UOC TM4-ECPL activities in 2016

Maria Kanakidou

Giorgos Fanourgakis (post doc)

Dimitris Amanatidis (PhD)

Stelios Myriokefalitakis (now UU)

Nikos Daskalakis (LATMOS/IPSL)

25th International TM5 meeting January 2017

Global modeling of atmospheric deposition of N, P and Fe with TM4-ECPL

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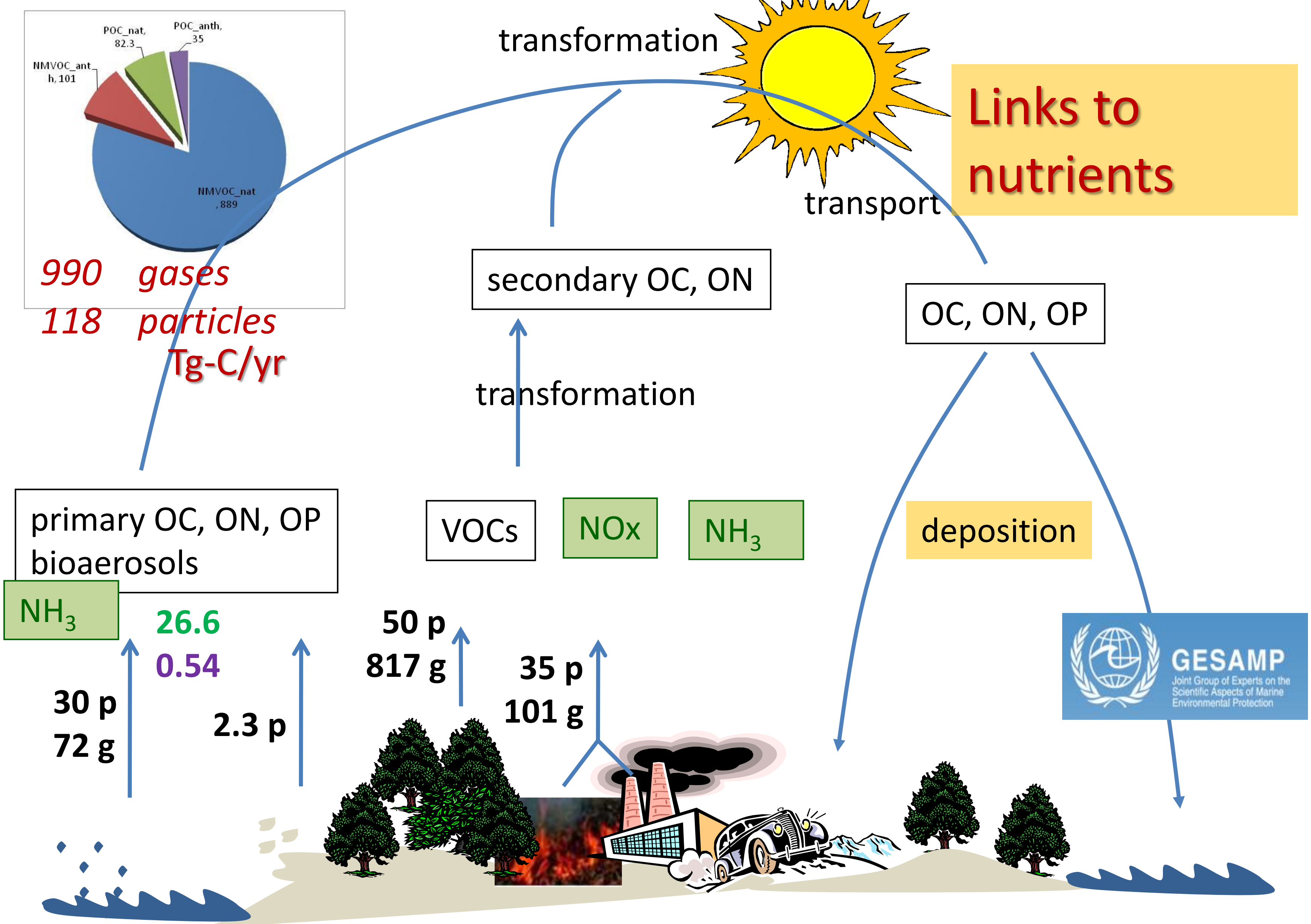
And coworkers
K. Tsigaridis, A. Nenes, A. Baker, N. Mihalopoulos

24th International TM5 meeting (27-28 June 2016), JRC, Ispra

Organic C, N, P in the global atmosphere

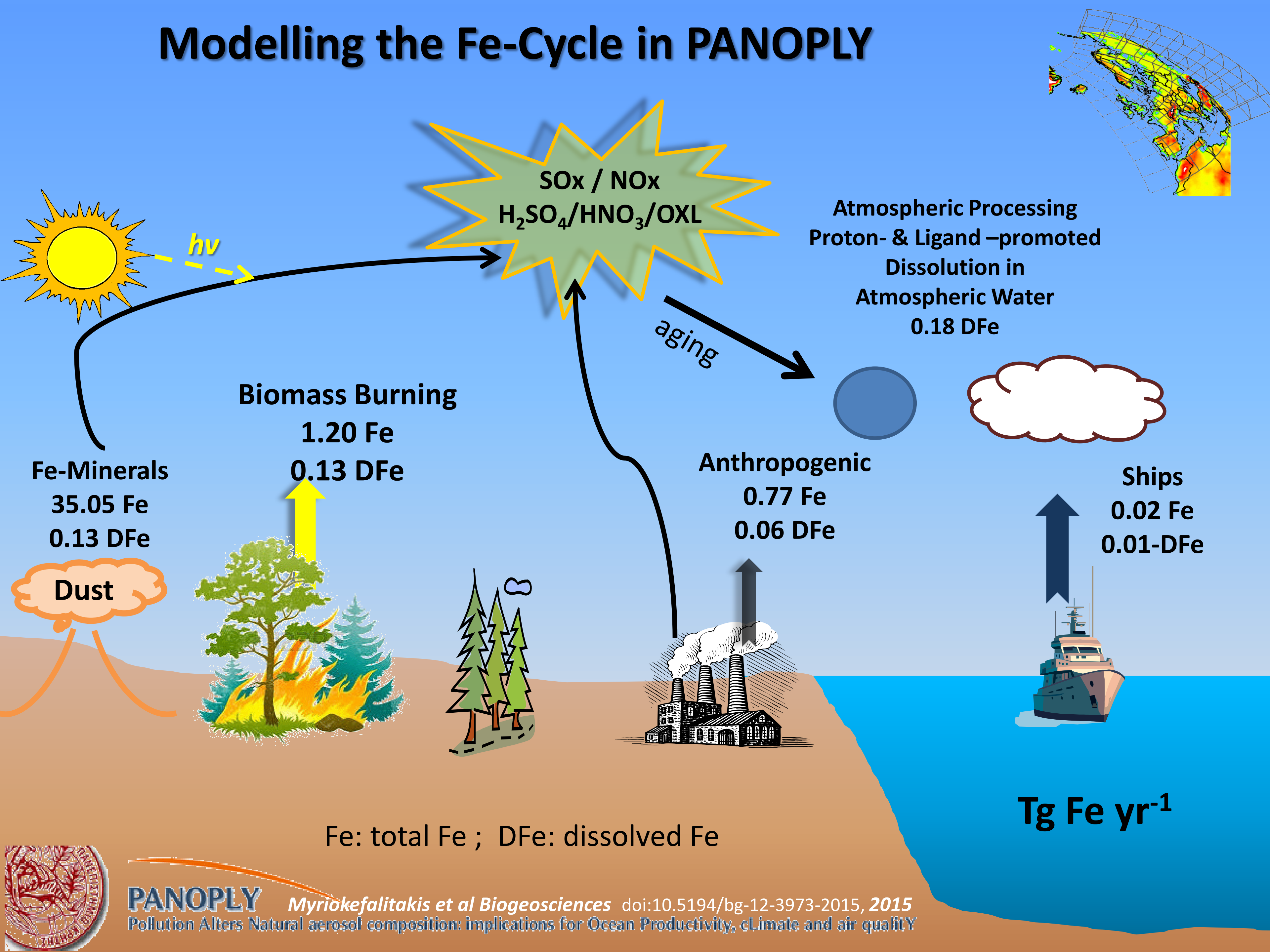
Concept: link ON and OP to OC atmospheric budget



