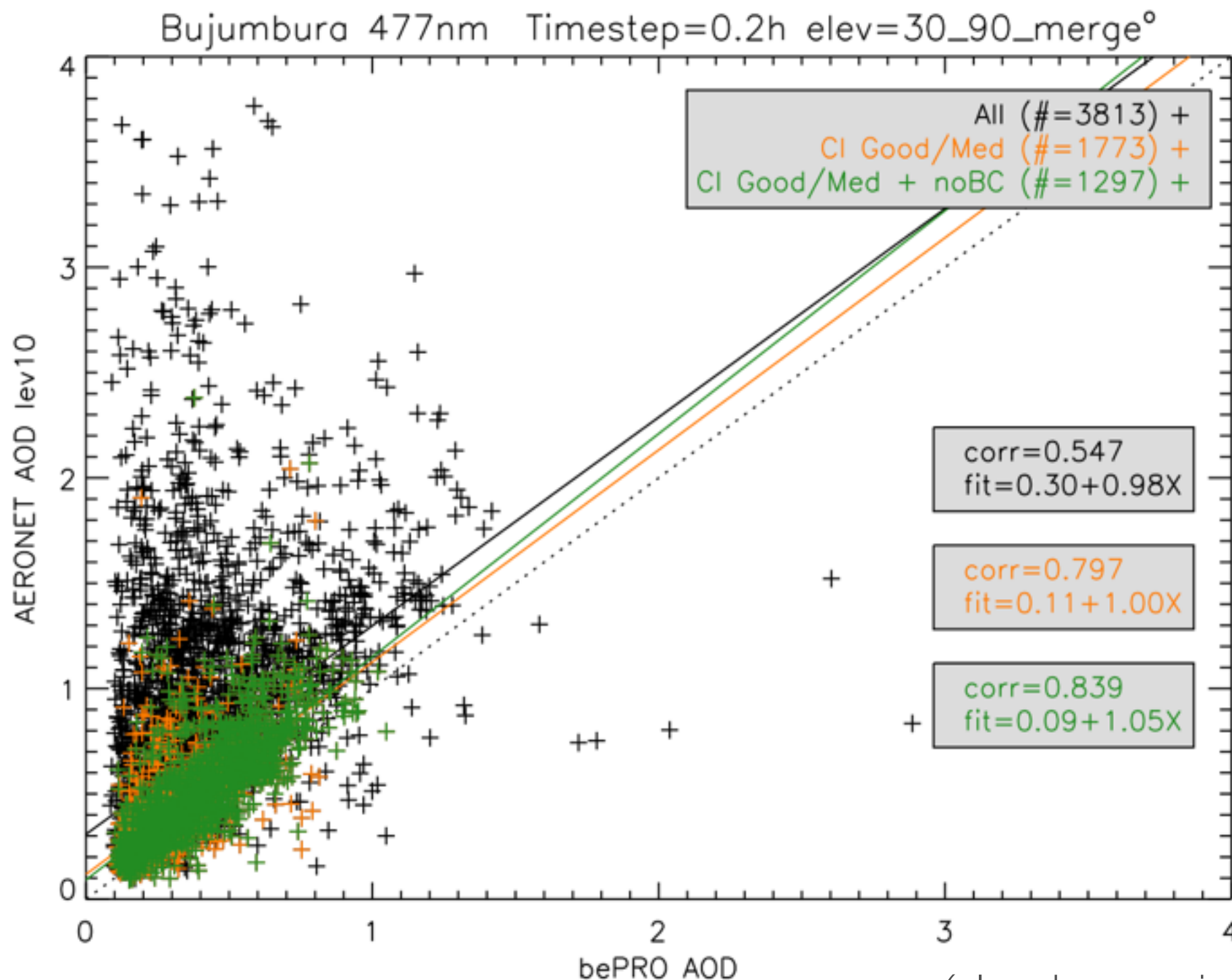
BIRA-IASB 1964-2014



max-DOAS profiles: Daily



Correlation with AERONET



