An AEROCOM intercomparison exercise in organic aerosol modeling

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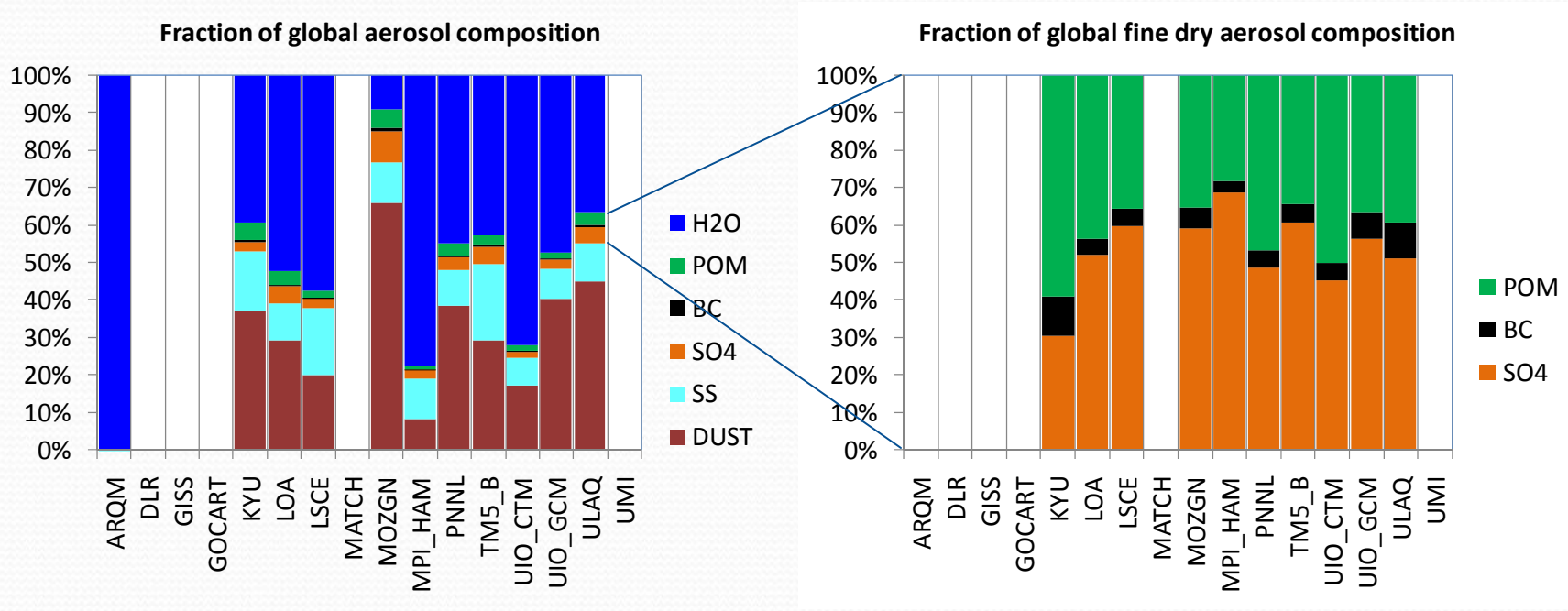
and the AEROCOM modelers