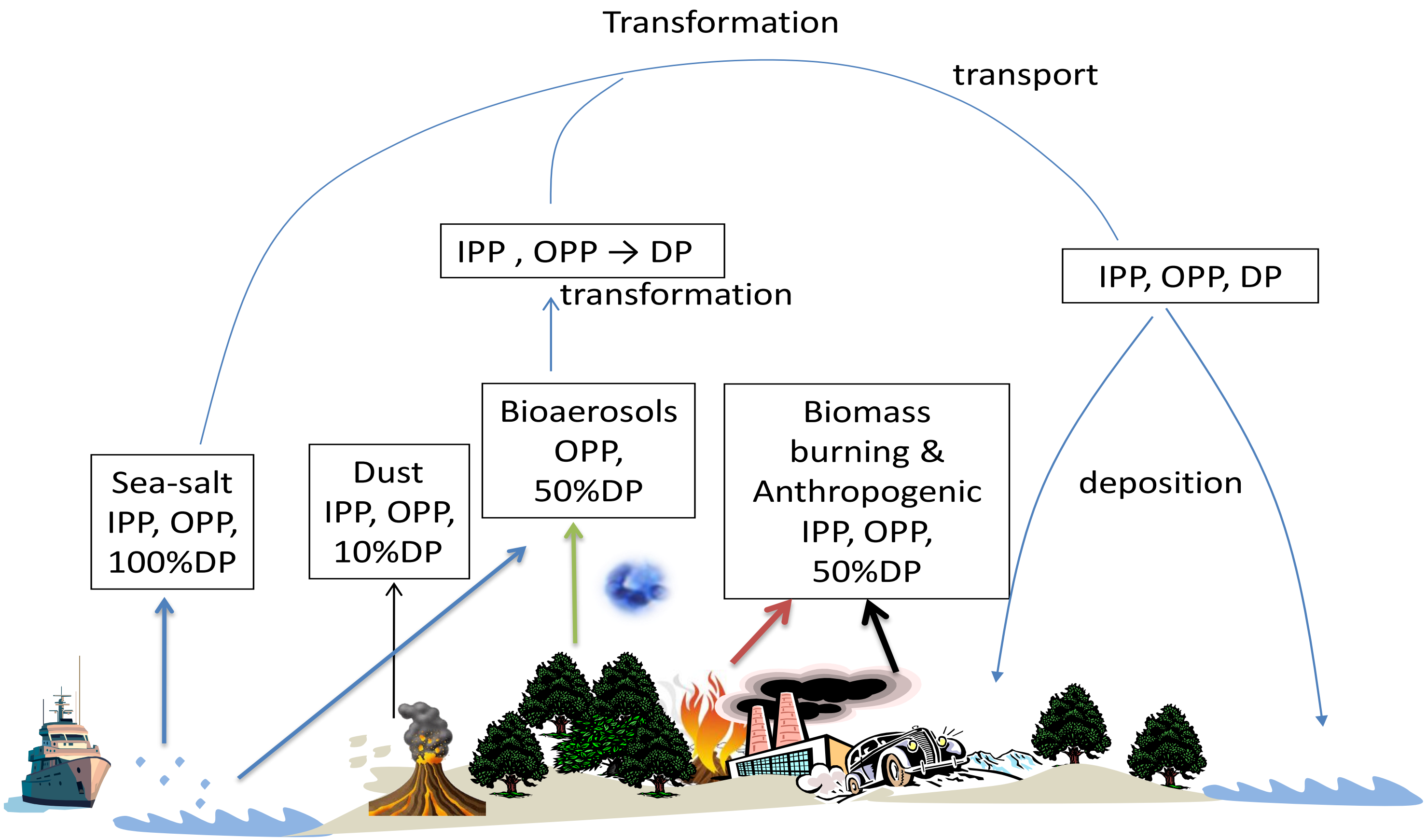
Present day

Kanakidou et al., GBC, 2012, doi 10.10.1029/2011GB004277

Kanakidou et al., JAS, 2016


Modelling the Fe-Cycle in PANOPLY
SOx / NOx
H2SO4/HNO3/OXL
hv
aging
Atmospheric Processing
Proton- & Ligand –promoted
Dissolution in
Atmospheric Water
0.18 DFe
Biomass Burning
1.20 Fe
0.13 DFe
Fe-Minerals
35.05 Fe
0.13 DFe
Dust
Anthropogenic
0.77 Fe
0.06 DFe
Ships
0.02 Fe
0.01-DFe
Tg Fe yr-1
Fe: total Fe ; DFe: dissolved Fe
PANOPLY
Myriokefalitakis et al Biogeosciences doi:10.5194/bg-12-3973-2015, 2015
Pollution Alters Natural aerosol composition: implications for Ocean Productivity, cLimate and air qualitY

