Hygroscopic and Ethanolic Growth Factors of AMS Organic Components

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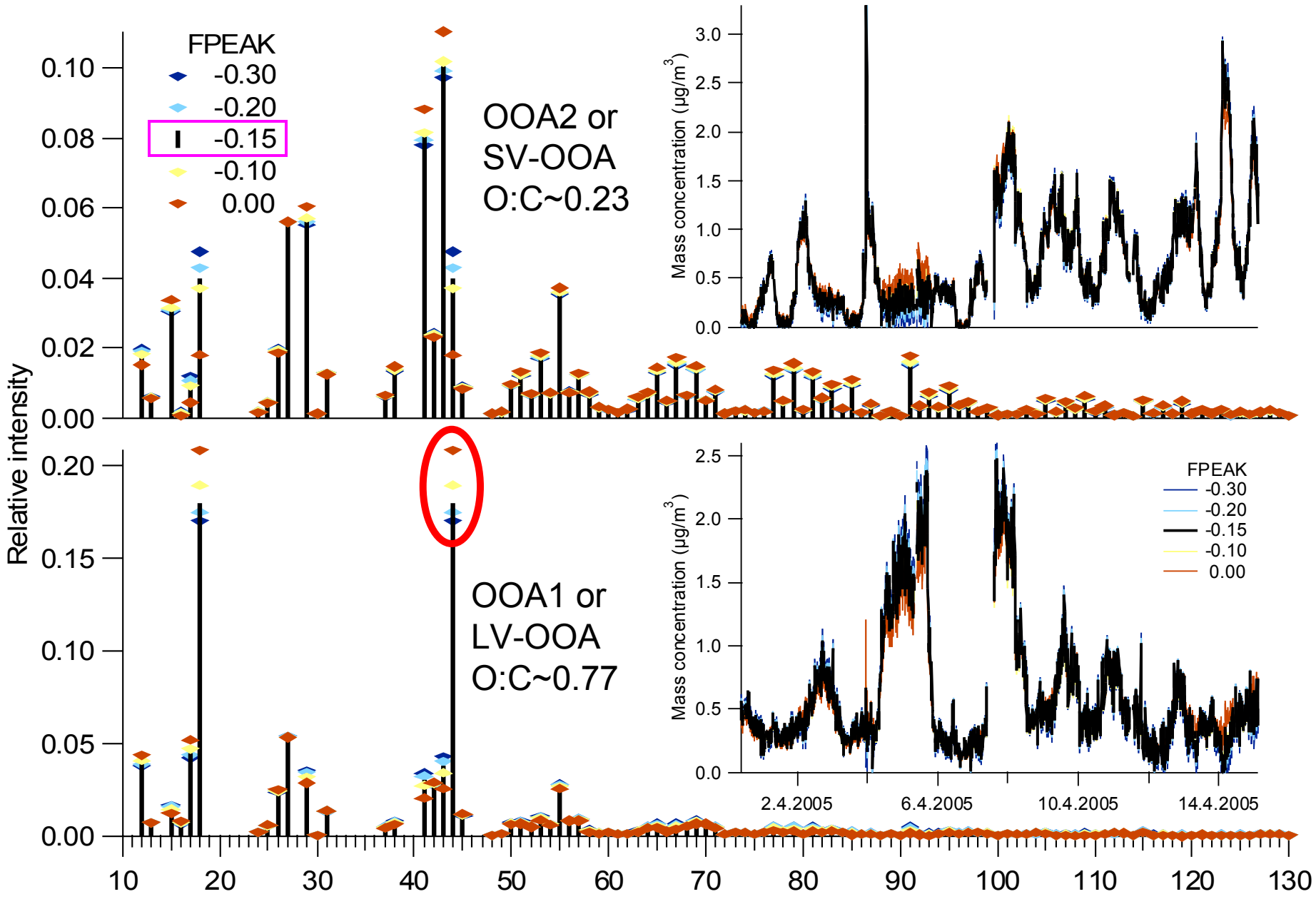
Measurements