max-DOAS retrievals
< AERONET AOD

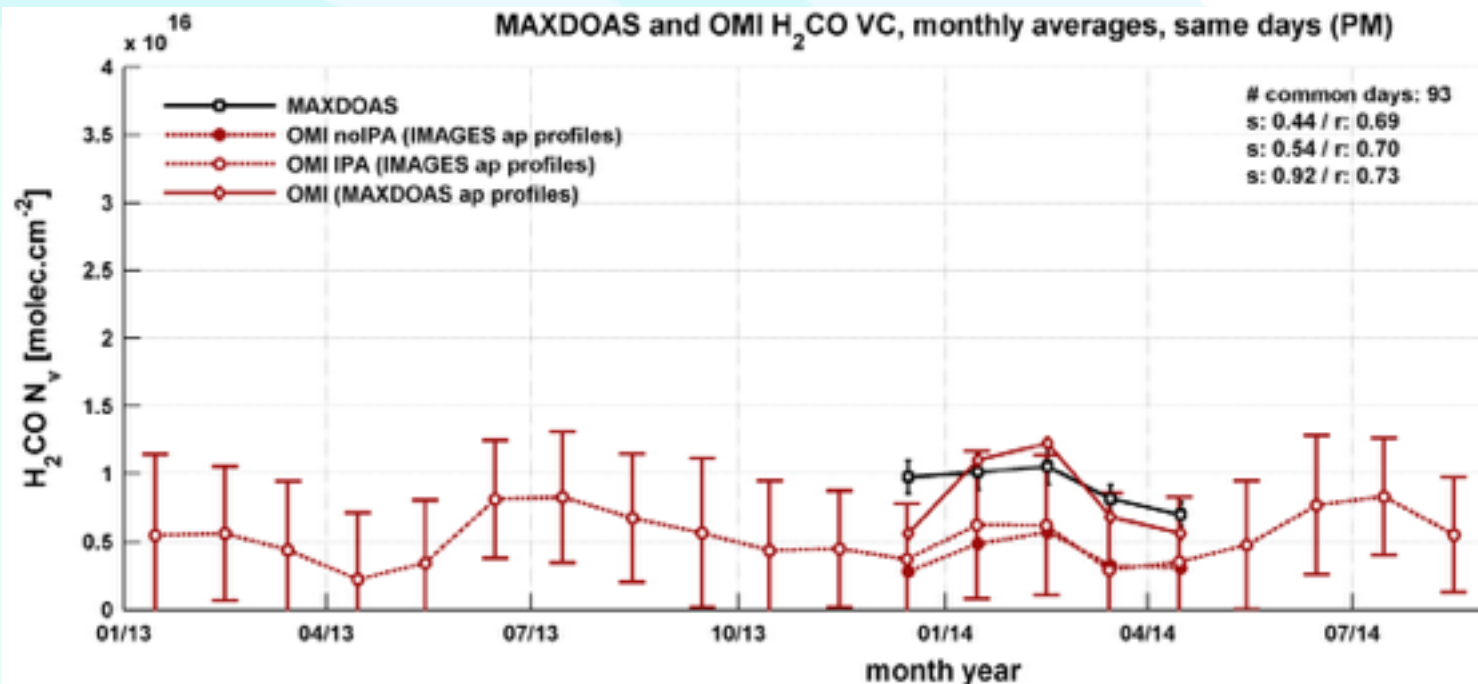
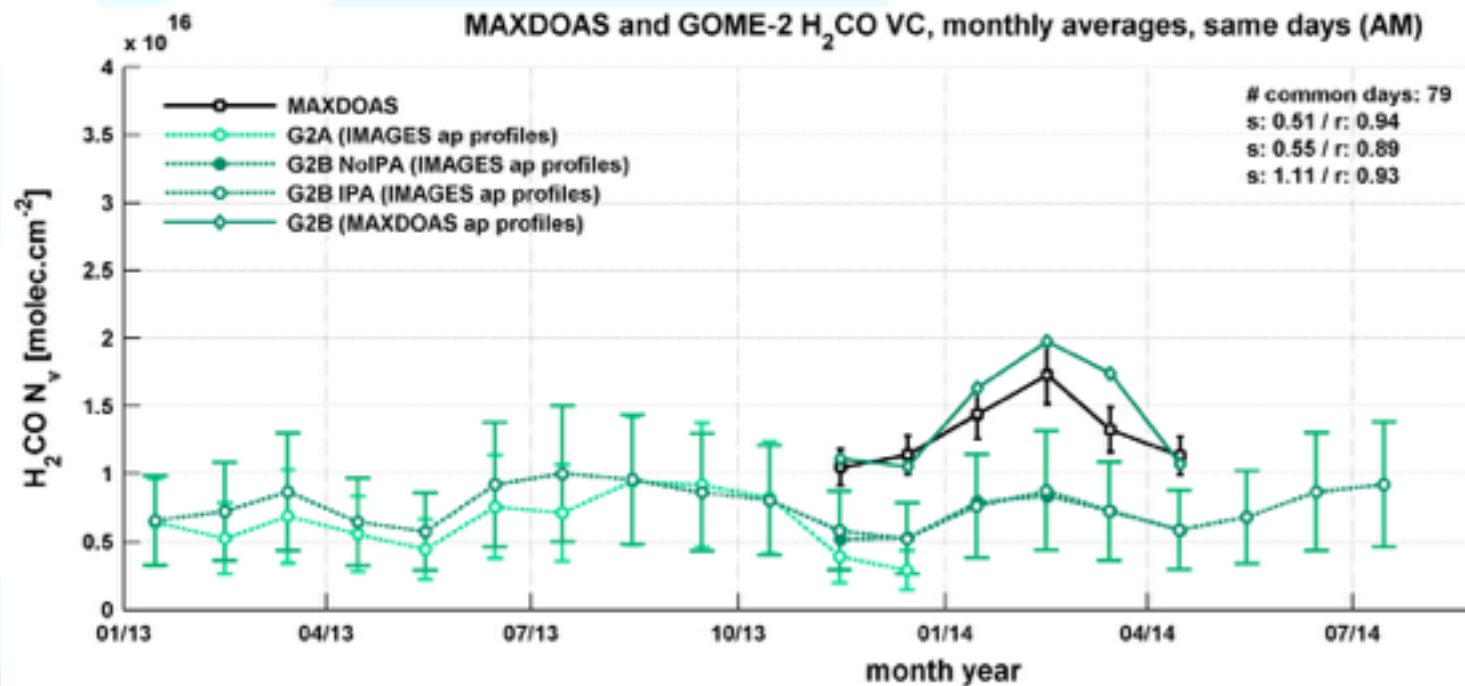
All data: $R=0.55$