Atmospheric Phosphorus cycle

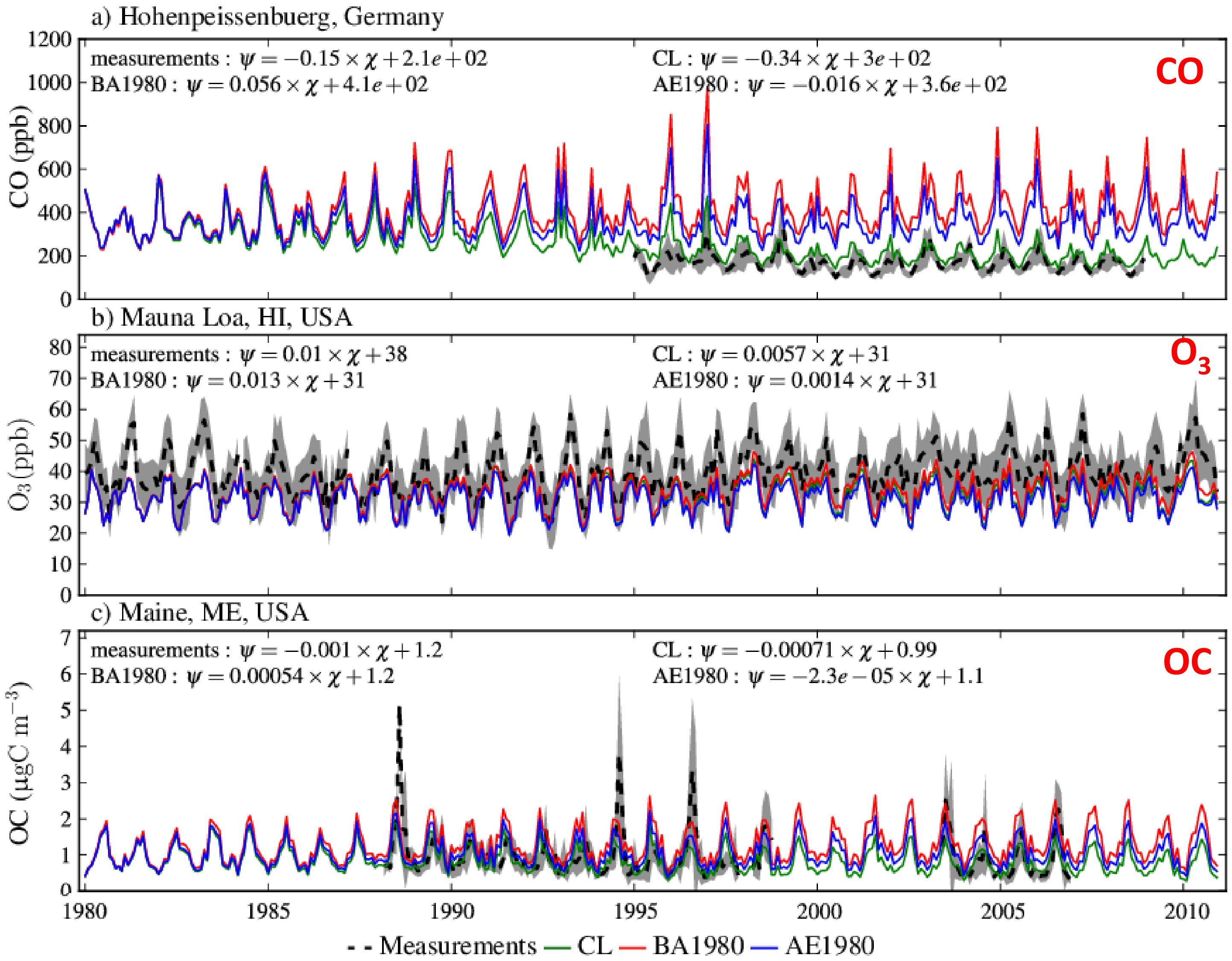


IPP: Inorganic P insol. *; OPP: Organic P* insol.*; DP: Dissolved (IP+OP)*

Myriokefalitakis et al. Biogeosci. 2016

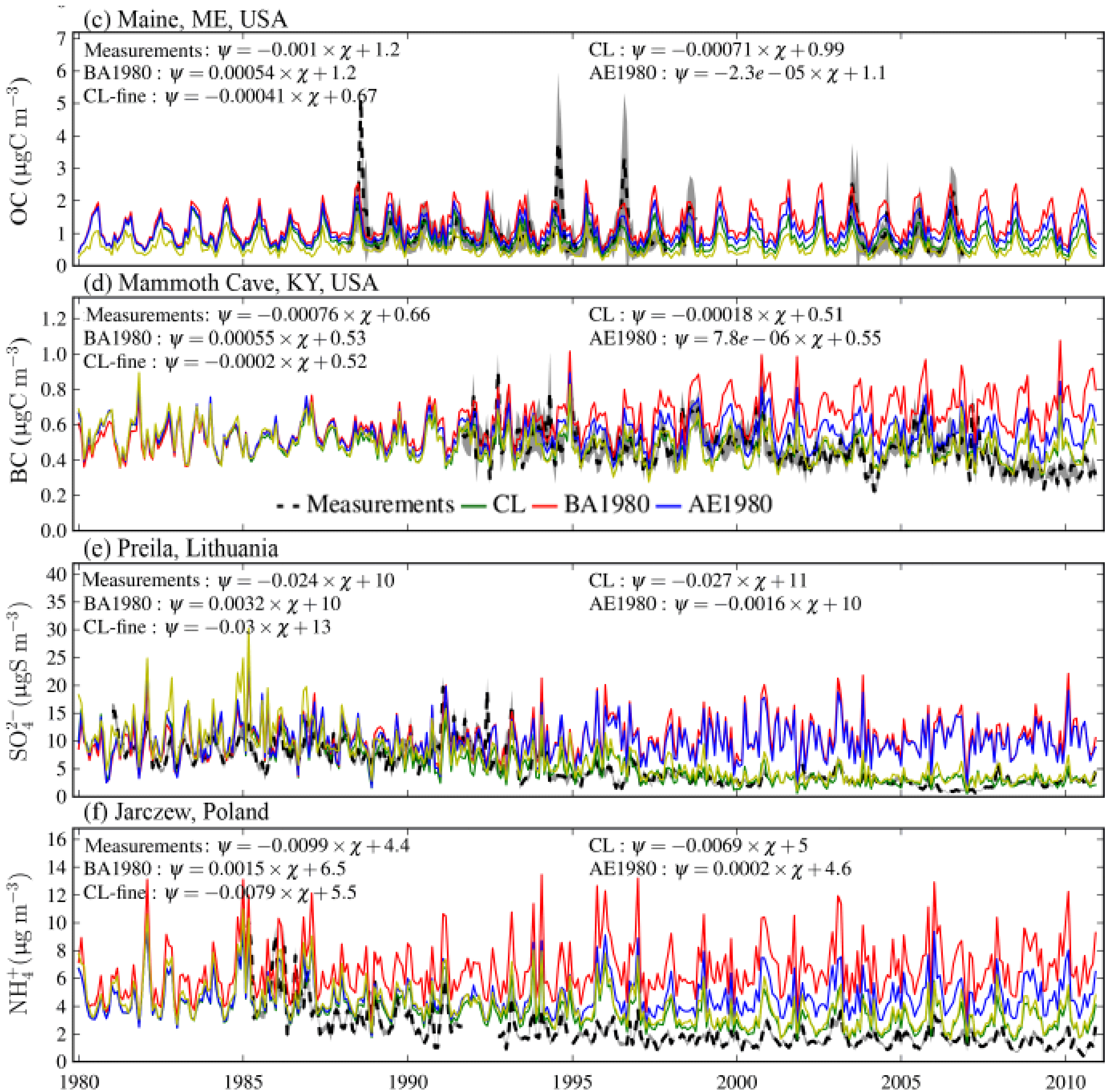
PANOPLY
Pollution Alters Natural aerosol composition: implications for Ocean Productivity, cLimate and air qualitY

Interannual observed and simulated changes in surface pollutant levels.