- From 31 March to 15 April 2005 in Hyytiälä, a forested background site in southern Finland
- HTDMA and OTDMA: hygroscopic (HGF) and ethanol (EGF) growth factors
- VTDMA: volume fractions evaporating at ≤50°C, 50-150°C, 150-280°C and ≥280°C
- Q-AMS from Univ. of Kuopio & PMF: OOA1, OOA2 and SO_4^{2-}+NO_3^-+NH_4^+

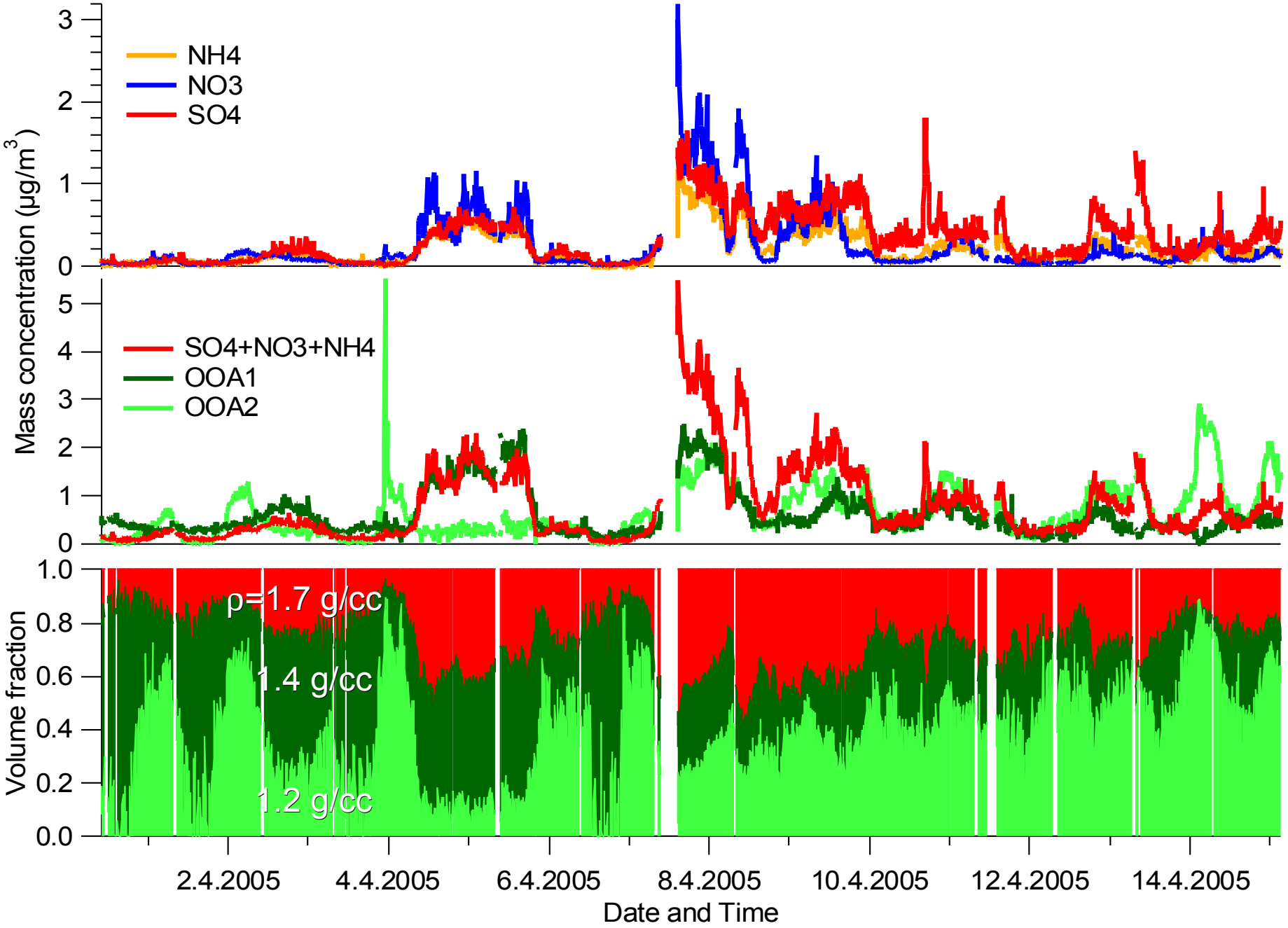
Correlated

PMF: Two factors, reasonable results for FPEAKs from -0.3 to 0



O:C based on Aiken et al. (2008) fit

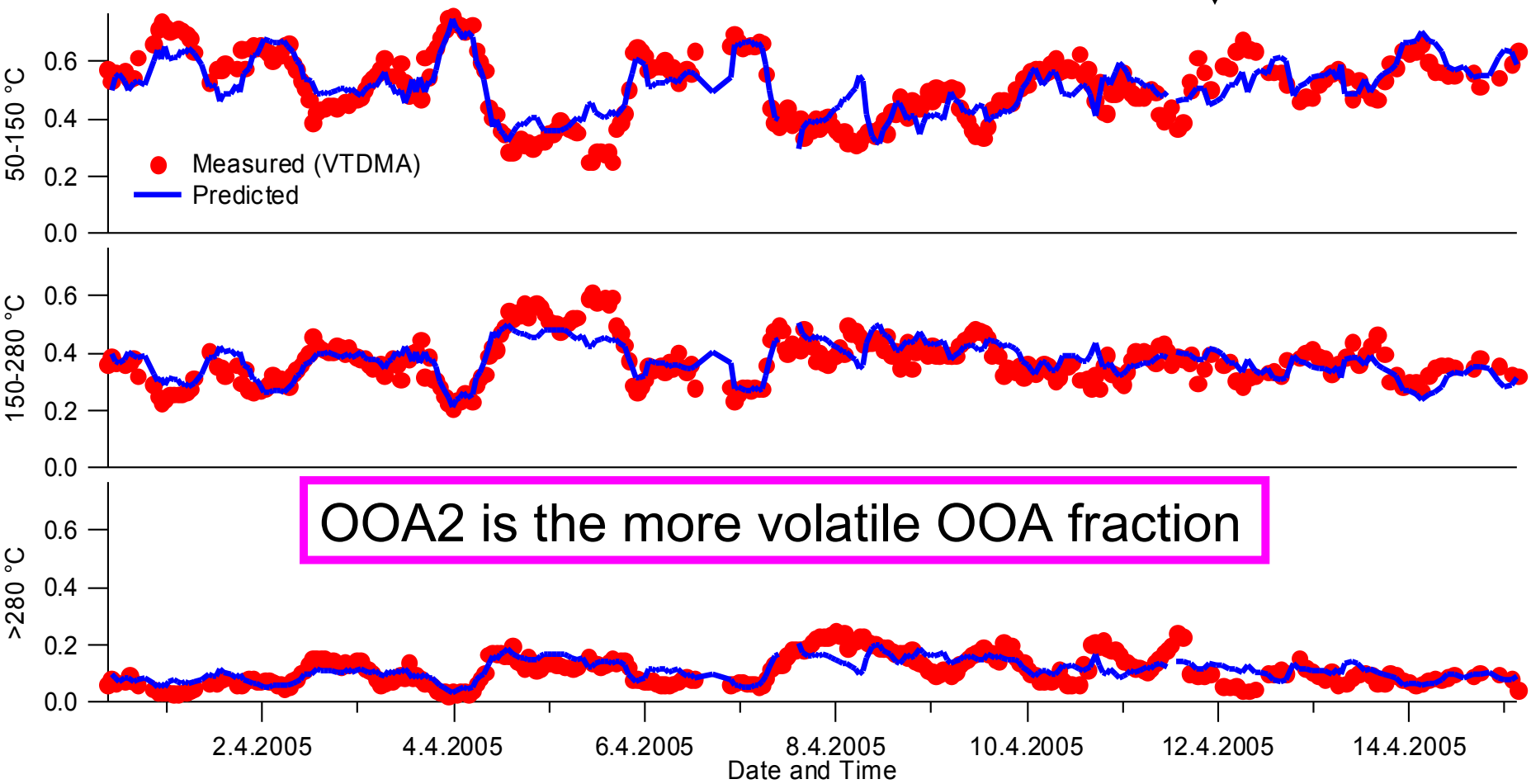
Mass concentrations and volume fractions



