Supplementary material for 'Error Apportionment for Atmospheric Chemistry-Transport Models. A new approach to model evaluation' by Solazzo and Galmarini

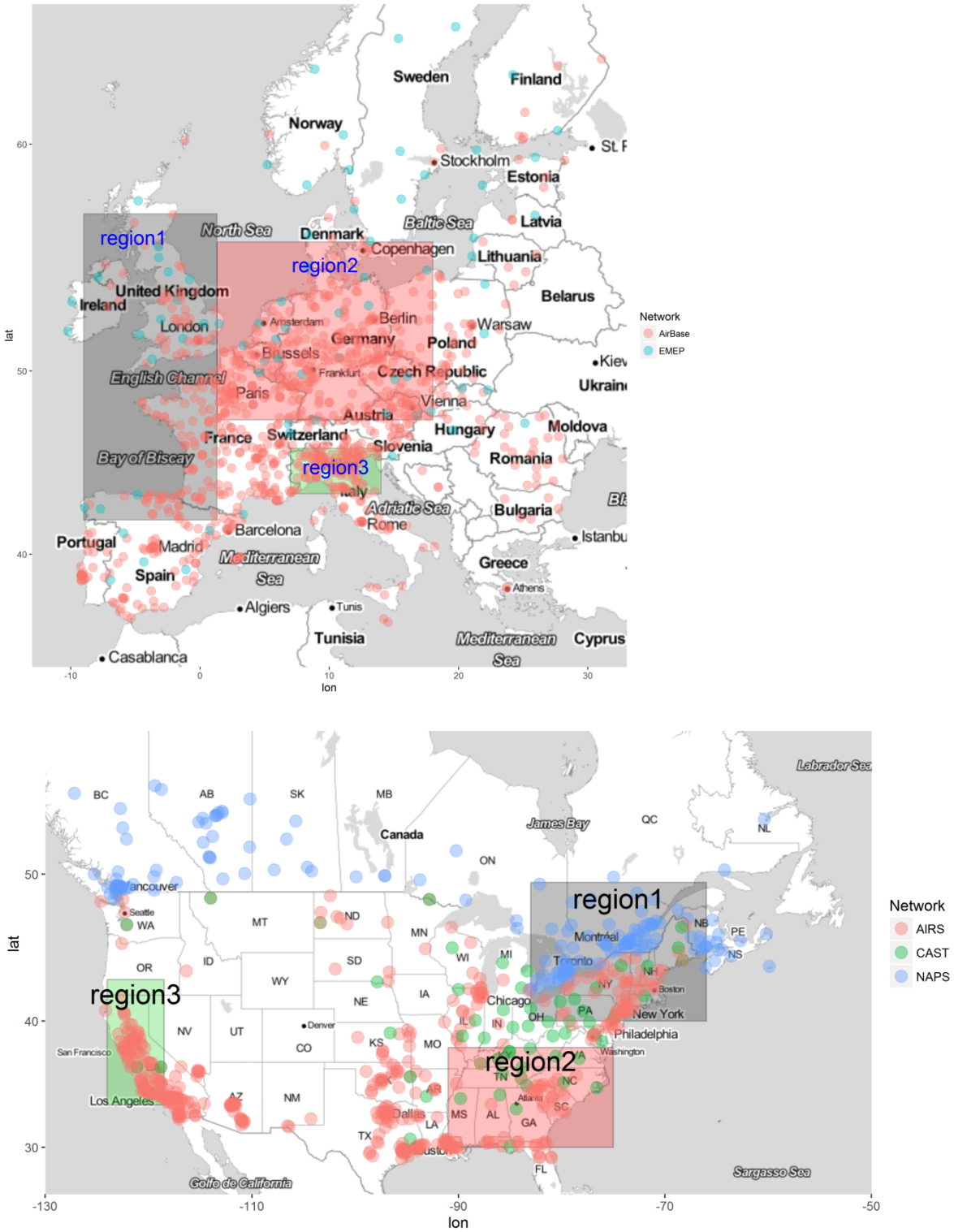
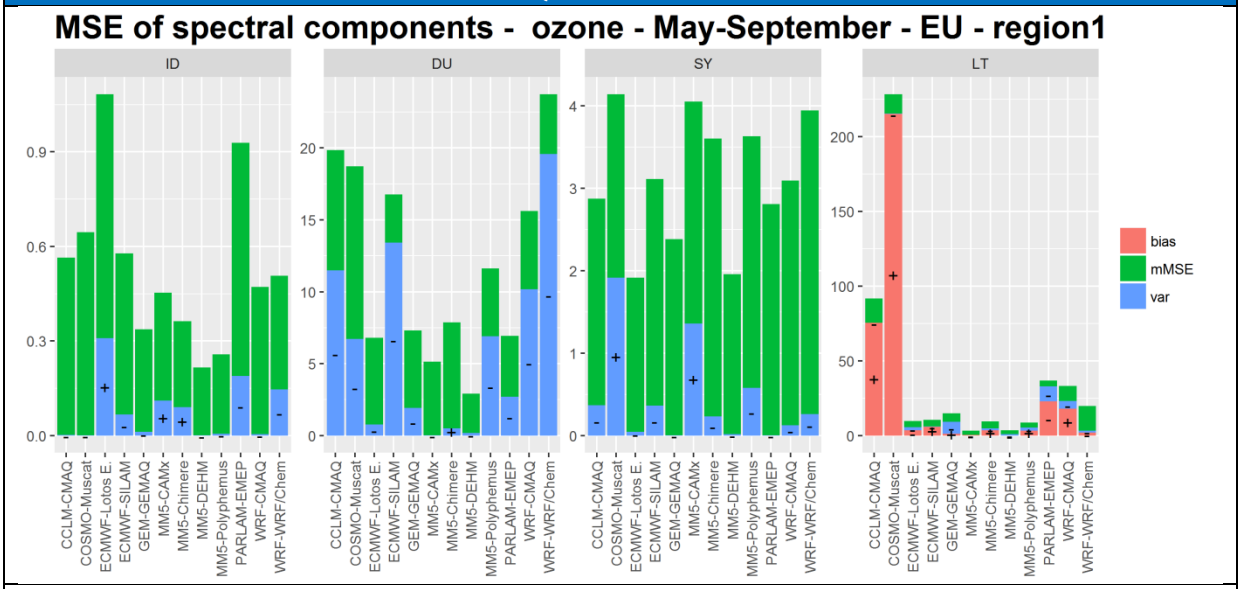
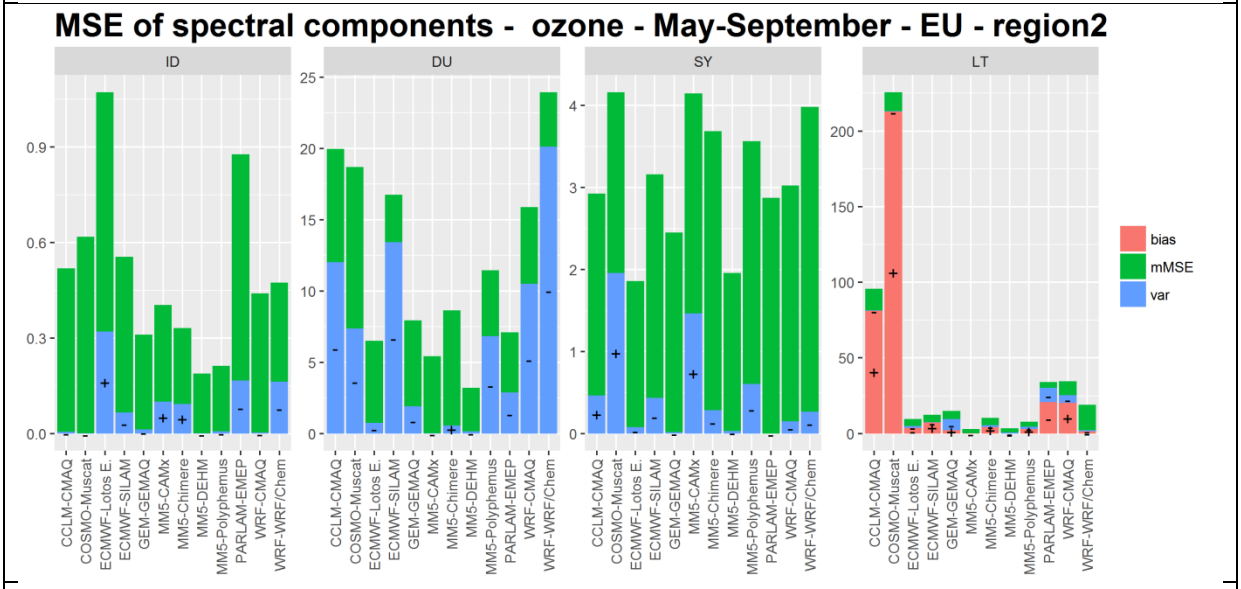
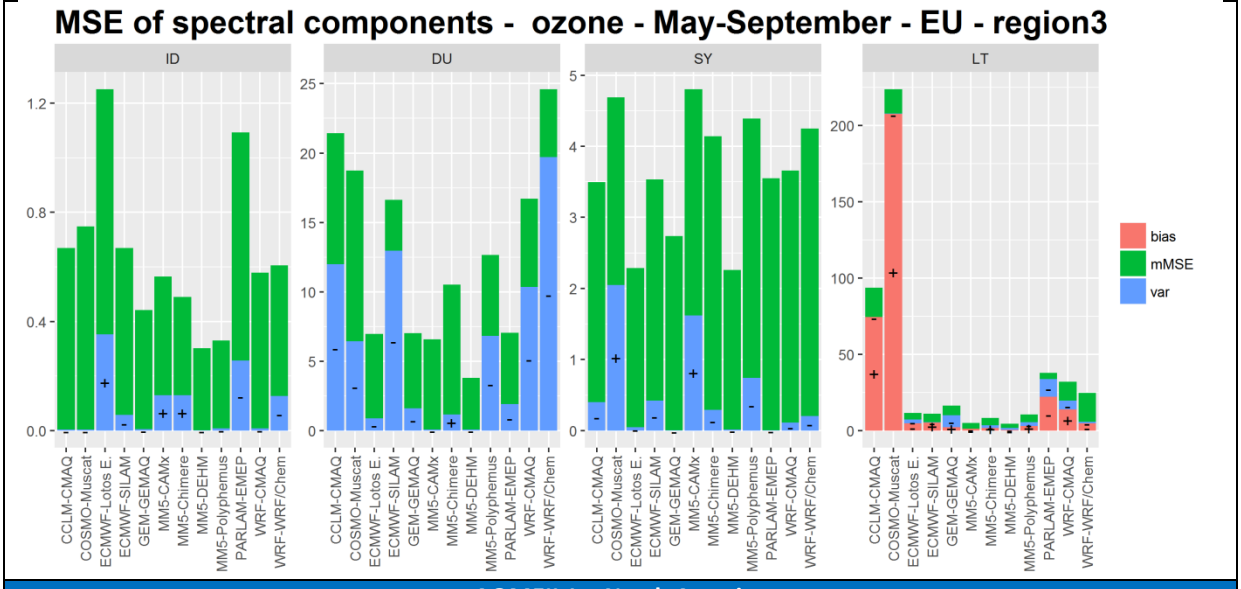