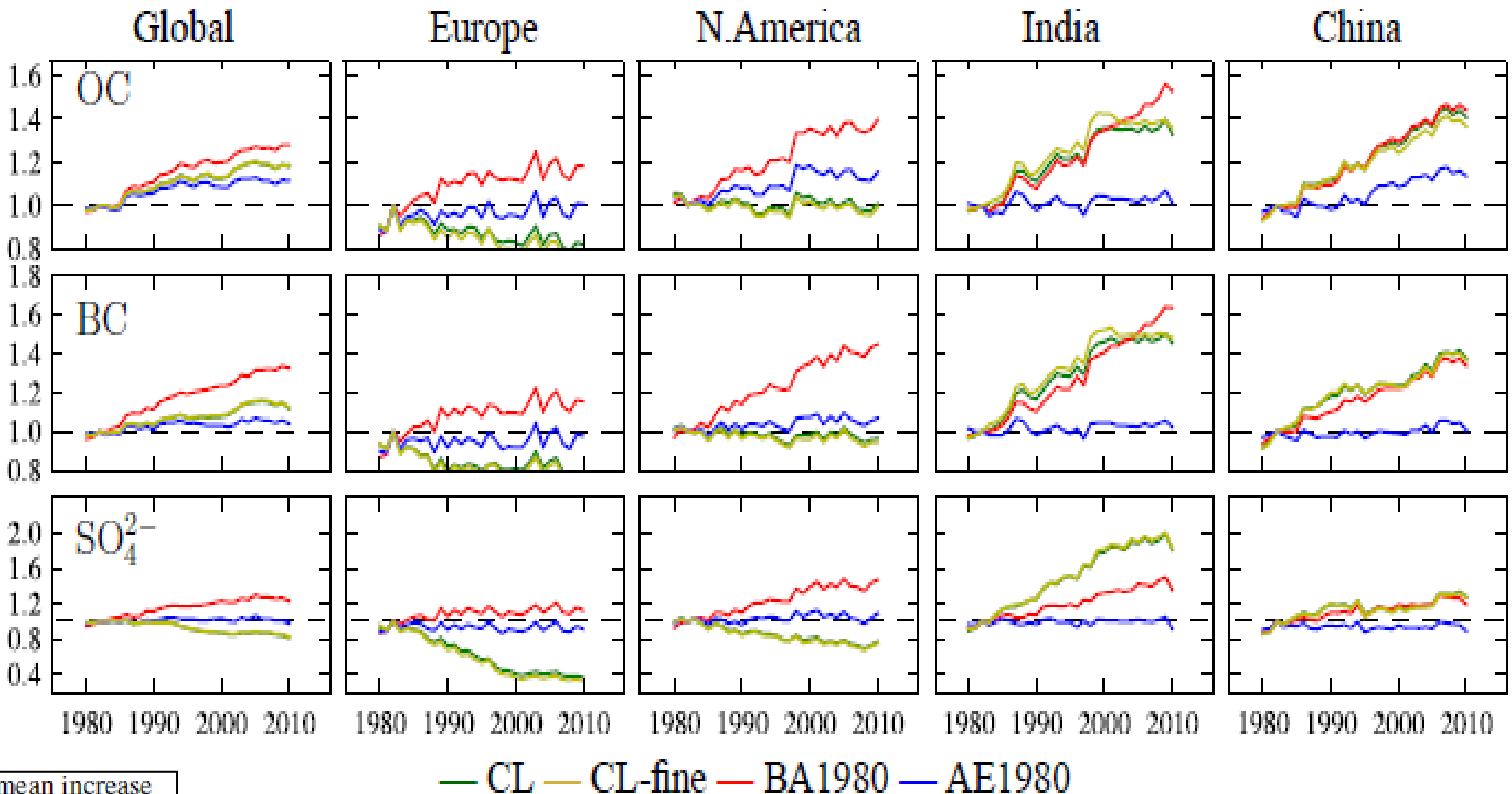
Daskalakis et al, ACP, 2016

Interannual observed and simulated changes in surface pollutant levels.



Daskalakis et al., ACP, 2016

Normalized changes in aerosol surface concentrations



	N. America	Europe	India	China	S.E. Asia	Africa	Asia	Global
mean increase in energy use**	0.90	1.01	2.04	3.08	2.30	1.00[&]	2.50[&]	1.30

Daskalakis et al., ACP, 2016

Continuing work on

- Biomass burning impact on atmospheric deposition

- atmospheric acidity modeling

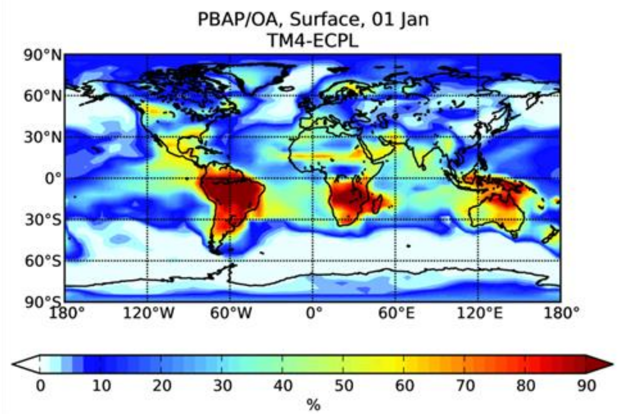
- CCN modeling (BACCHUS intercomparison)
- Impact of Organics on CCN