a) Volatility correlations

$$\xi^{\Delta T} = \sum_i \xi_i p_i^{\Delta T}$$

VTDMA ξ ΔT	AMS groups OOA2	OOA1	$SO_4^{2-}+NH_4^{+}+NO_3^{-}$
50-150 °C	0.83	0.59	0.00
150-280 °C	0.16	0.35	0.02
>280 °C	0.01	0.04	0.34

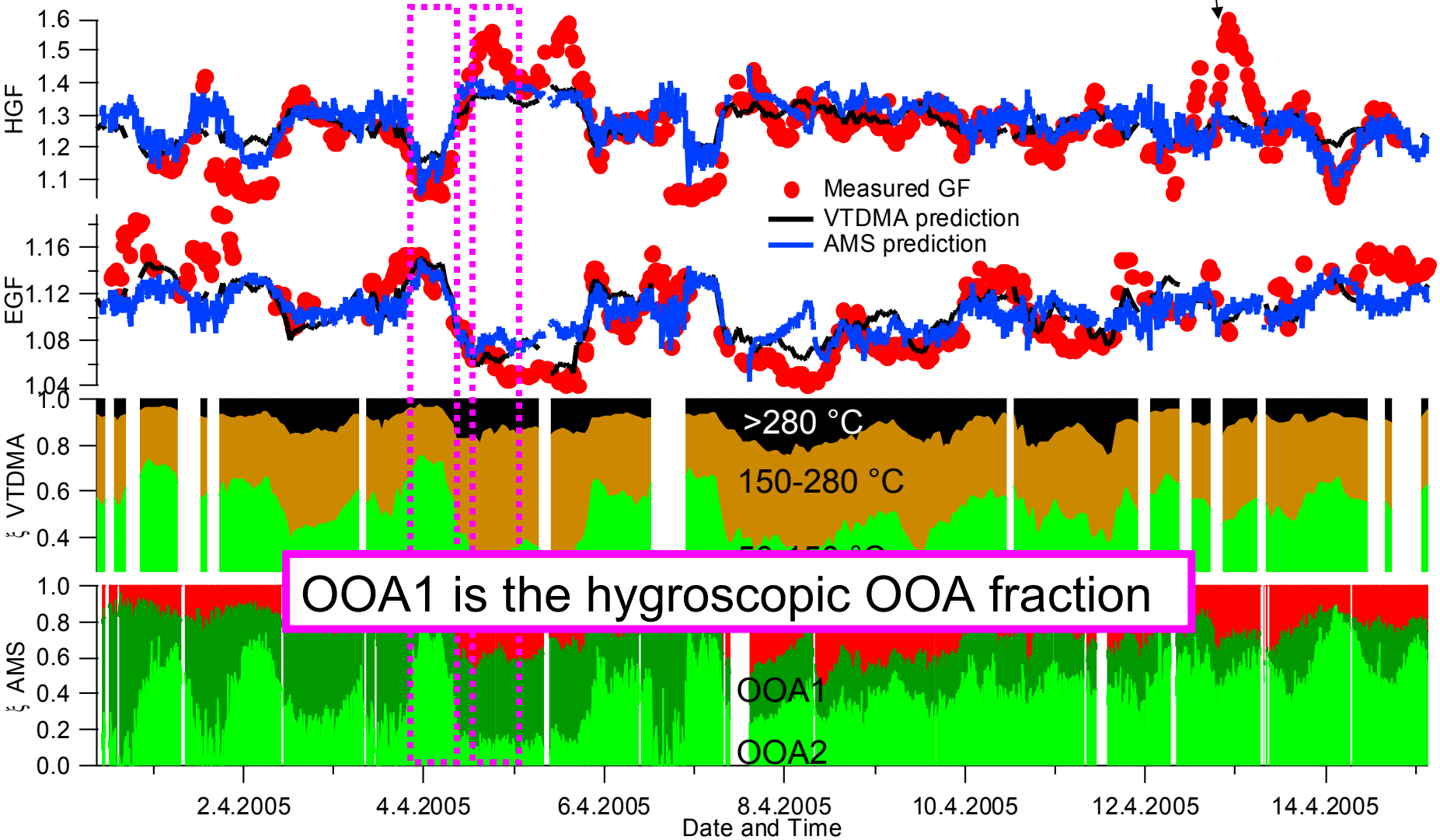


OOA2 is the more volatile OOA fraction