FIGURE S1. Sub-regions of the two continental domains a) EU, and b) NA. Overlaid are the ozone monitoring stations for the year 2010 classified based on the network**.**

AQMEII 1 - EUROPE







AQMEII 1 – North America

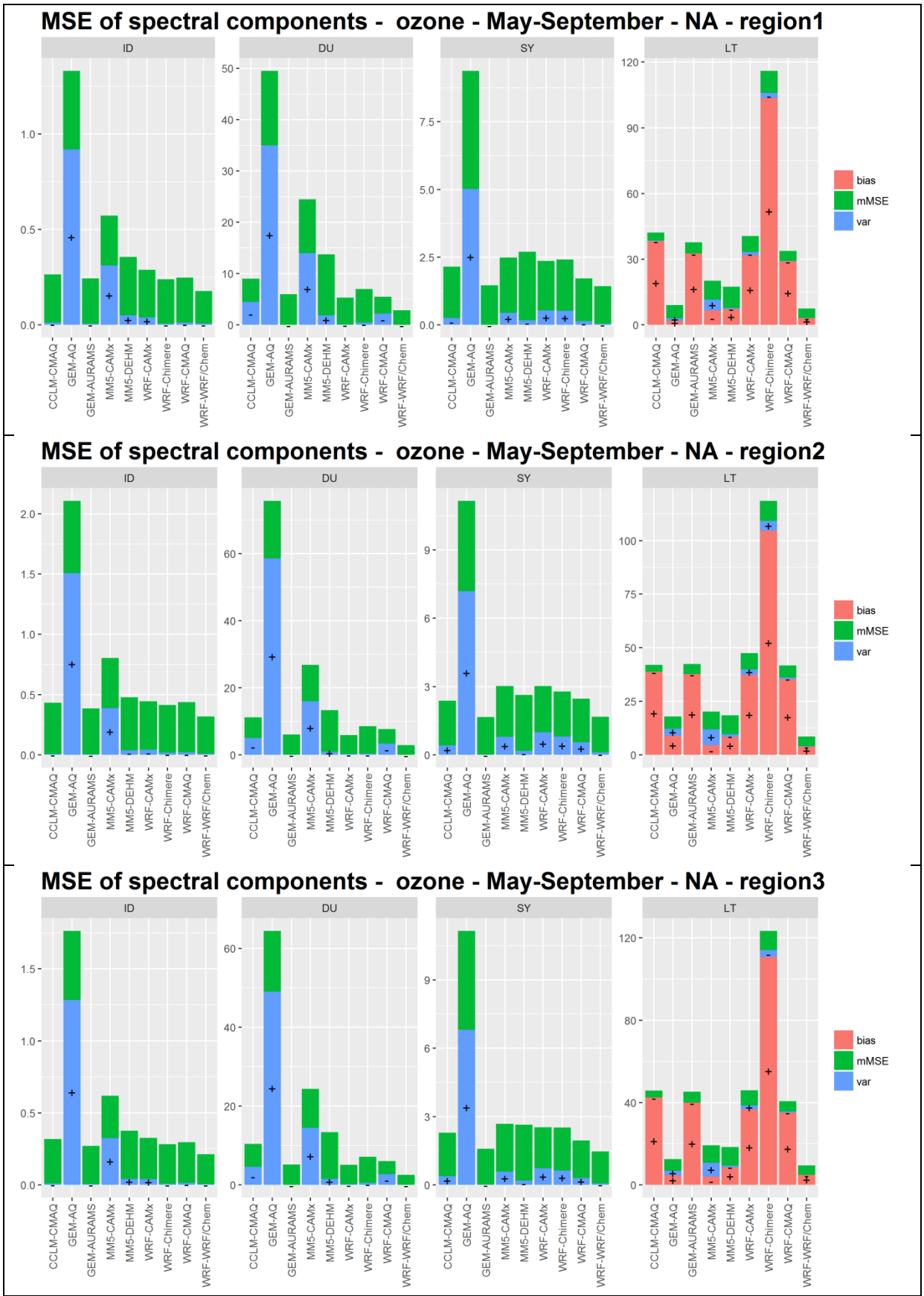
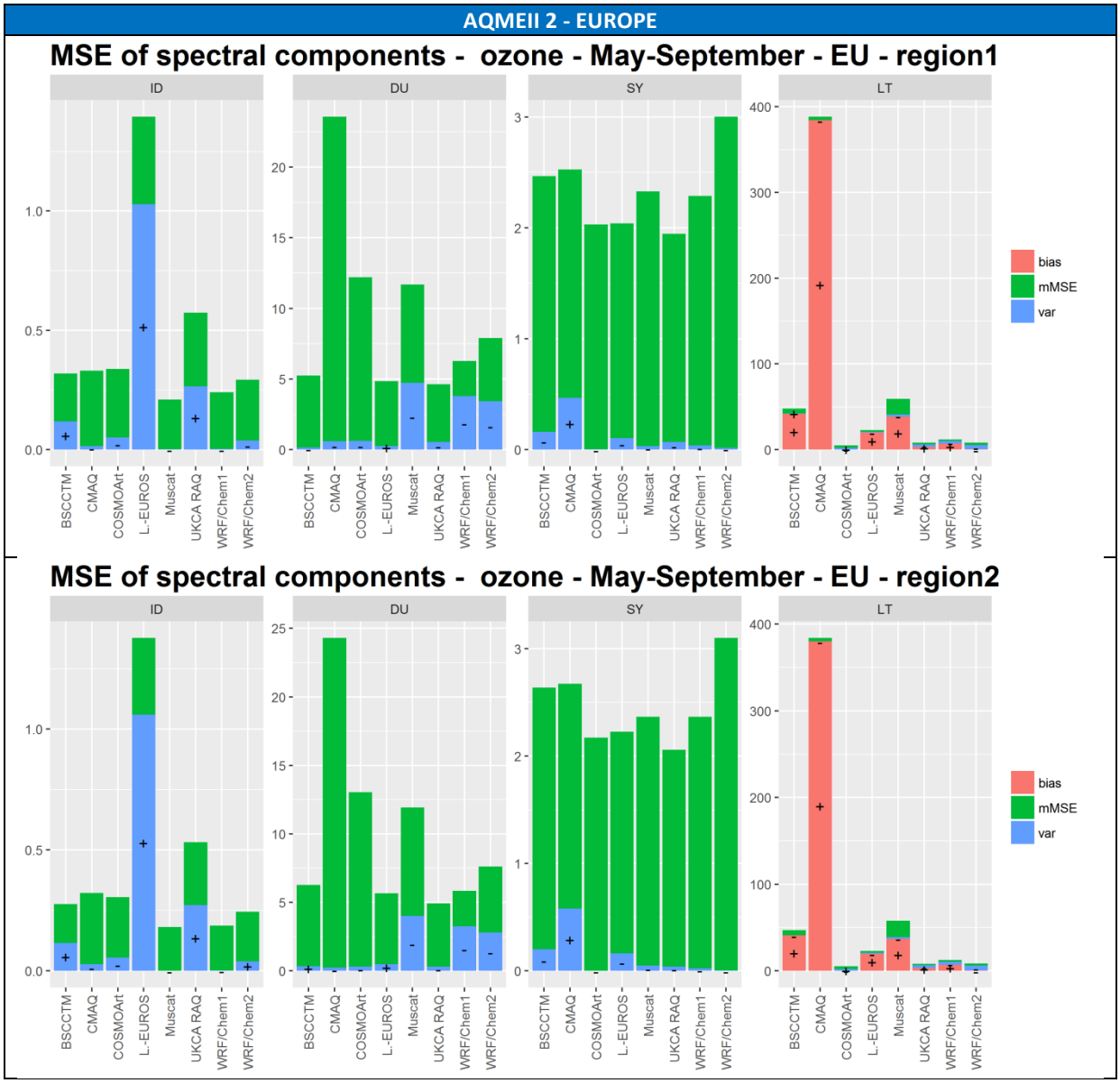
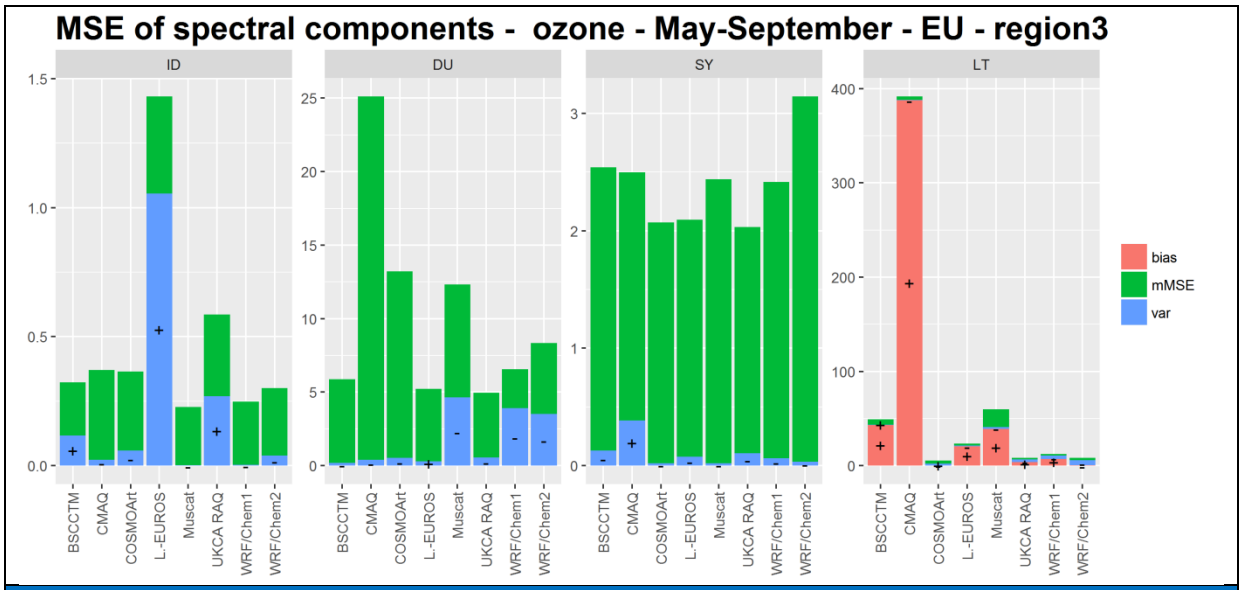