- WRF-CHEM deposition modeling in the East Mediterranean

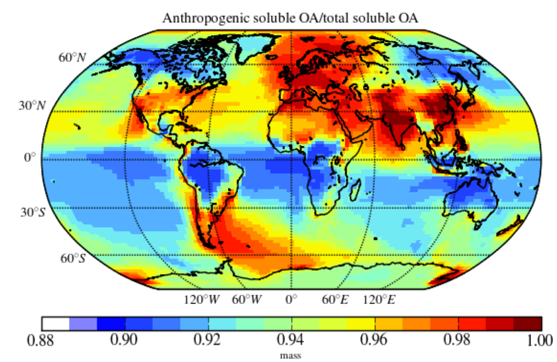
WP 2

Process studies of the role of both organic and inorganic aerosol in CCN/IN- CCN

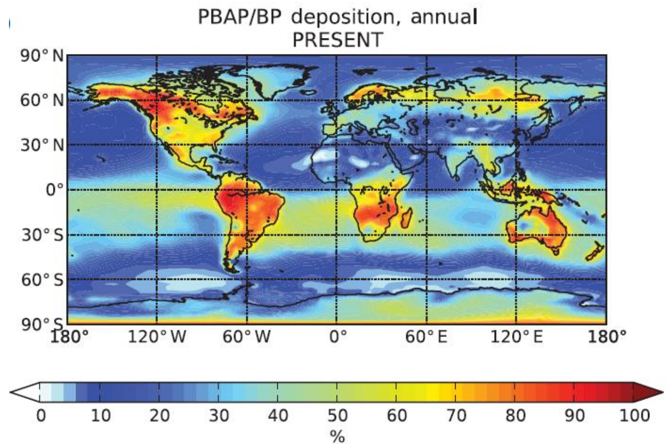
Importance of bioaerosols for OA



Importance of anthropogenic OA for OA



Myriokefalitakis et al., Springer book 2016



Importance of bioaerosols for soluble P deposition

Myriokefalitakis et al., BG 2016

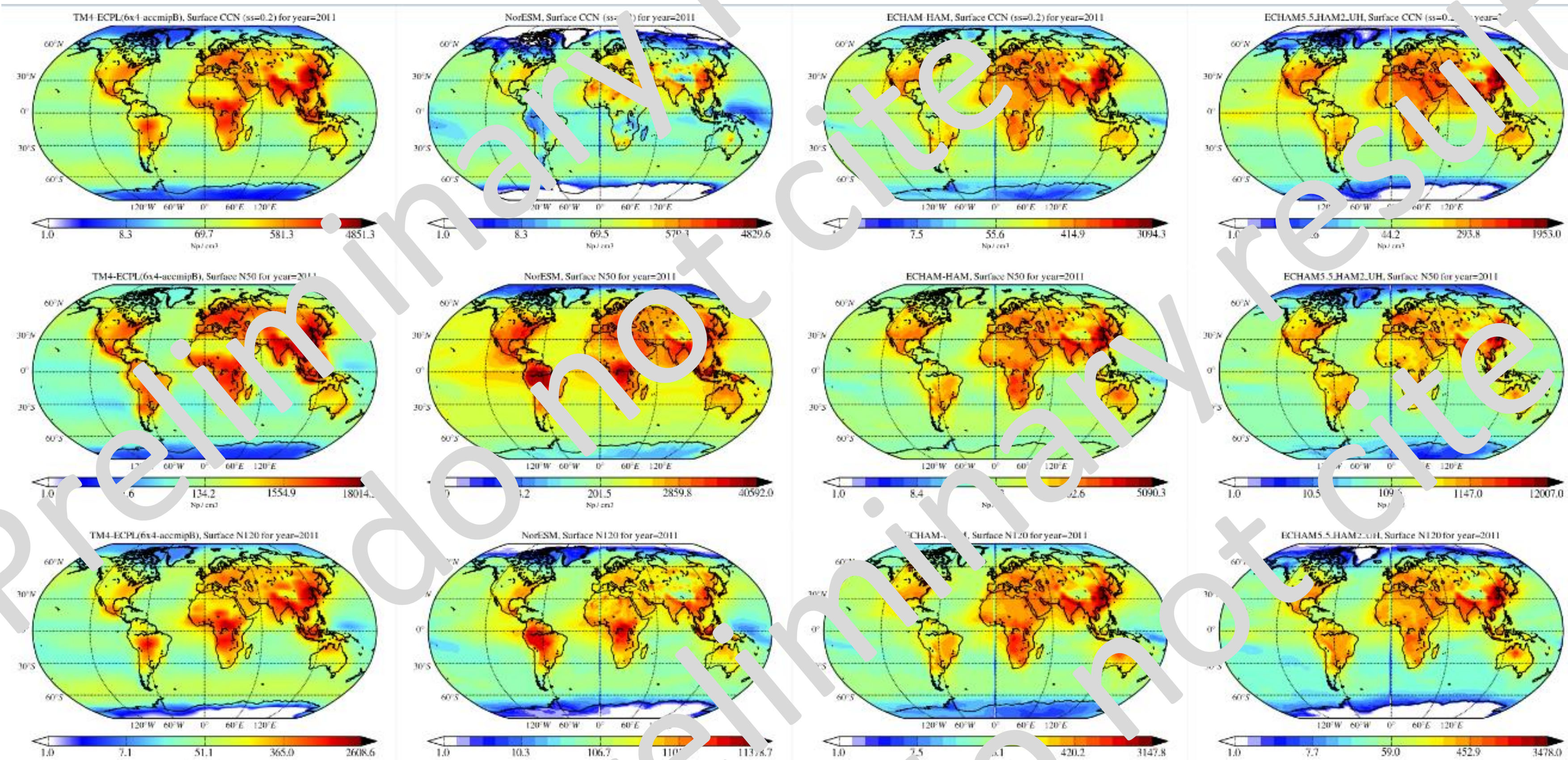
Annual mean surface CCN at ss=0.2%, N50, N120