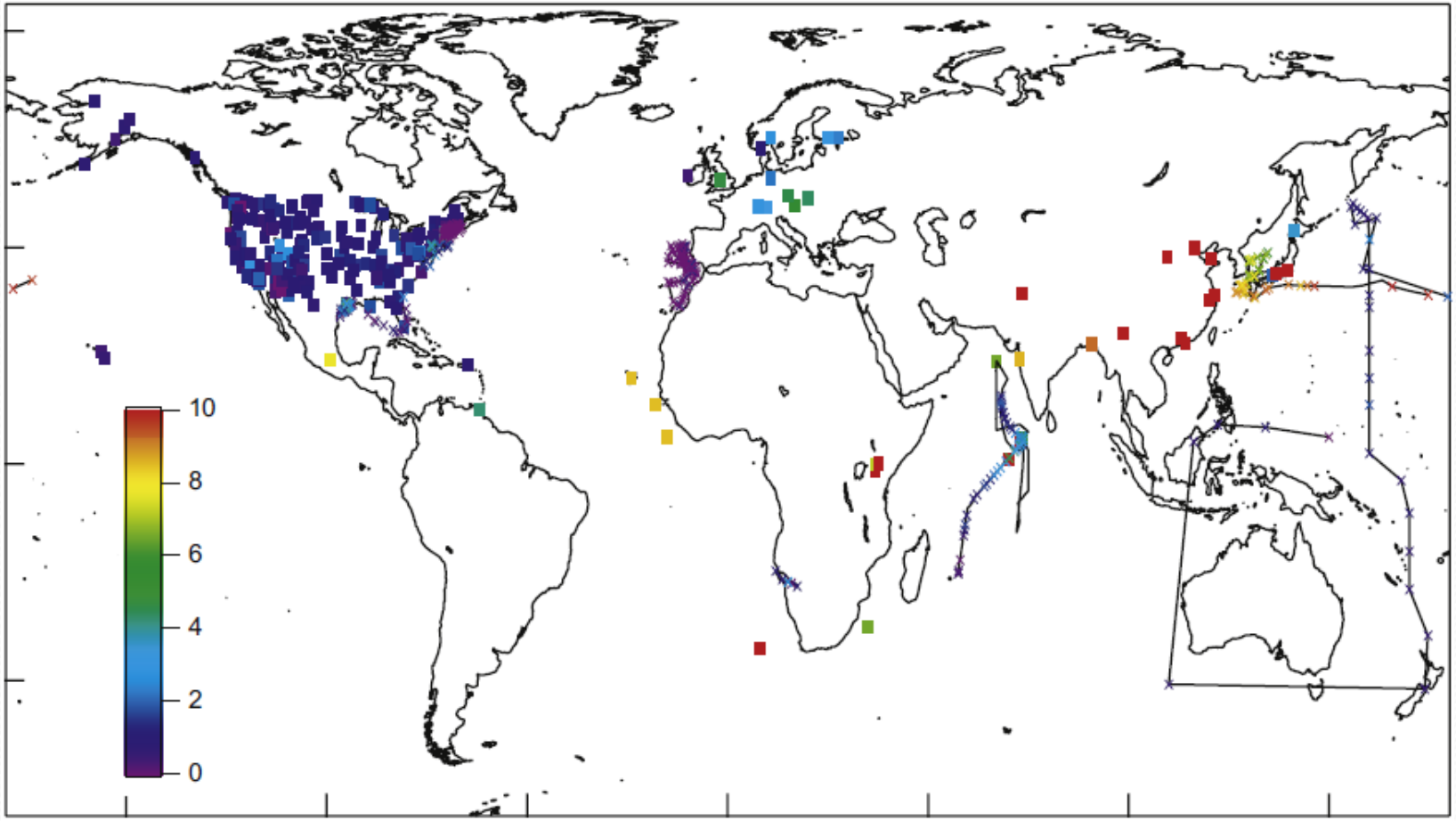
OA within AEROCOM



Modified from Textor et al., 2006

Bahadur et al., 2009

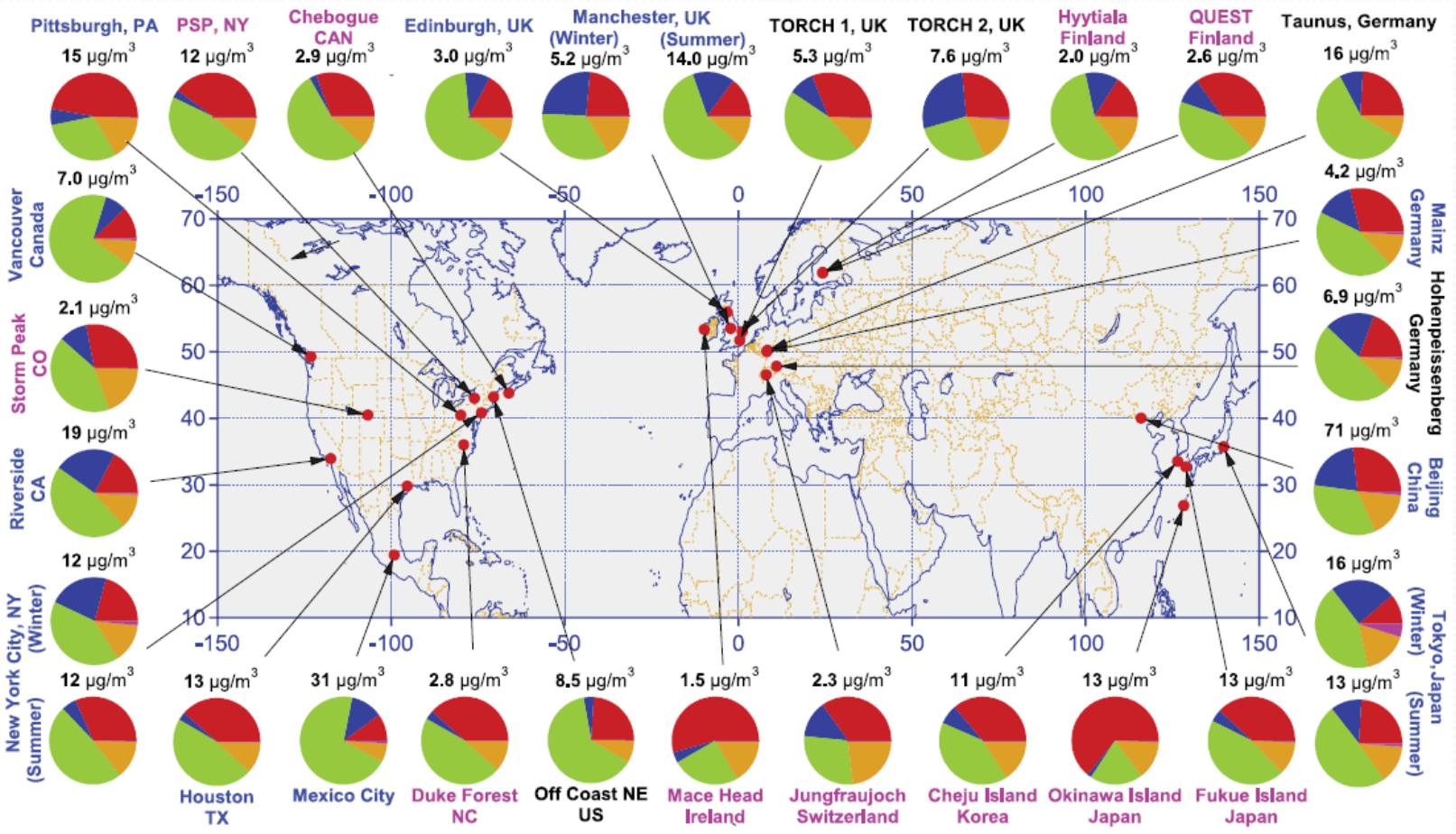
OA measurements – $PM_{2.5}$



Zhang et al., 2007