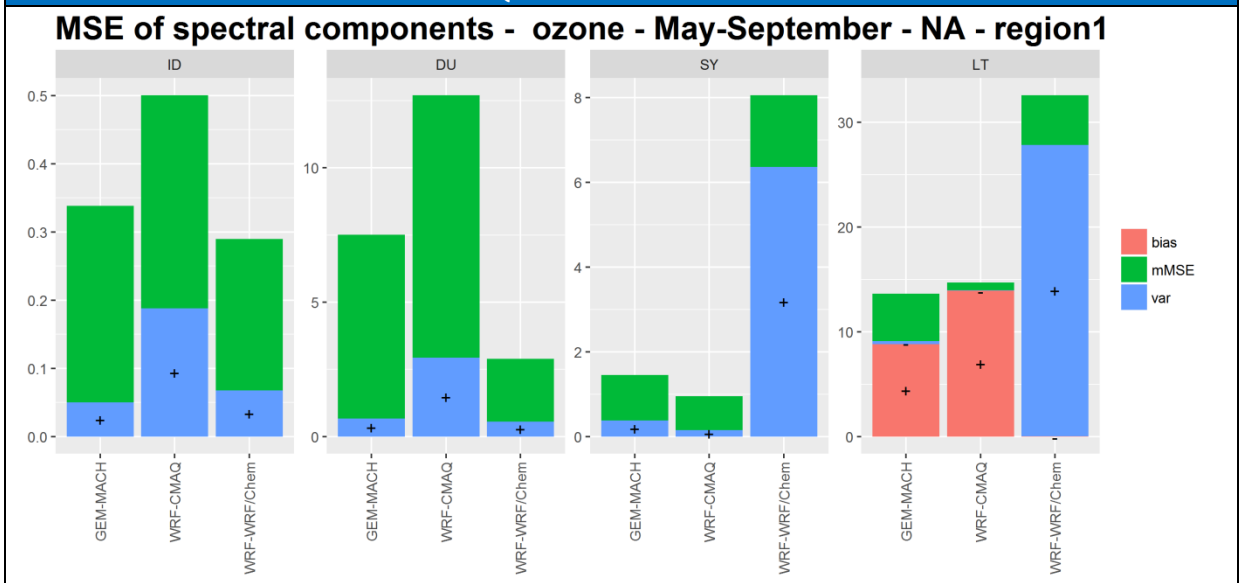
FIGURE S2. MSE (ppb^2) breakdown in bias, variance and mMSE of the spectral components ID, DU, SY, LT (based on Eq 9) for the models of AQMEII1 and the three sub-regions of **FIGURE S1**. The sign within the share of bias and variance indicates