TM4-ECPL | NorESM | ECHAM-HAM | ECHAM5.5-HAM2

CCN

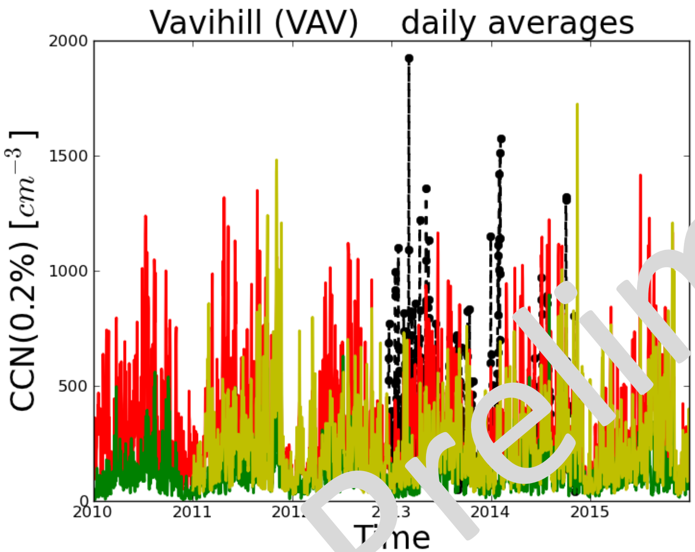
N50

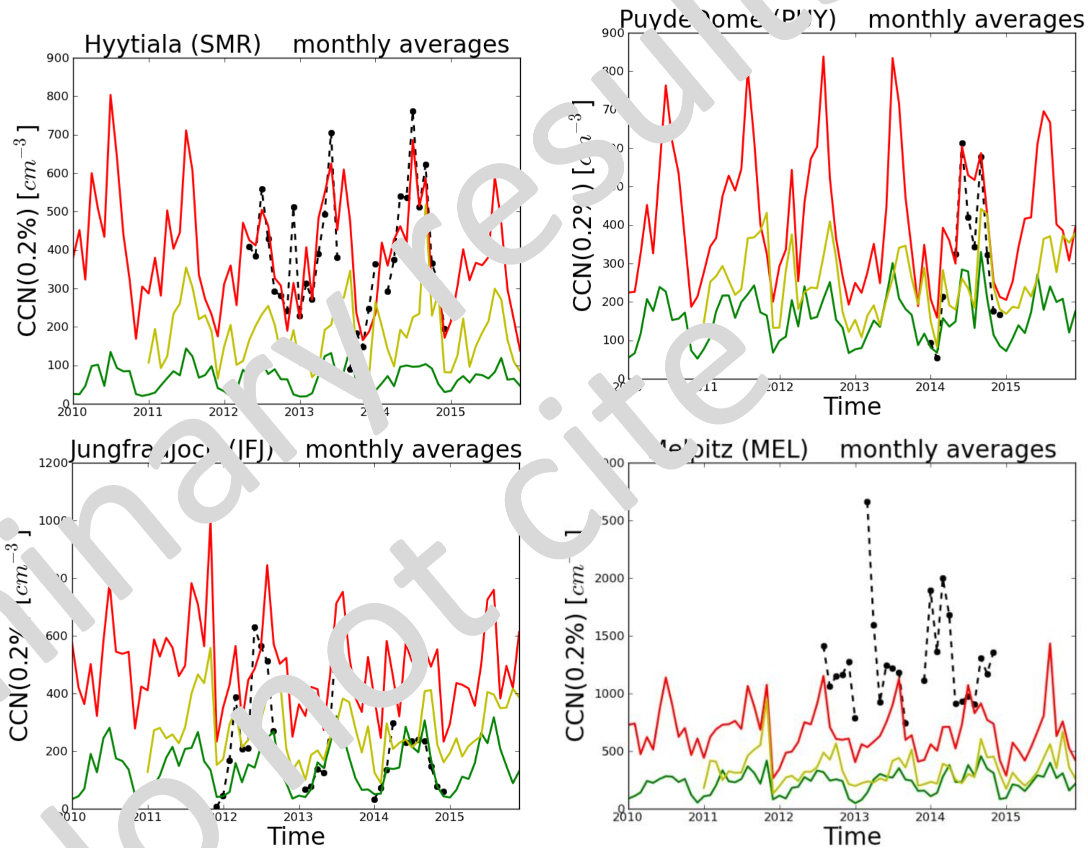
N120



CCN model intercomparison

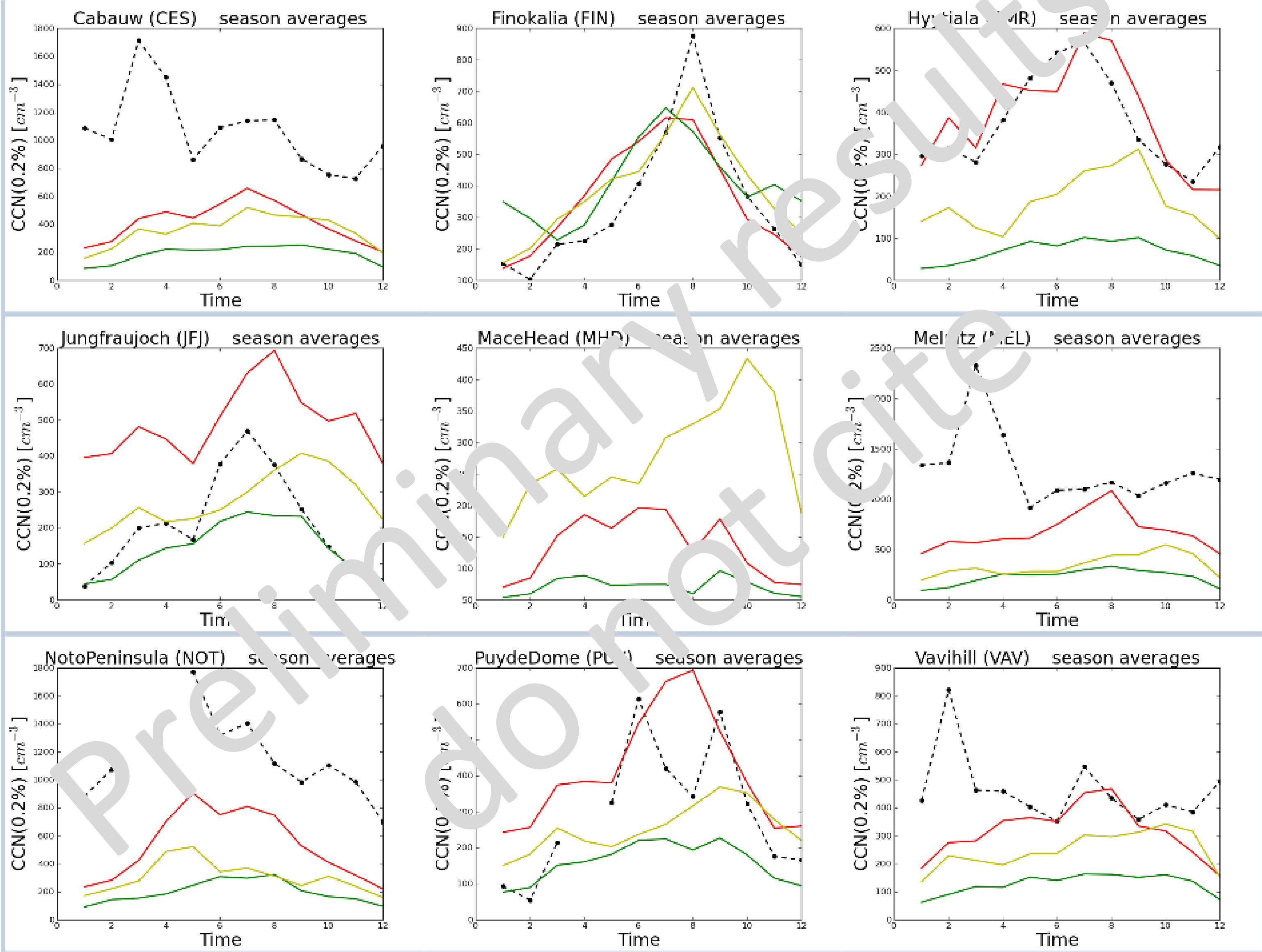
CCN model intercomparison – to consolidate BACCHUS model results and evaluate uncertainties





CCN for SS=0.2% as calculated by BACCHUS models (continuous lines) and observed (dots with dashed lines). Red: TM4-ECPL, Green: NorESM, yellow: ECHAM-HAM