Cloud-screened
data: $R=0.84$

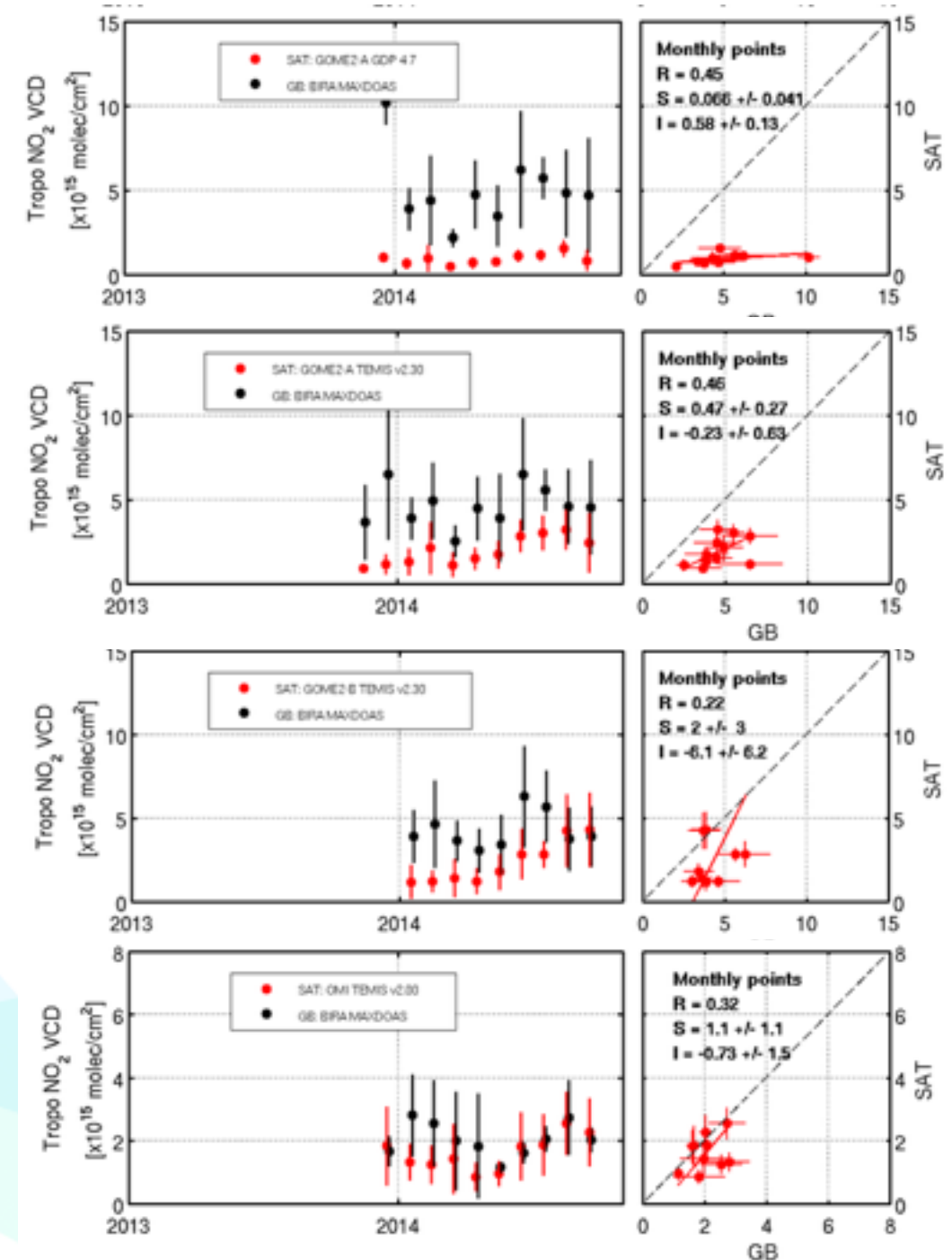
(cloud screening: Gielen et al., AMT, 2014)