OA measurements – AMS

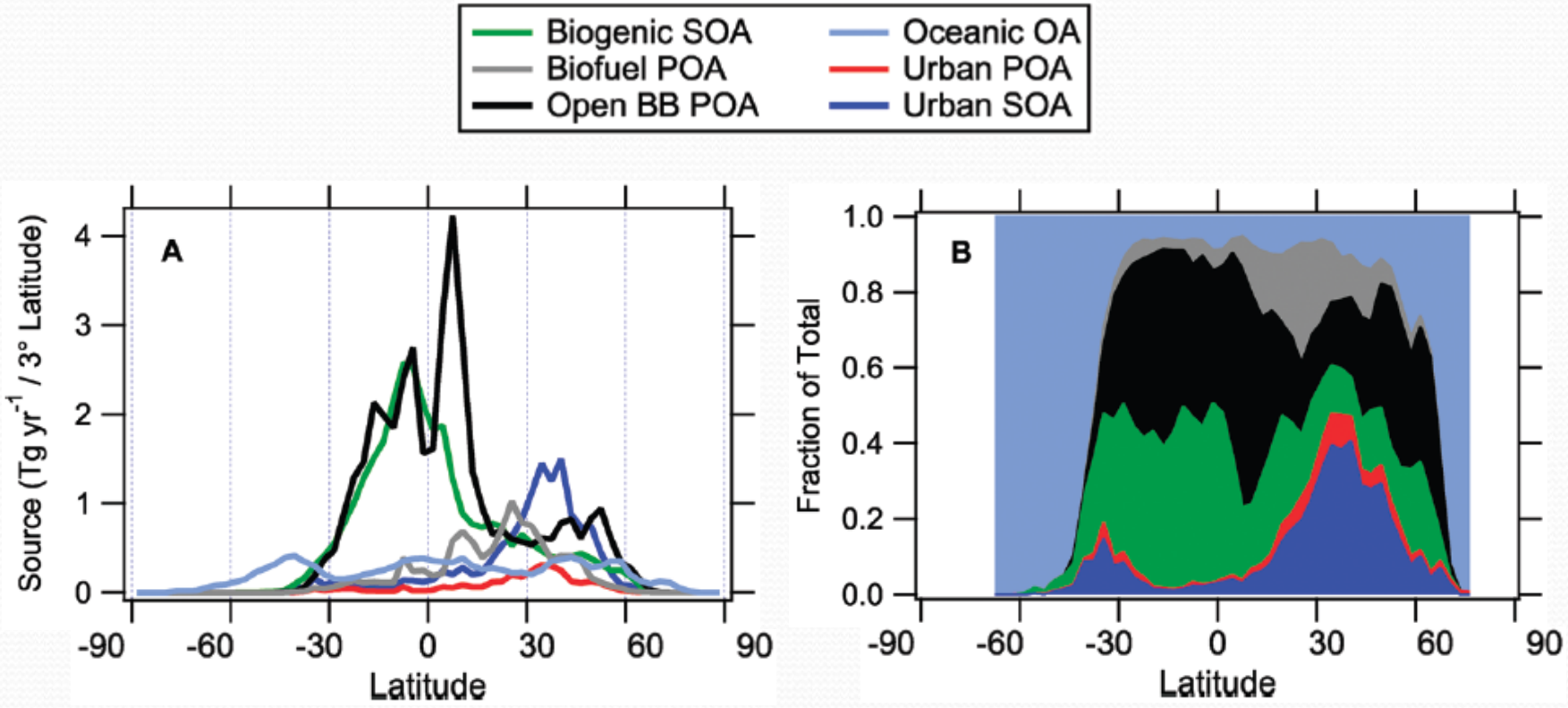
Urban
Urban downwind
Rural/remote



organics (green), sulfate (red), nitrate (blue), ammonium (orange), and chloride (purple), of NR-PM_1