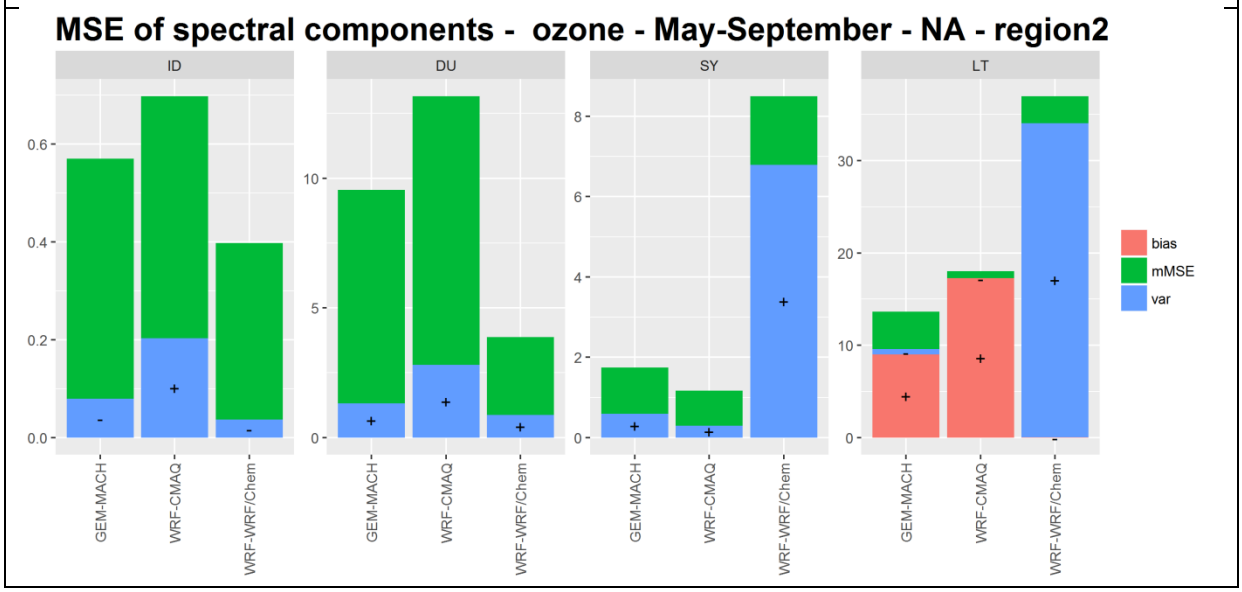
model overestimation (+) or underestimation (-) of mean concentration (bias) and variance. Top three panels: EU; lower three panels: NA.