Satellite validation

HCHO



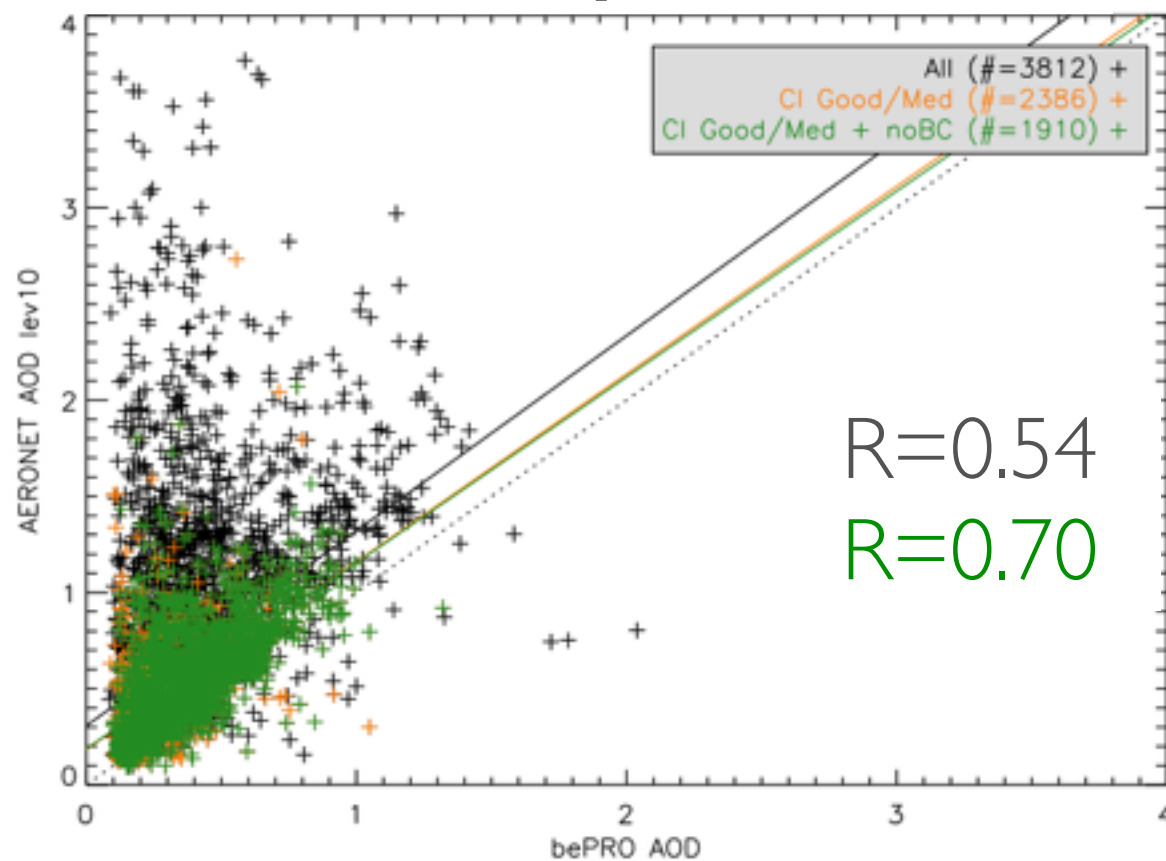
NO₂



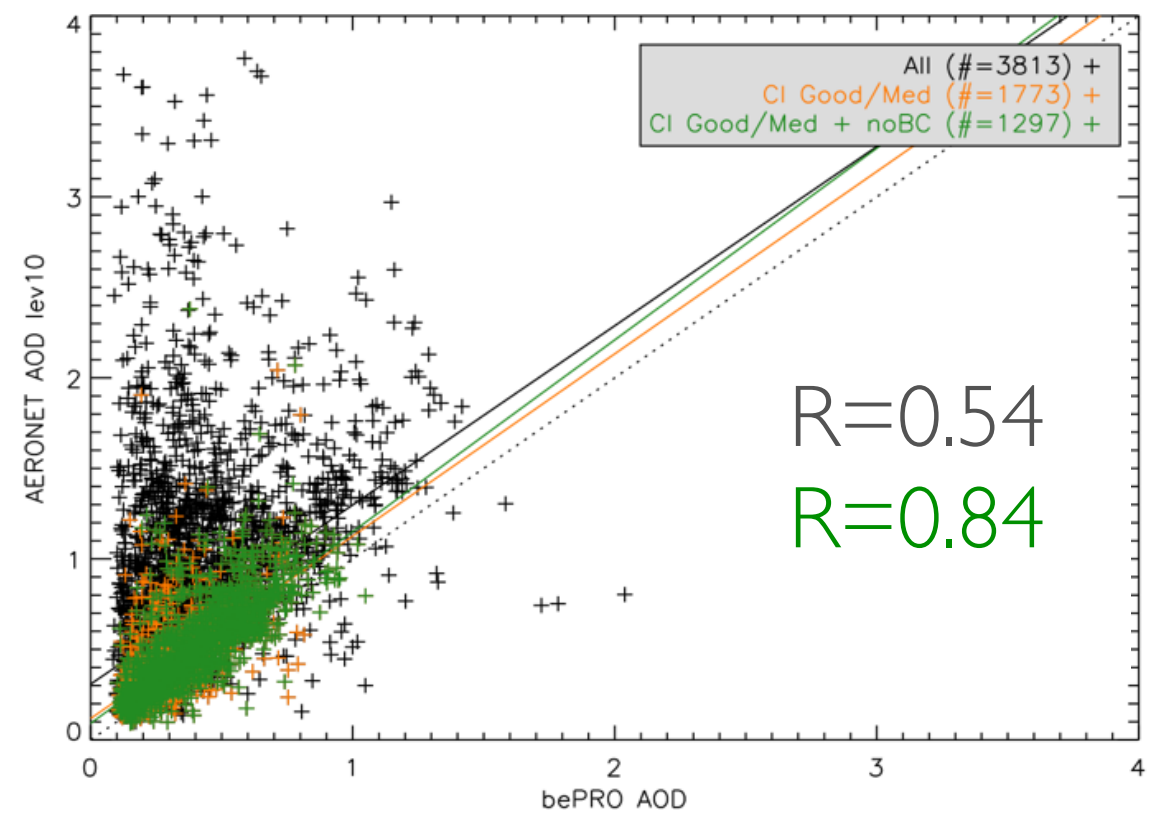
Cloud screening: elevation dependence

Clouds above lake only visible for lower elevations
→ zenith cloud screening not sufficient