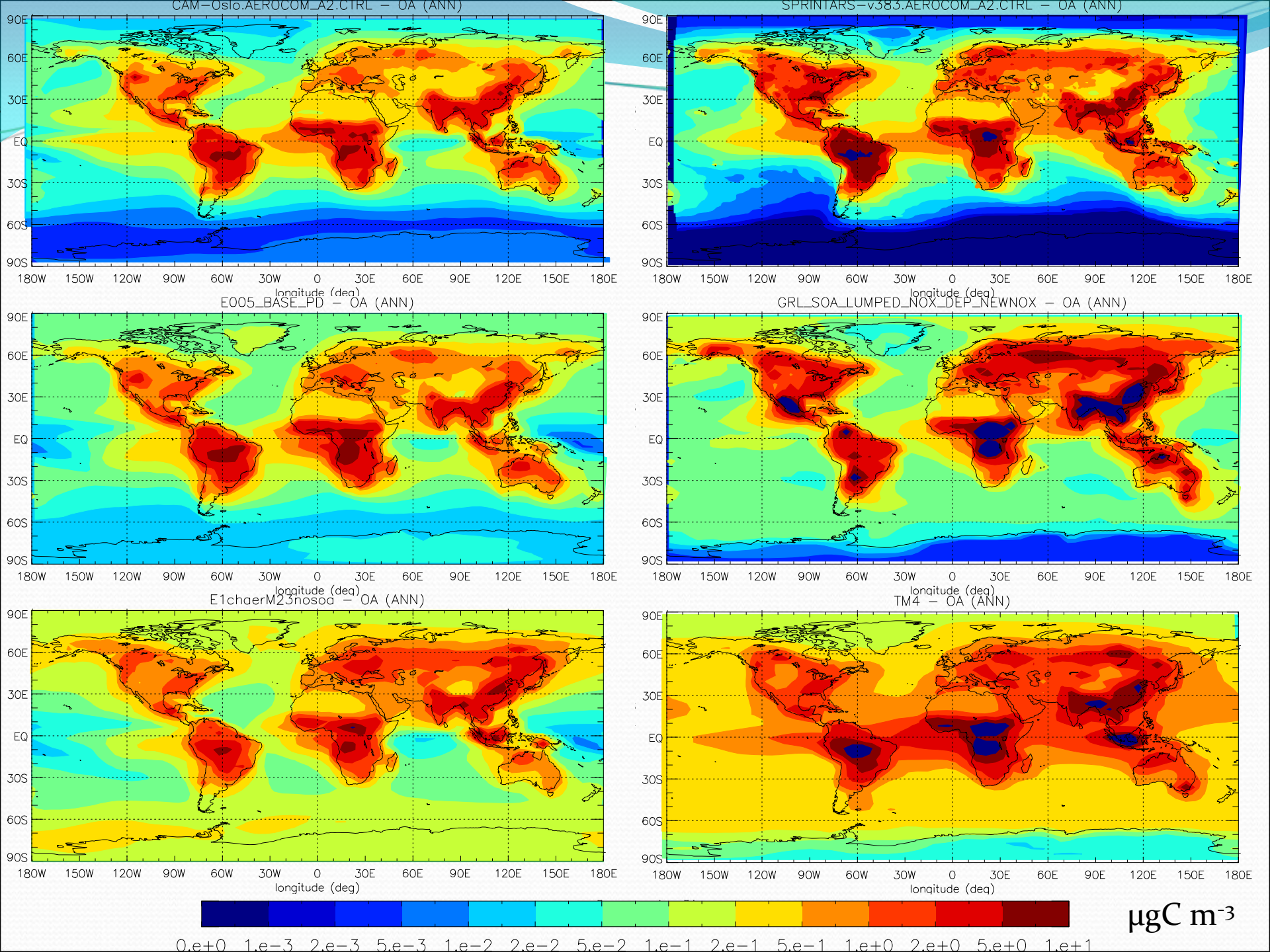
De Gouw and Jimenez, 2009

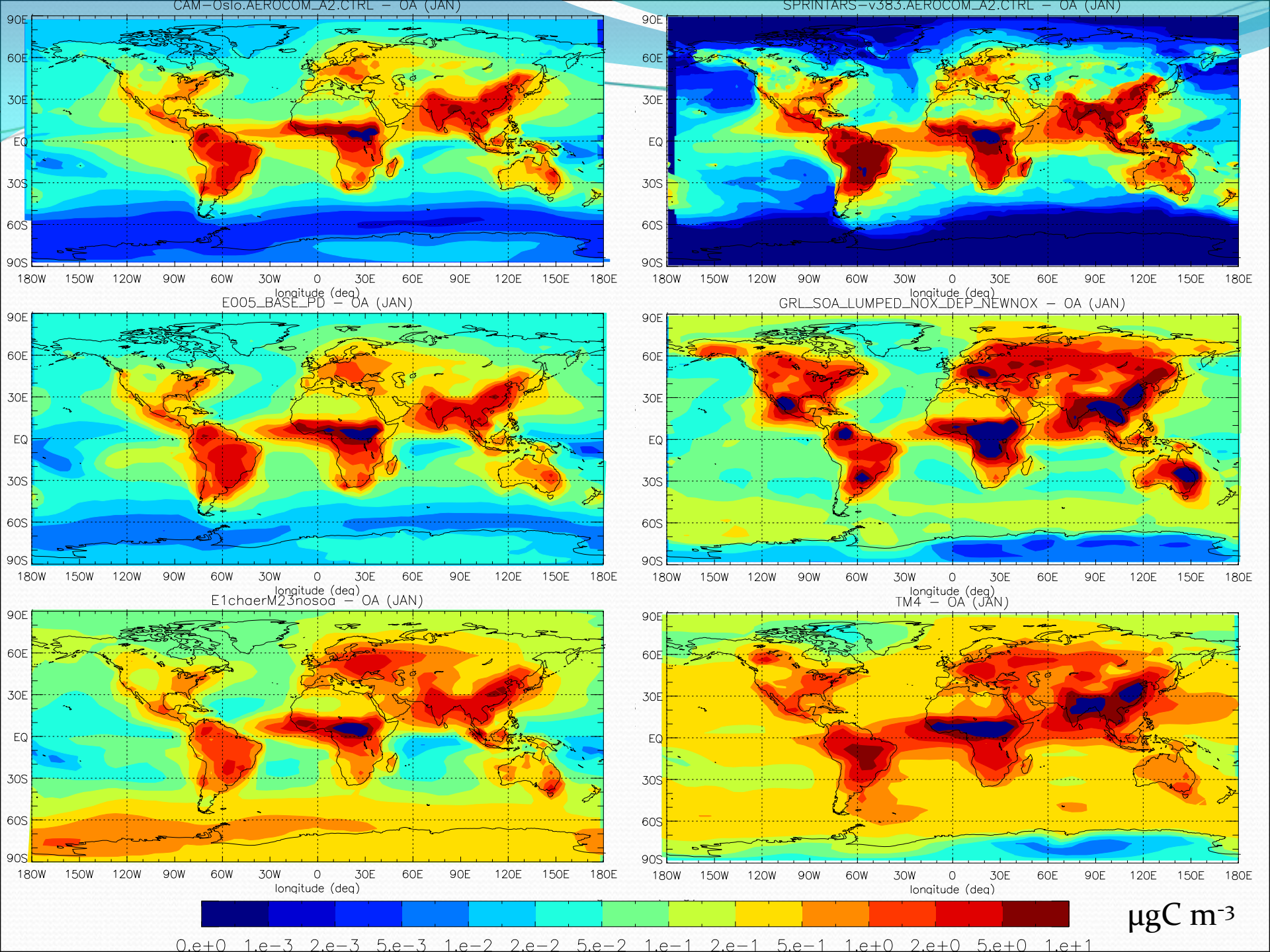
Latitudinal distribution



Estimate, based on measurements

CAM-Oslo Oceanic POA, increased SOA	**SPRINTARS** Finest resolution
GISS MATRIX Includes detailed microphysics	**TM3** Includes SOA form. dependence on NOx
GISS modelE SOA yield based on terpene emissions	**TM4** Includes marine and cloud SOA source