Seasonal variation of CCN at 0.2% supersaturation



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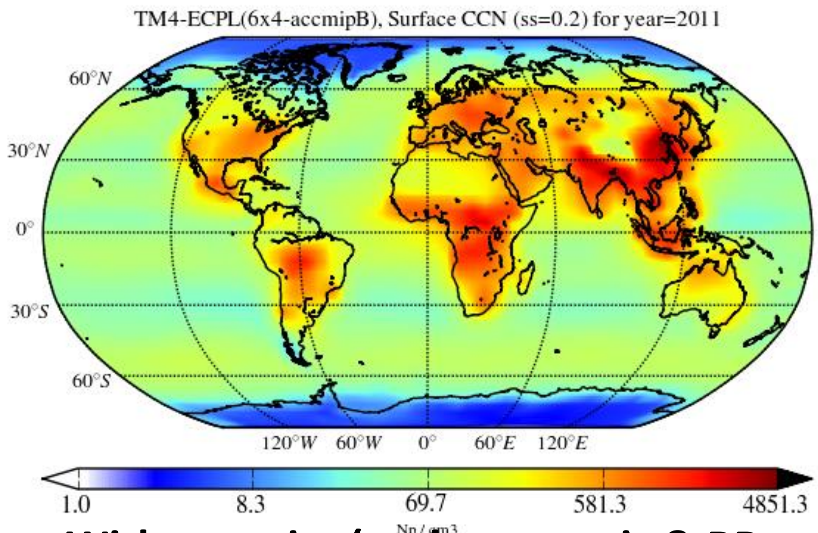
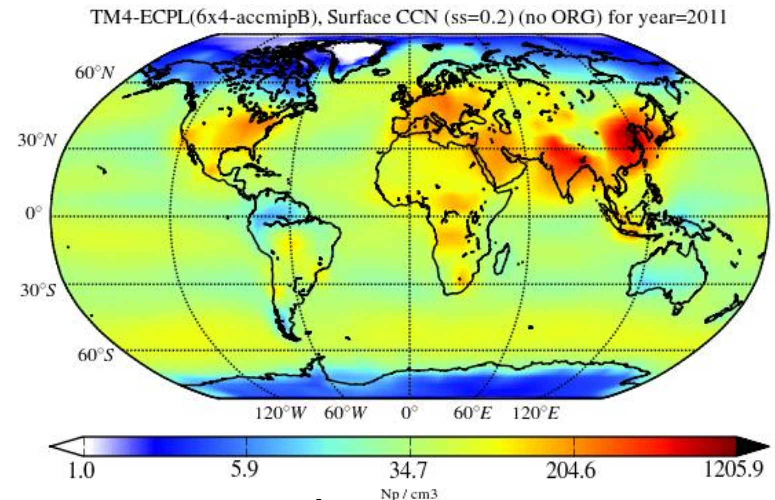
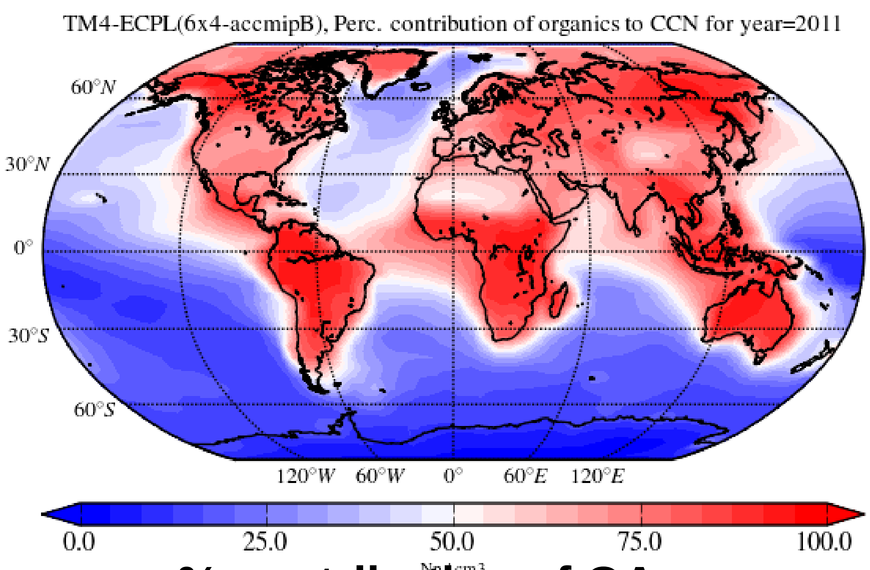
TM4-ECPL ACCMIP → CCN at ss=0.2%



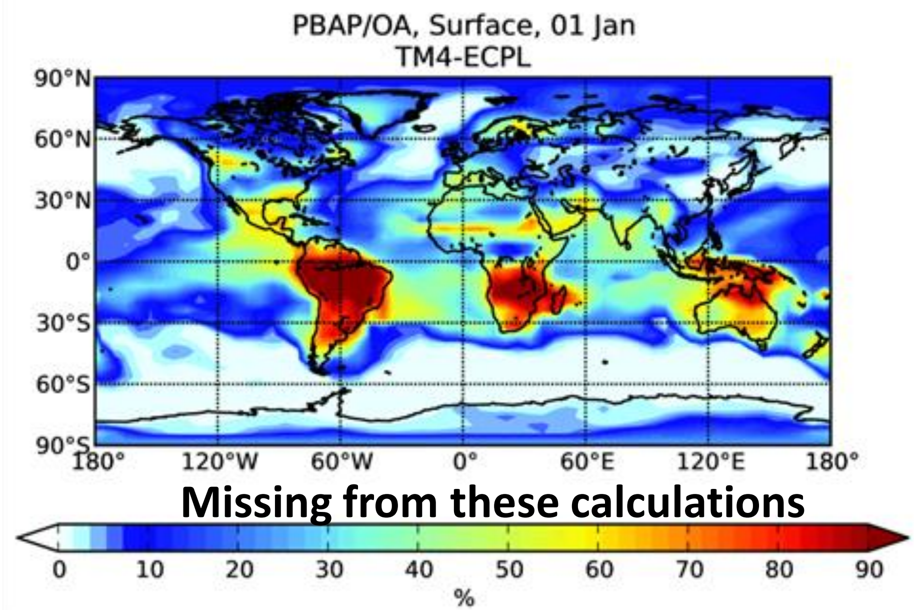
With organics (anthropogenic & BB primary, SOA, fine marine OA)