AQMEII 2 – North America





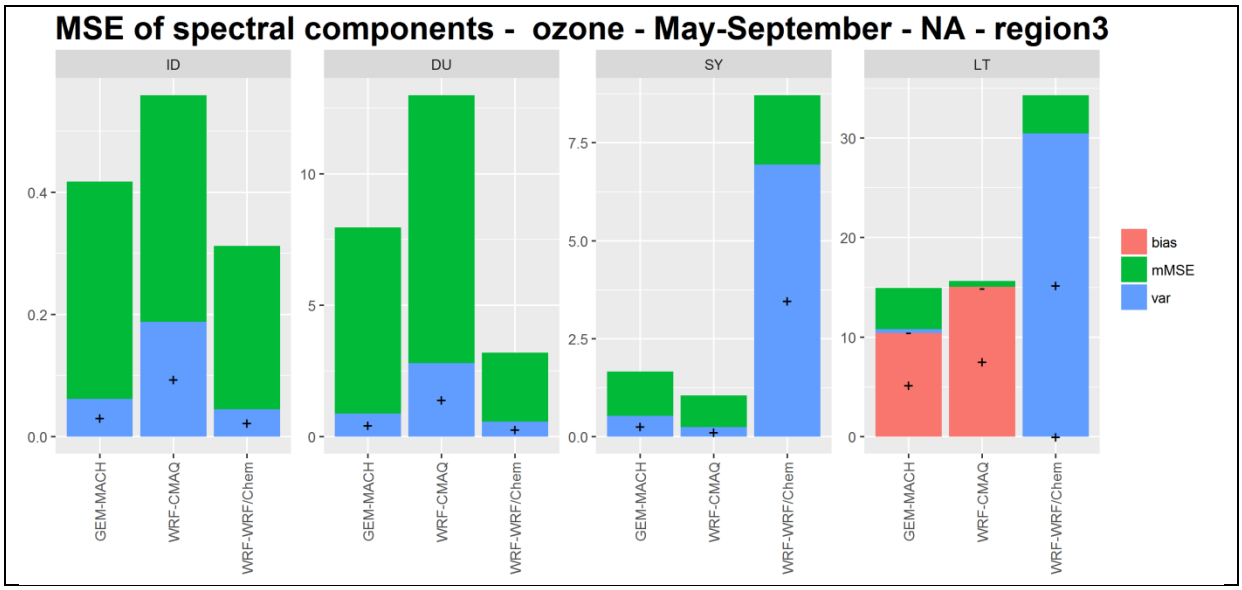
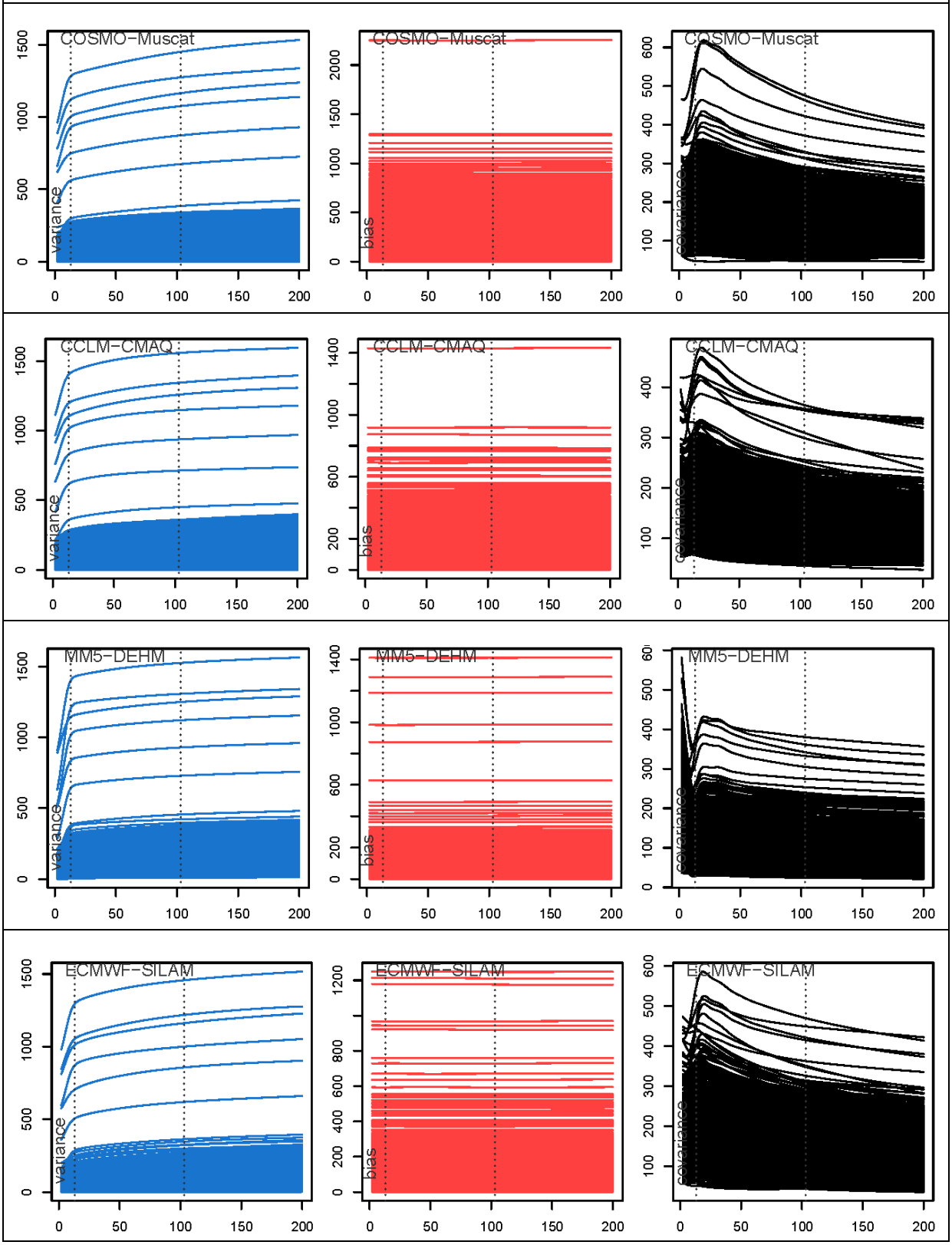