CAM−Oslo.AEROCOM_A2.CTRL − OA (ANN)
SPRINTARS−v383.AEROCOM_A2.CTRL − OA (ANN)
E005_BASE_PD − OA (ANN)
GRL_SOA_LUMPED_NOX_DEP_NEWNOX − OA (ANN)
E1chaerM23nosoa − OA (ANN)
TM4 − OA (ANN)
90E
60E
30E
EQ
30S
60S
90S
180W 150W 120W 90W 60W 30W 0 30E 60E 90E 120E 150E 180E
longitude (deg)
0.e+0 1.e−3 2.e−3 5.e−3 1.e−2 2.e−2 5.e−2 1.e−1 2.e−1 5.e−1 1.e+0 2.e+0 5.e+0 1.e+1
μgC m-3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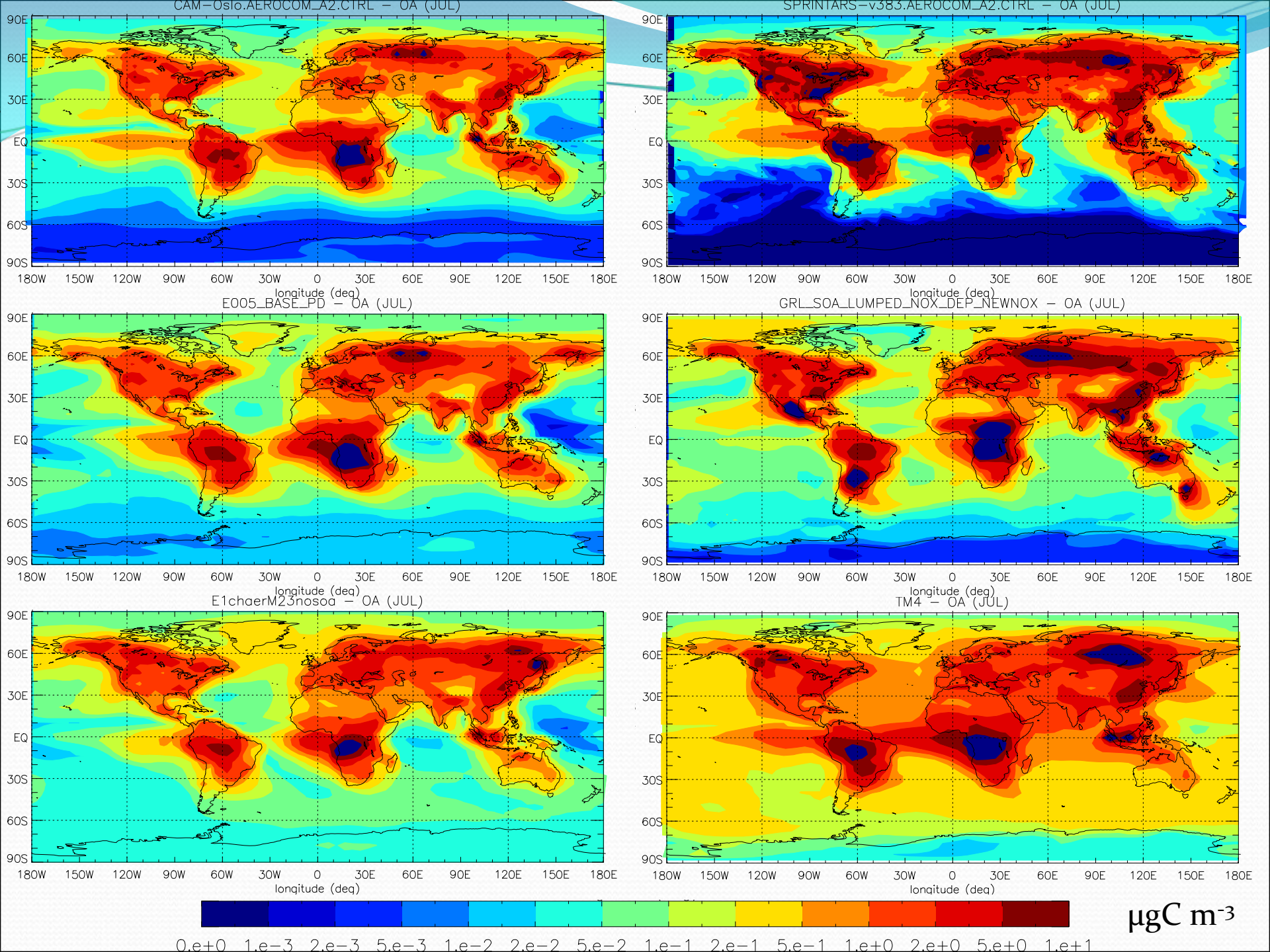
E005_BASE_PD − OA (JAN)
GRL_SOA_LUMPED_NOX_DEP_NEWNOX − OA (JAN)
E1chaerM23nosoa − OA (JAN)
TM4 − OA (JAN)
90E
60E
30E
EQ
30S
60S
90S
180W 150W 120W 90W 60W 30W 0 30E 60E 90E 120E 150E 180E
longitude (deg)
0.e+0 1.e−3 2.e−3 5.e−3 1.e−2 2.e−2 5.e−2 1.e−1 2.e−1 5.e−1 1.e+0 2.e+0 5.e+0 1.e+1
µgC m-3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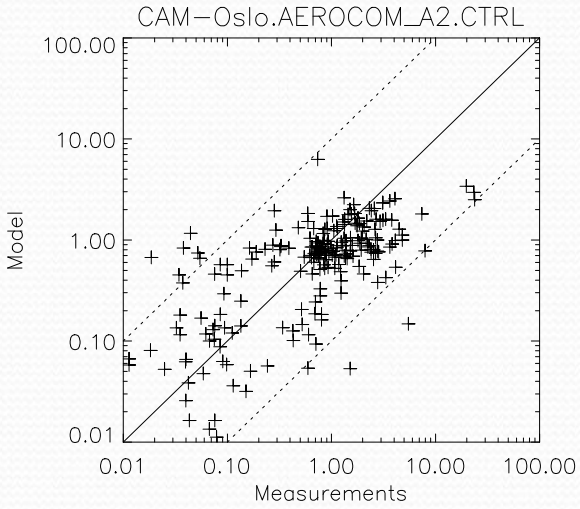
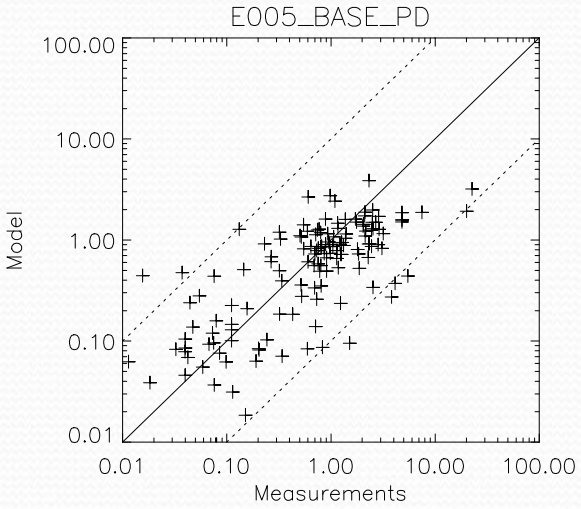
E005_BASE_PD − OA (JUL)
GRL_SOA_LUMPED_NOX_DEP_NEWNOX − OA (JUL)
E1chaerM23nosoa − OA (JUL)
TM4 − OA (JUL)
90E
60E
30E
EQ
30S
60S
90S
180W 150W 120W 90W 60W 30W 0 30E 60E 90E 120E 150E 180E
longitude (deg)
0.e+0 1.e−3 2.e−3 5.e−3 1.e−2 2.e−2 5.e−2 1.e−1 2.e−1 5.e−1 1.e+0 2.e+0 5.e+0 1.e+1
µgC m-3