Without organics



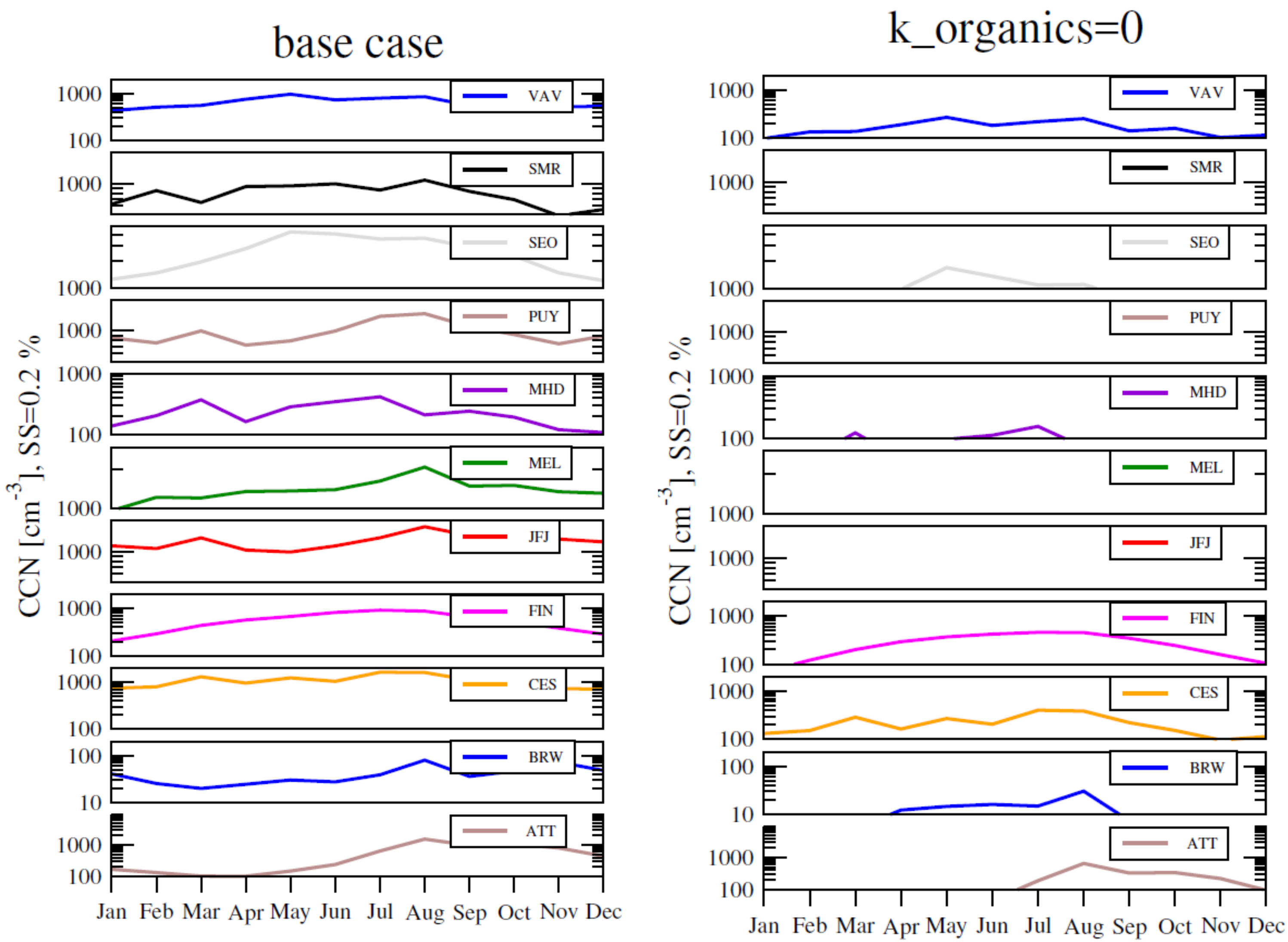
% contribution of OA



Missing from these calculations

UOC

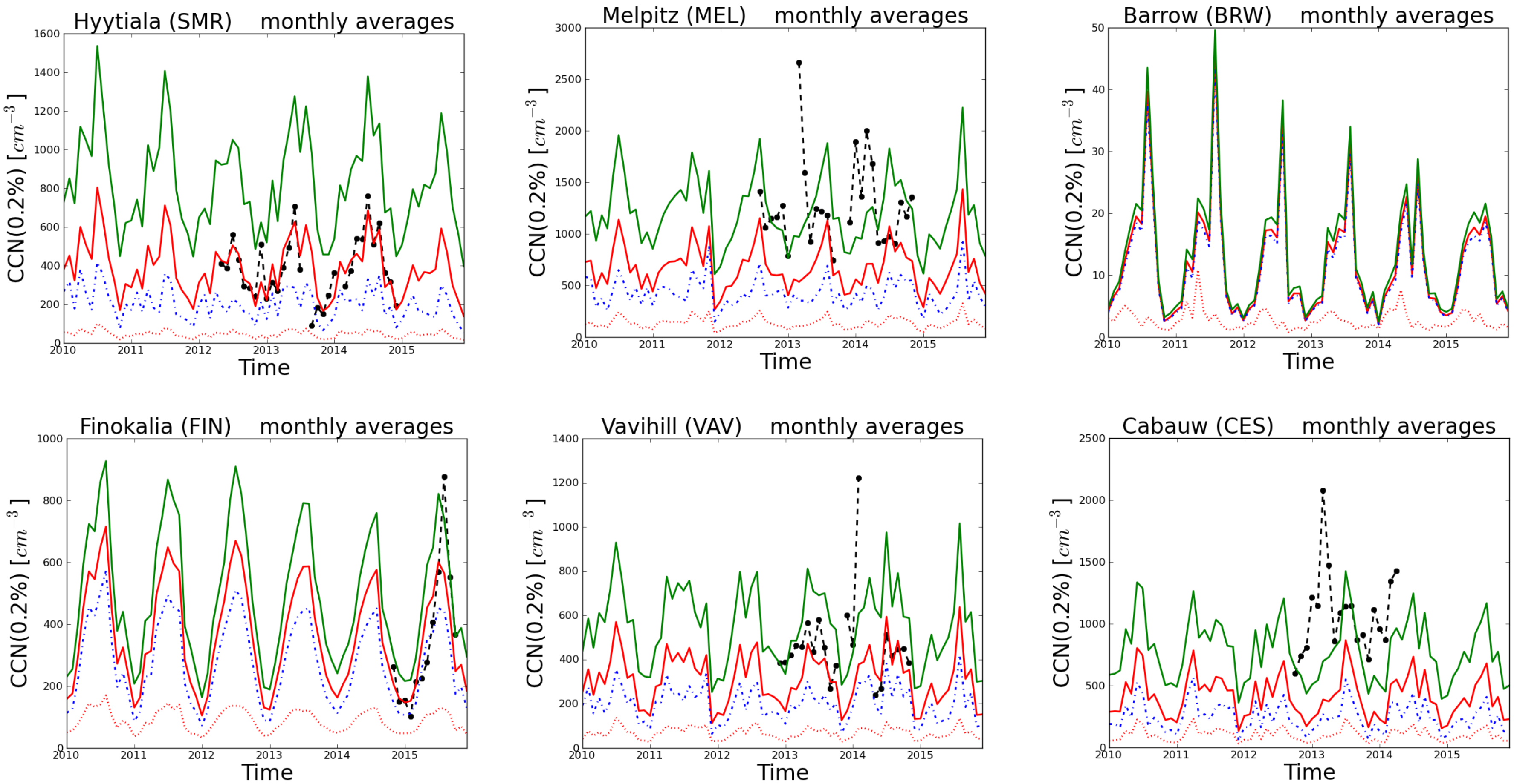
c.



Test performed with

0.61 for sulfate particles, 1.28 for sea-salt, 0.227 OA, 0.0 for dust and black carbon

Impact of organics on CCN at ss=0.2%



korg=0.227, korg=0.1, korg=0, dashed – no organics