b) Growth factor correlations

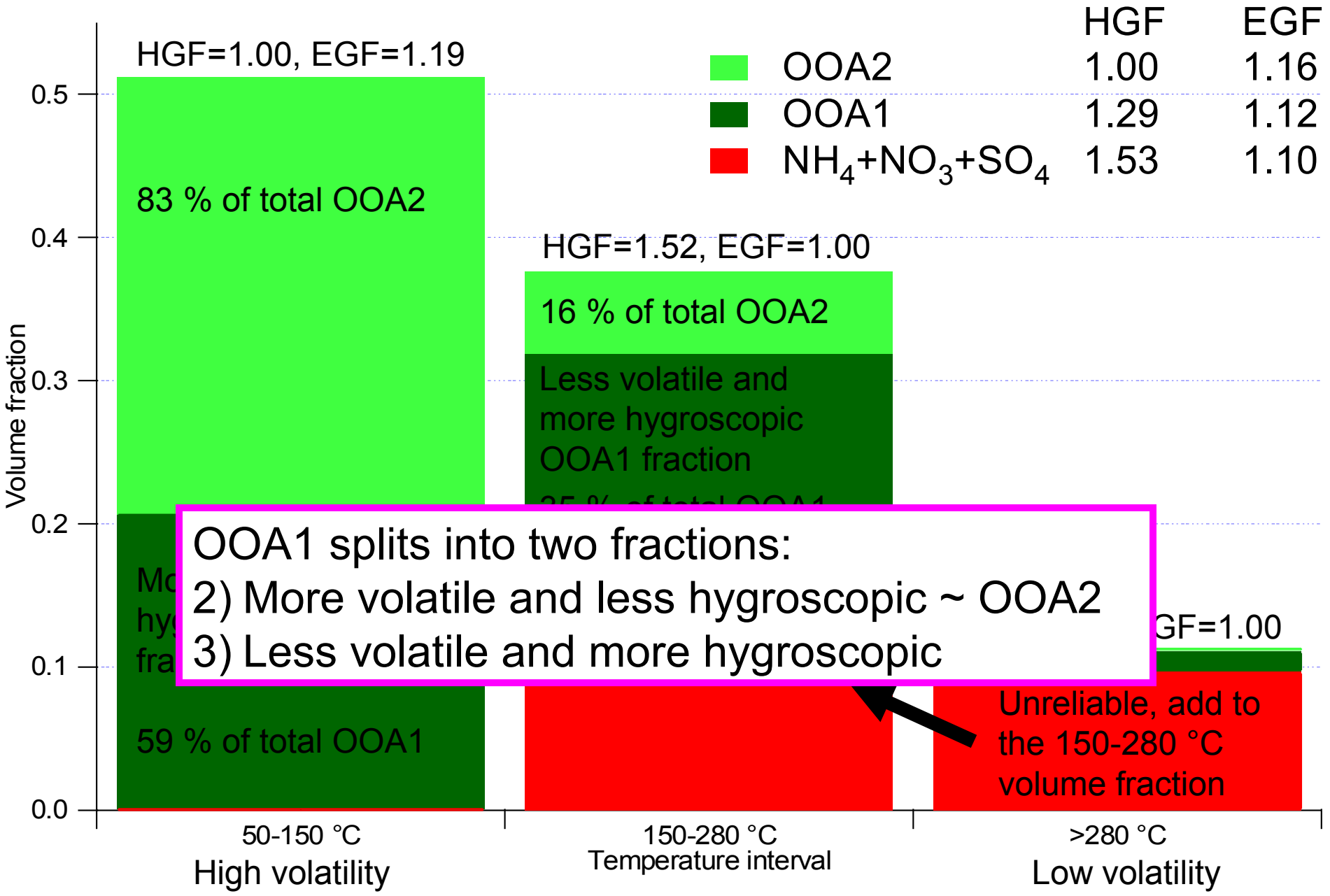
$$GF^3 = \sum_i \xi_i GF_i^3$$

GF	AMS groups OOA2	OOA1	SO_4^{2-}+…	VTDMA volume fractions 50-150°C	150-280°C	>280°C
HGF	1.00	1.29	1.53	1.00	1.52	1.28
EGF	1.16	1.12	1.00	1.19	1.00	1.00