Annual mean

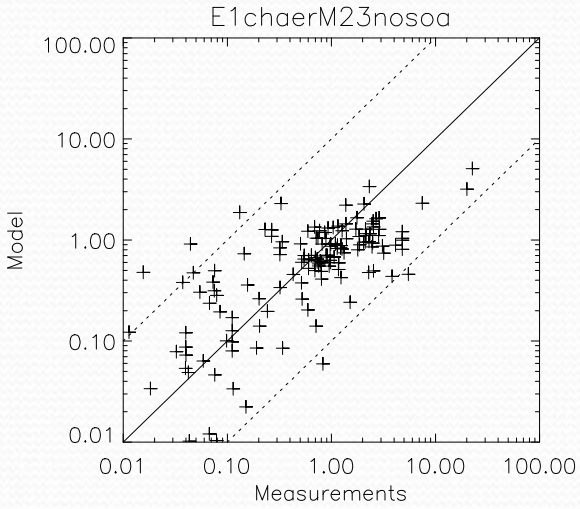
CAM-Oslo

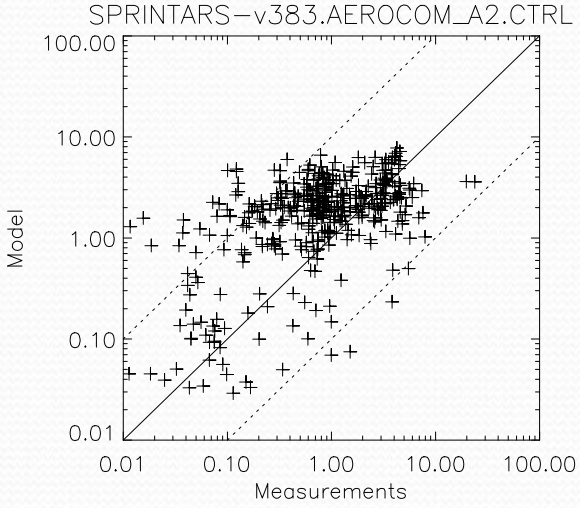


GISS MATRIX

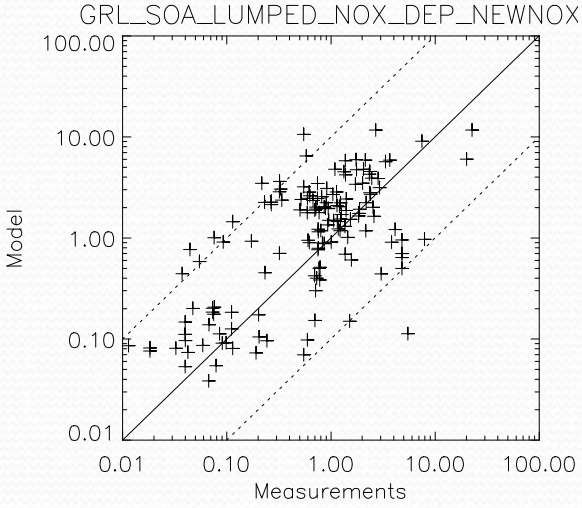


GISS modelE

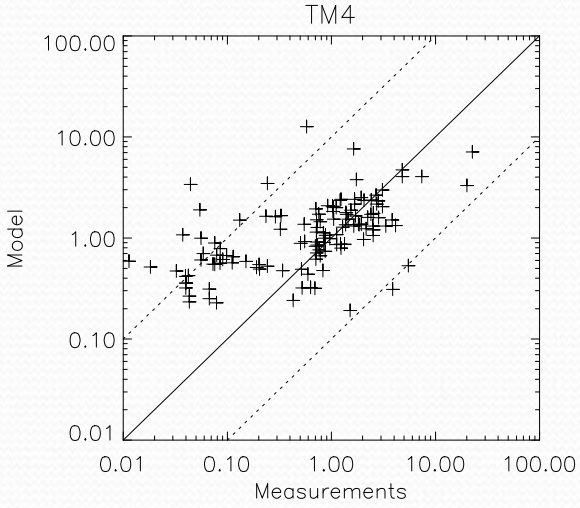




SPRINTARS



TM3

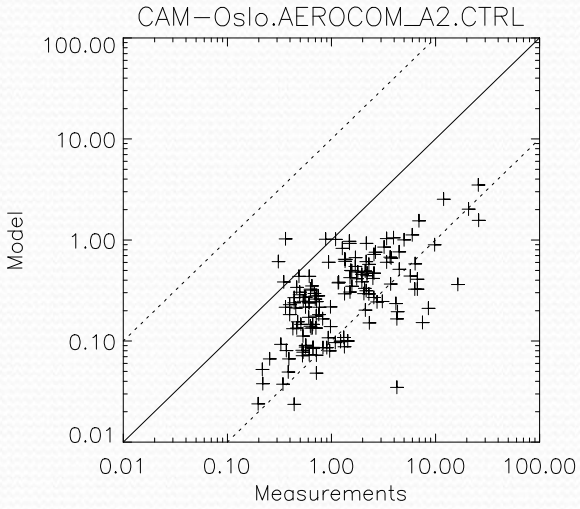


TM4

μgC m^{-3}

January

CAM-Oslo



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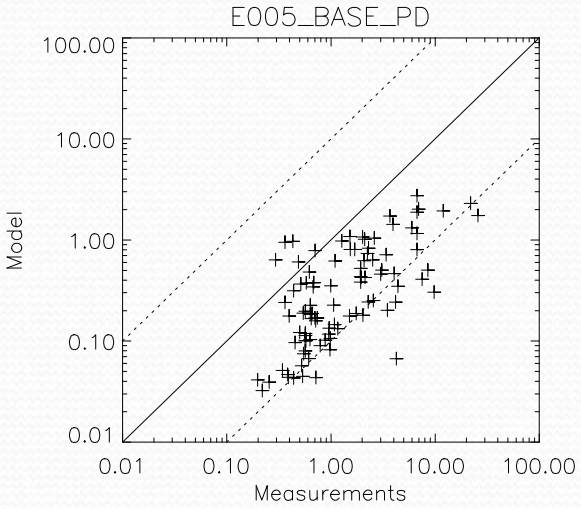
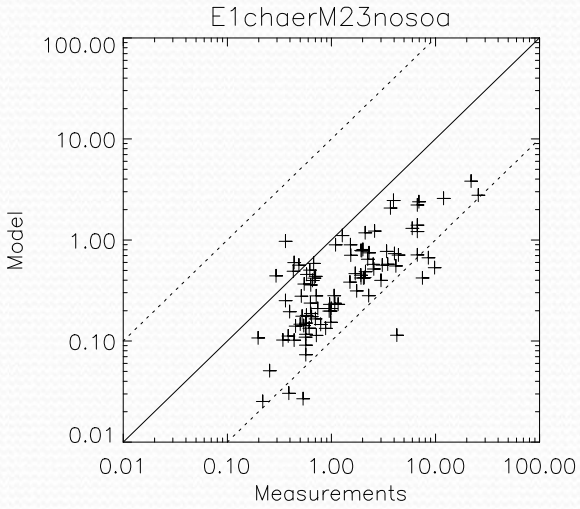
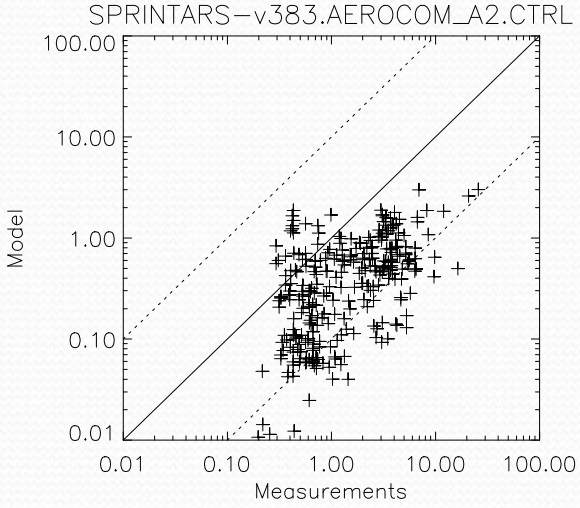