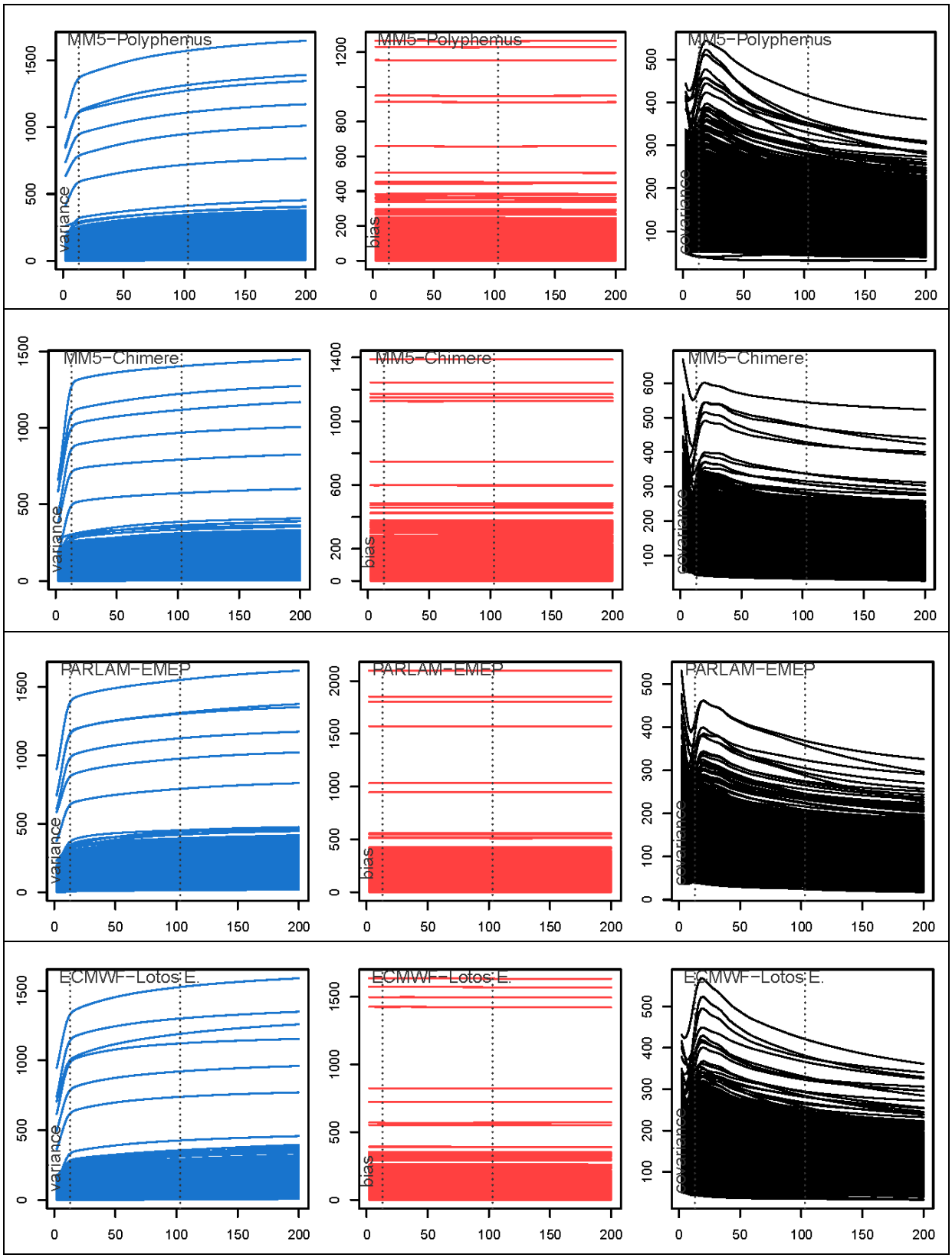
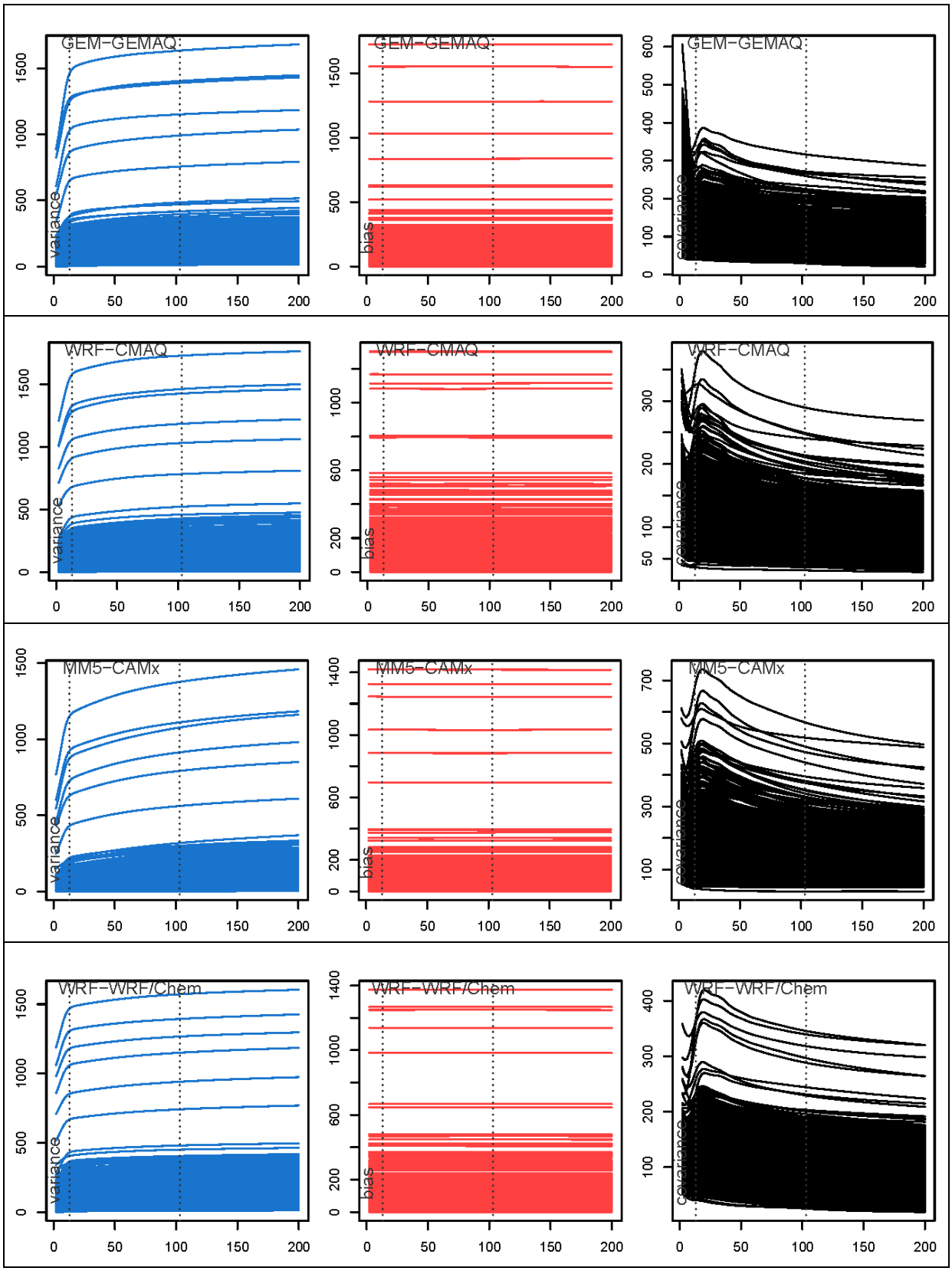