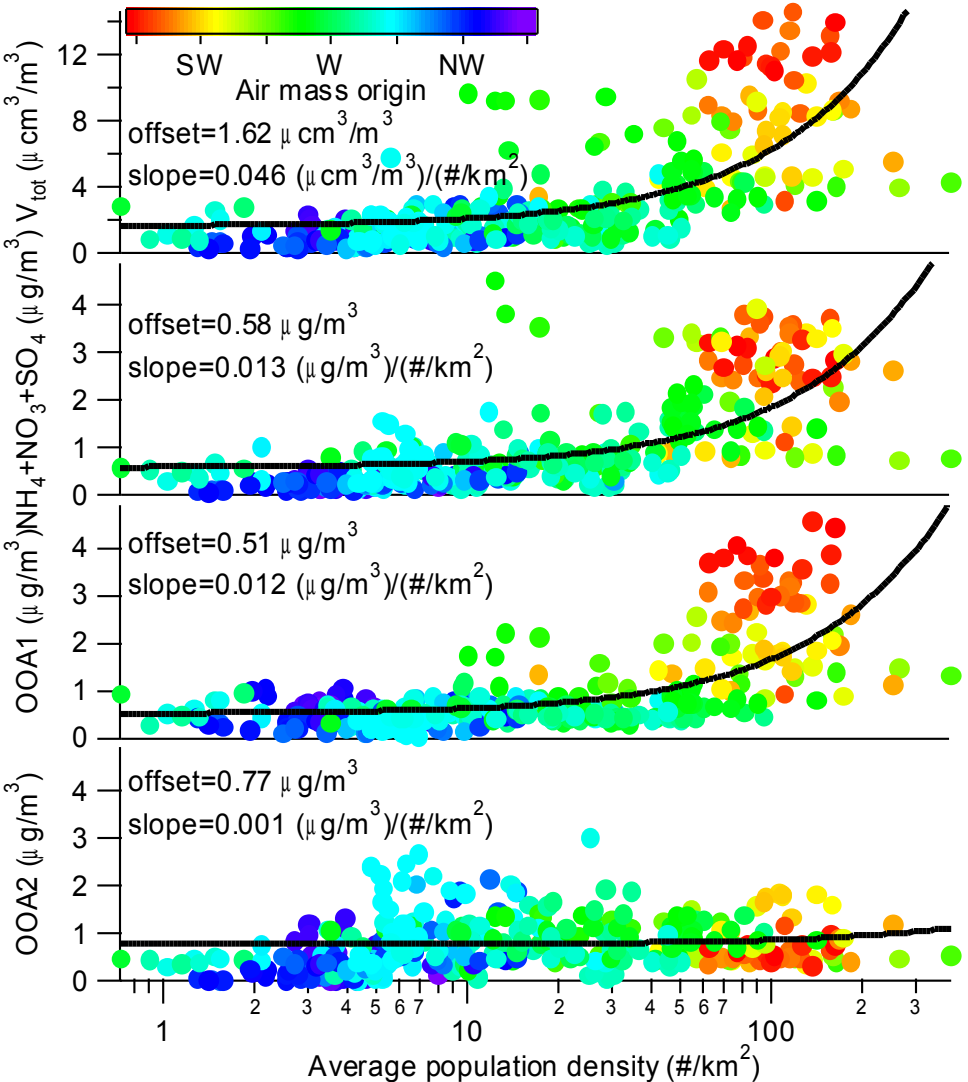
OOA1 is the hygroscopic OOA fraction

Average volatility, hygroscopicity & ethanolicity



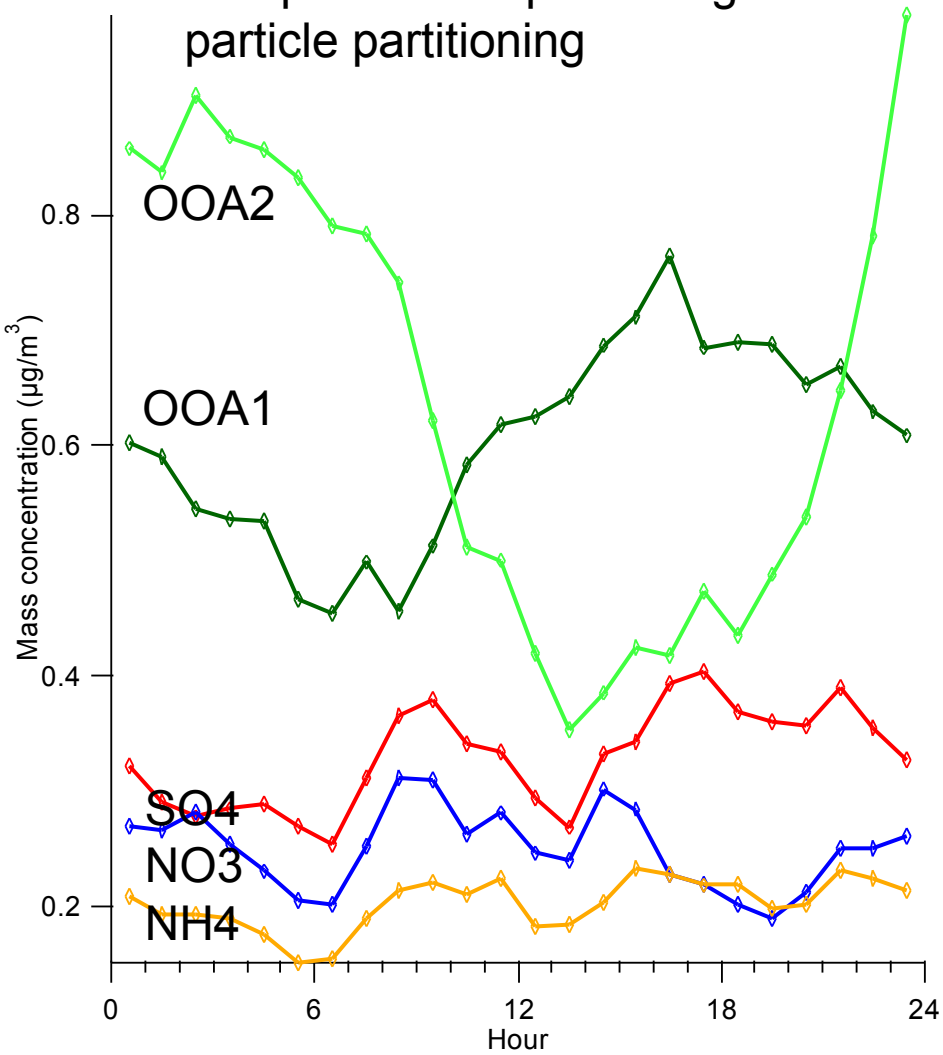
Other results

- OOA1 and the inorganic species long-range transported from anthropogenic sources
- OOA2 from local sources



Clear diurnal cycle for OOA2

- Mixing layer height
- Local sources and short life time
- Daytime photochemistry
- Temperature dependent gas-particle partitioning



For more information, see…

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Atmospheric Chemistry and Physics Discussions

This discussion paper is/has been under review for the journal *Atmospheric Chemistry and Physics (ACP)*. Please refer to the corresponding final paper in *ACP* if available.

Physicochemical properties and origin of organic groups detected in boreal forest using an aerosol mass spectrometer

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