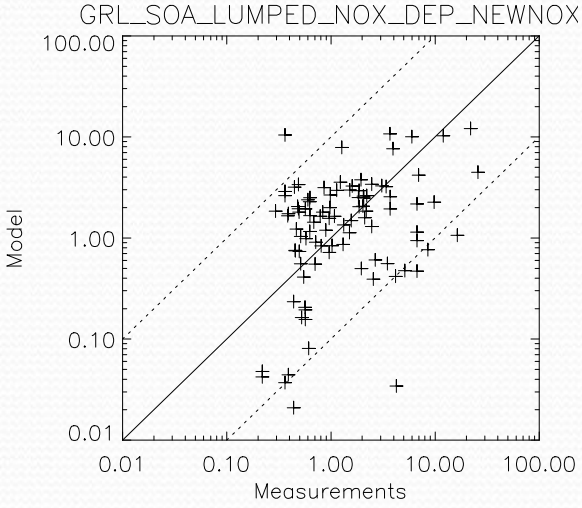
GISS modelE



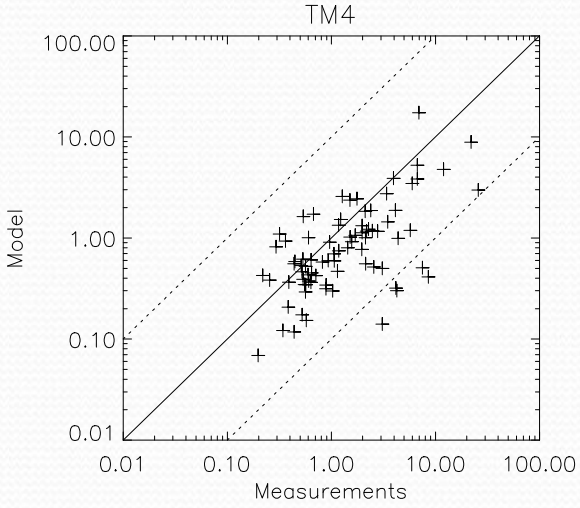
SPRINTARS



TM3



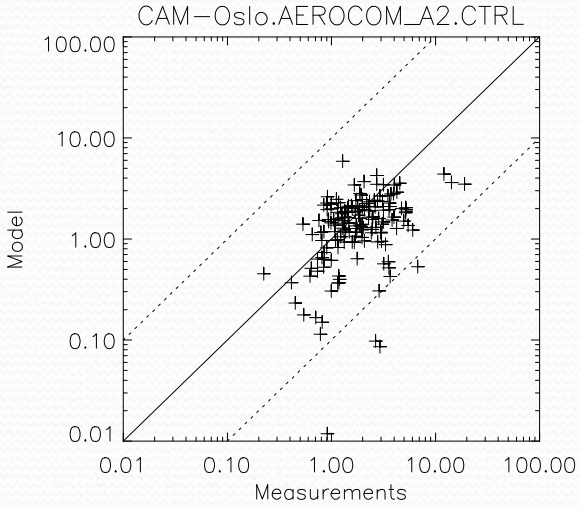
TM4



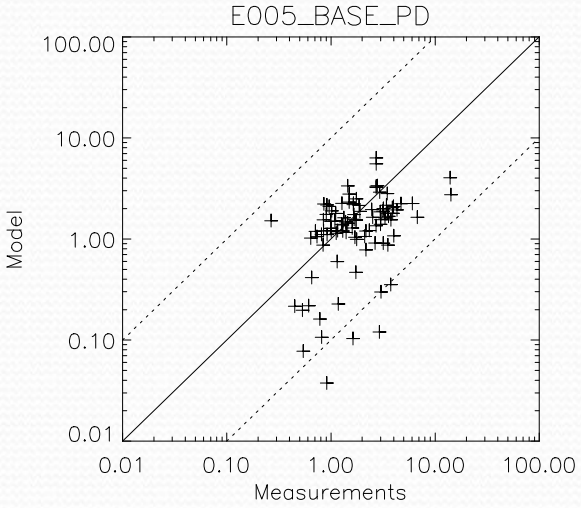
μgC m^{-3}

July

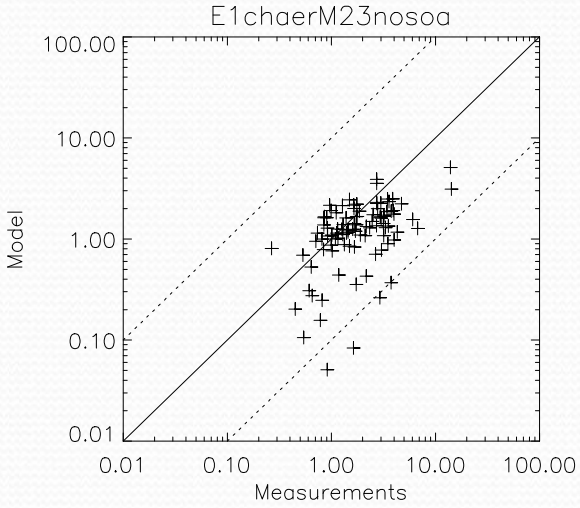
CAM-Oslo

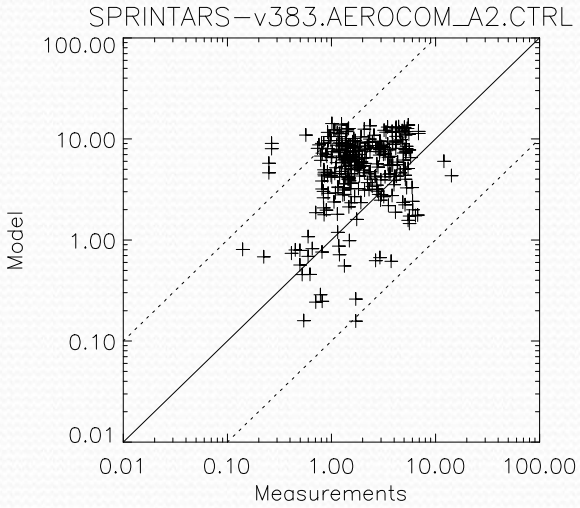


GISS MATRIX



GISS modelE





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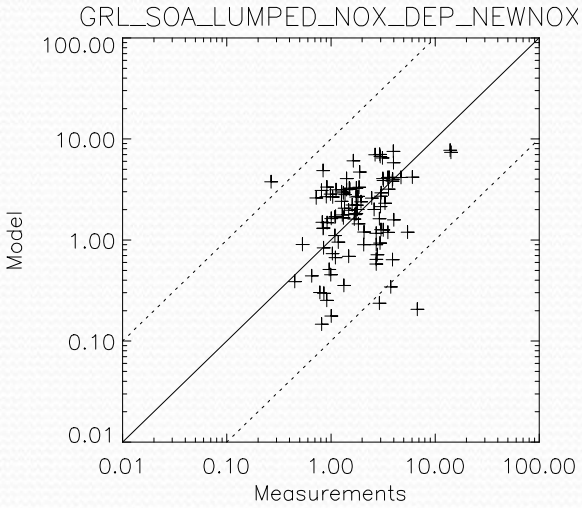
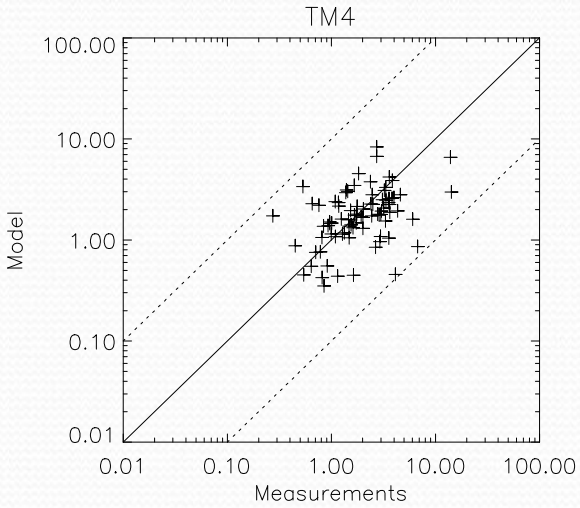


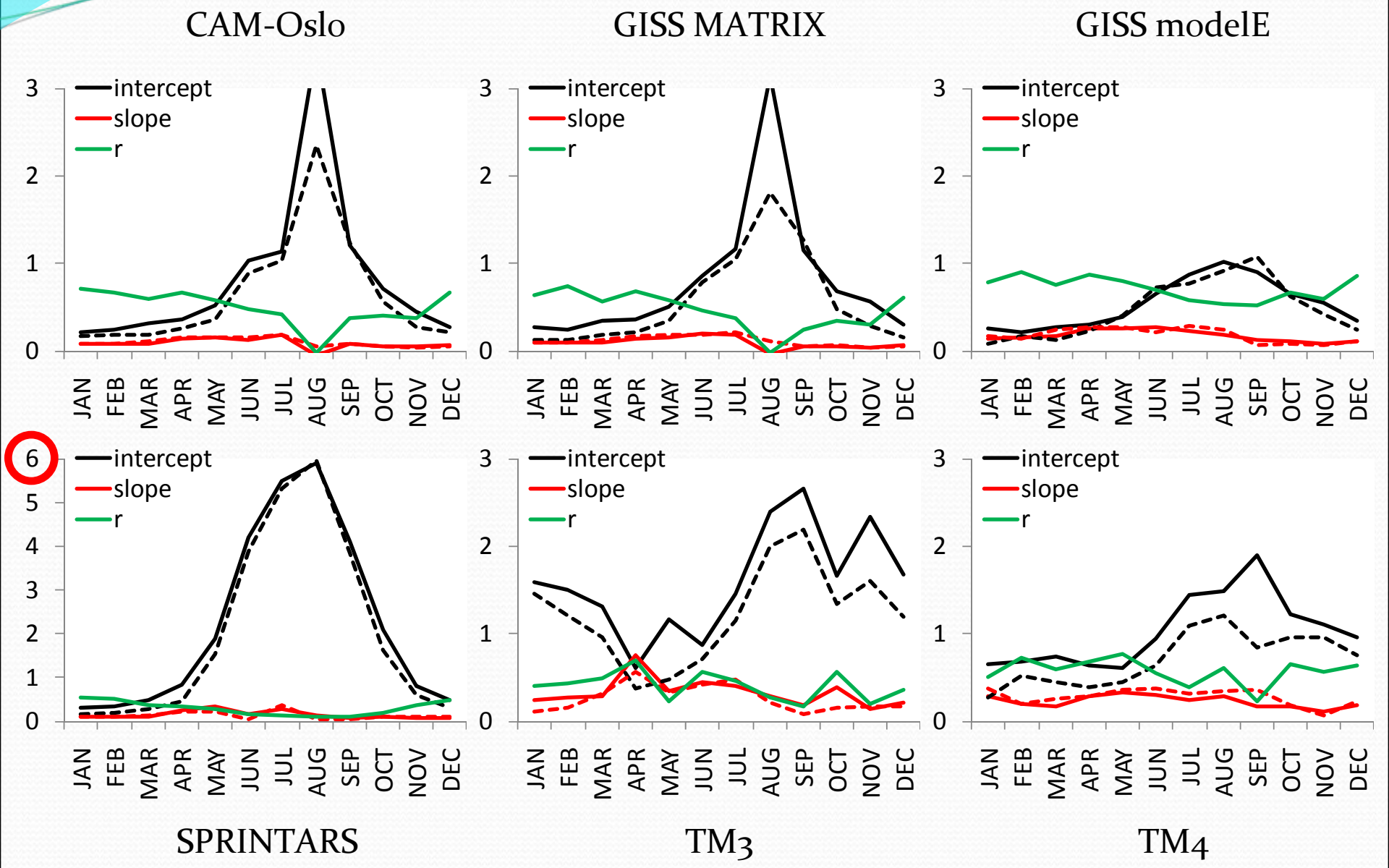
TM3



TM4

μgC m^{-3}

Seasonal variability of statistics



Things to keep in mind

- MSA is OA
- Speciation is important. POA/SOA is not enough for thorough comparisons
- Documentation!

Future work

- Include more models (please submit results)
- Include more stations (please submit measurements)
- Compare with high altitude measurements
- Filter urban stations
- Study budgets: sources, burden, removal, lifetime
- Study regions
- Compare with HOA/OOA/WSOC
- Compare AOD

Contributors

CAM-Oslo	Alf Kirkevåg
GISS MATRIX*	Susanne Bauer
GISS modelE*	Kostas Tsigaridis, Dorothy Koch
GLOMAP**	Graham Mann
SPRINTARS	Toshi Takemura
TM3	Kostas Tsigaridis, Maria Kanakidou
TM4*	Nikos Daskalakis, Maria Kanakidou
Measurements	Lynn Russell and many others

* Preliminary results

** Results not analyzed yet

Acknowledgements

This work was supported by an appointment to the NASA Postdoctoral Program at the Goddard Institute for Space Studies, administered by Oak Ridge Associated Universities through a contract with NASA.

Work at the University of Crete was supported by the EU funded project EUCAARI.