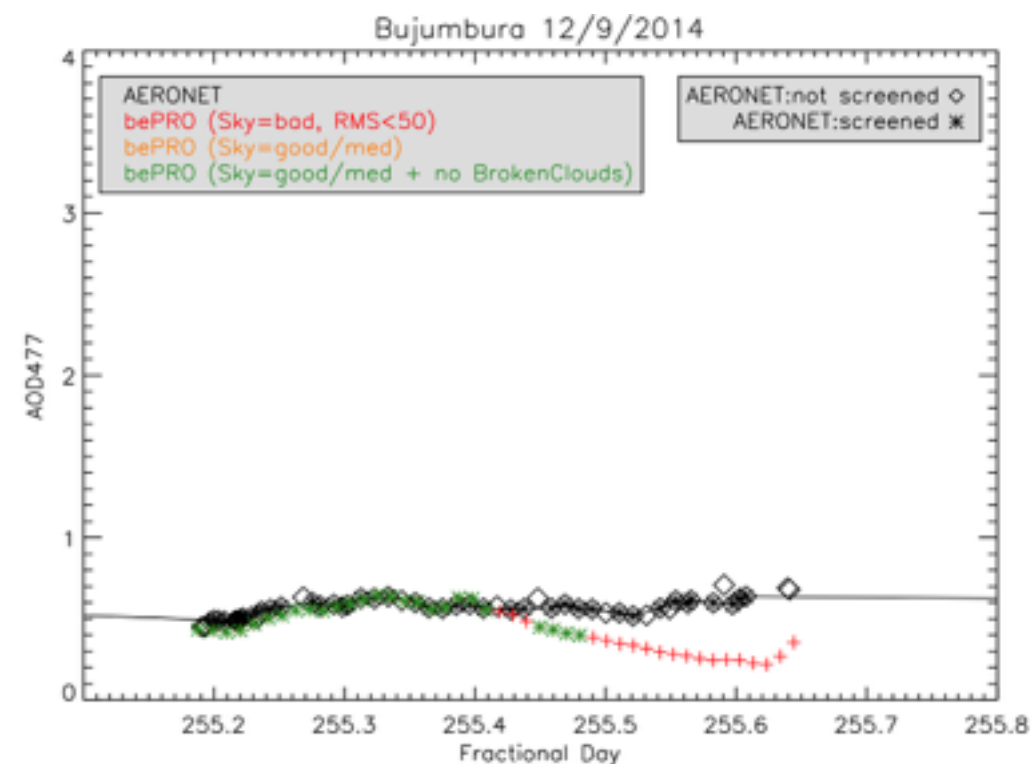
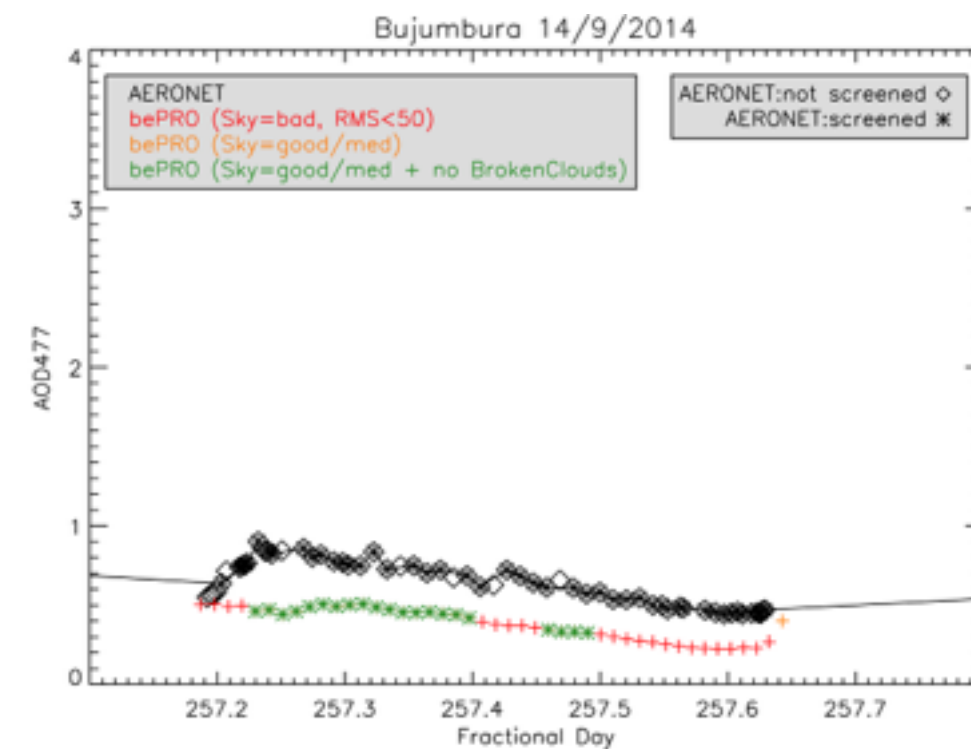
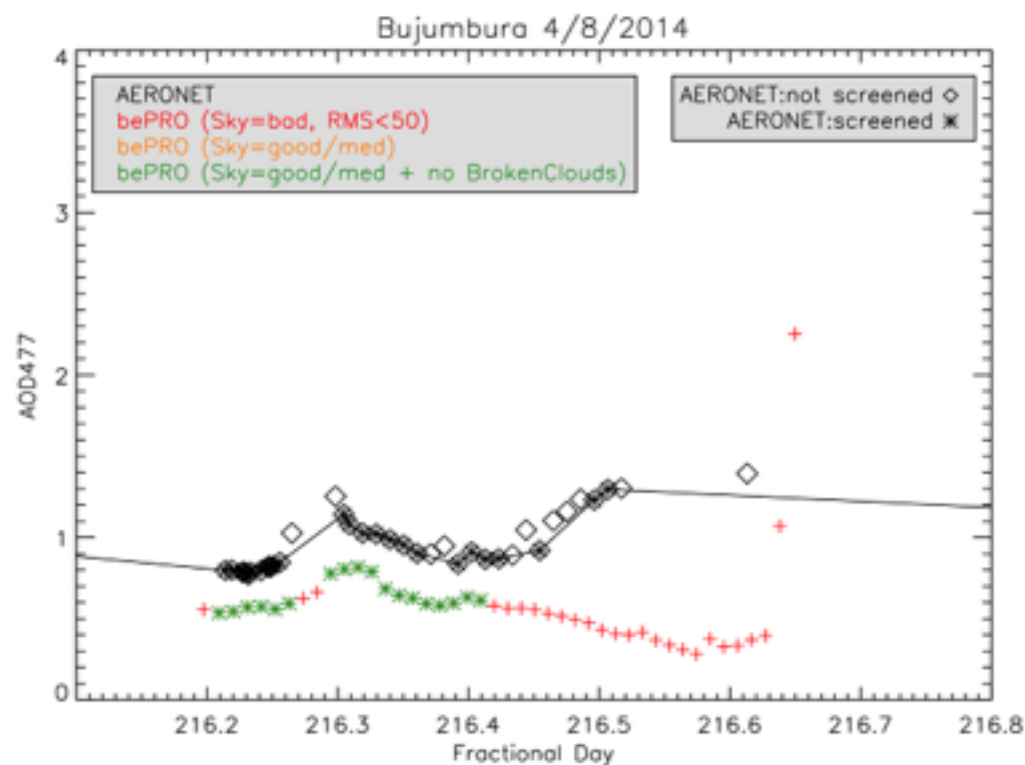
CS: only zenith



CS: 30°+90°



max-DOAS \leftrightarrow AERONET



- max-DOAS retrievals do not reach high AERONET AODs
- deviation from AERONET in afternoon