FIGURE S 3. As in Figure S2 for the models of AQMEII2.

AQMEII 1 – EUROPE - OZONE (MAY-SEPTEMBER 2006)




MM5-Polyphemus
variance
bias
covariance
MM5-Chimere
PARLAM-EMEP
ECMWF-Lotos E.


GEM-GEMAQ
variance
bias
covariance
WRF-CMAQ
variance
bias
covariance
MM5-CAMx
variance
bias
covariance
WRF-WRF/Chem
variance
bias
covariance

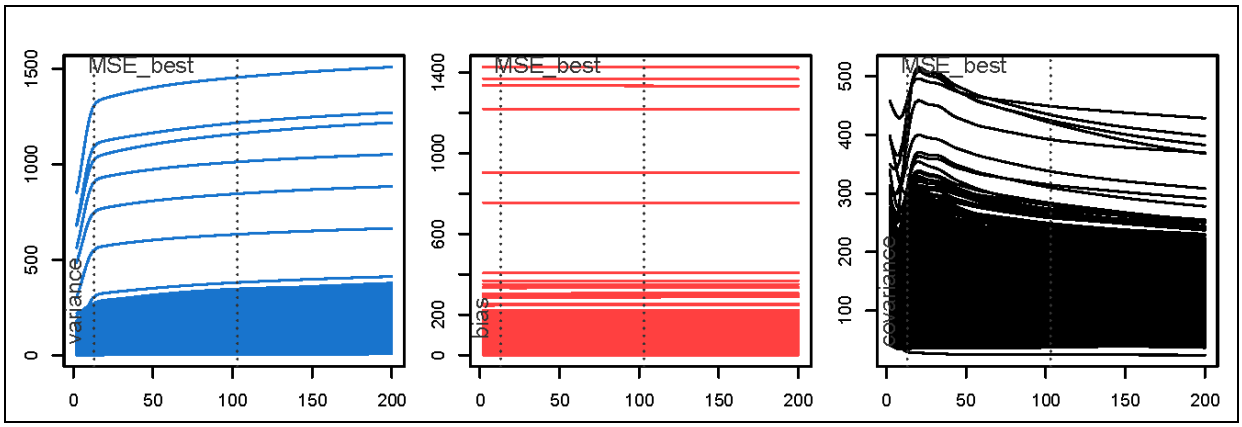
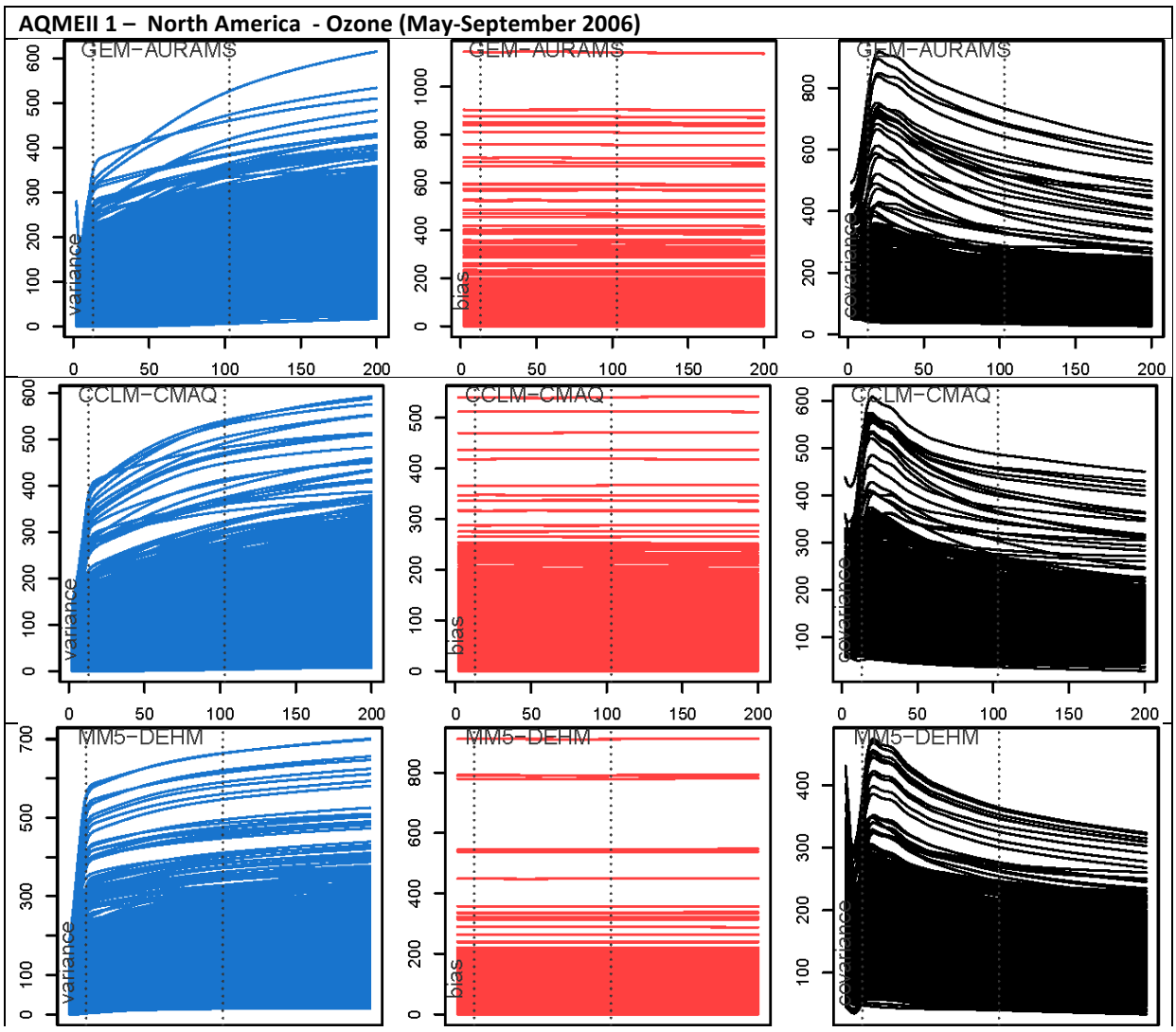
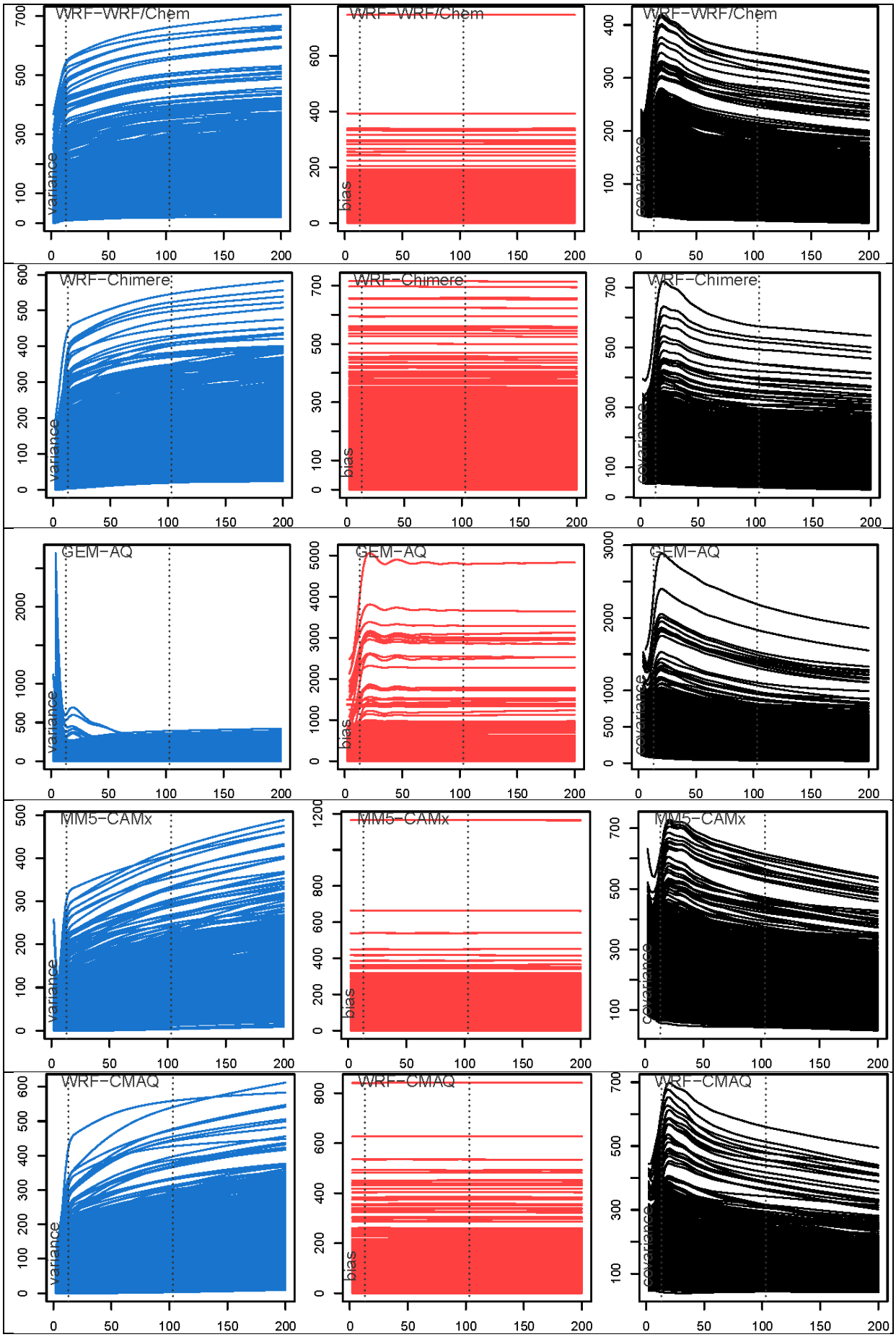


FIGURE S4. Variance (left column), Bias (central), and Covariance (right) for each modelling system and at all receptors as function of model complexity (decreasing from left to right on the horizontal axis). Vertical dotted lines represent the separation scale between SY and LT (103) and between ID and DU (13). Vertical axis is in ppb^2




WRF-WRF/Chem
variance
bias
covariance
WRF-Chimere
GEM-AQ
MM5-CAMx
WRF-CMAQ

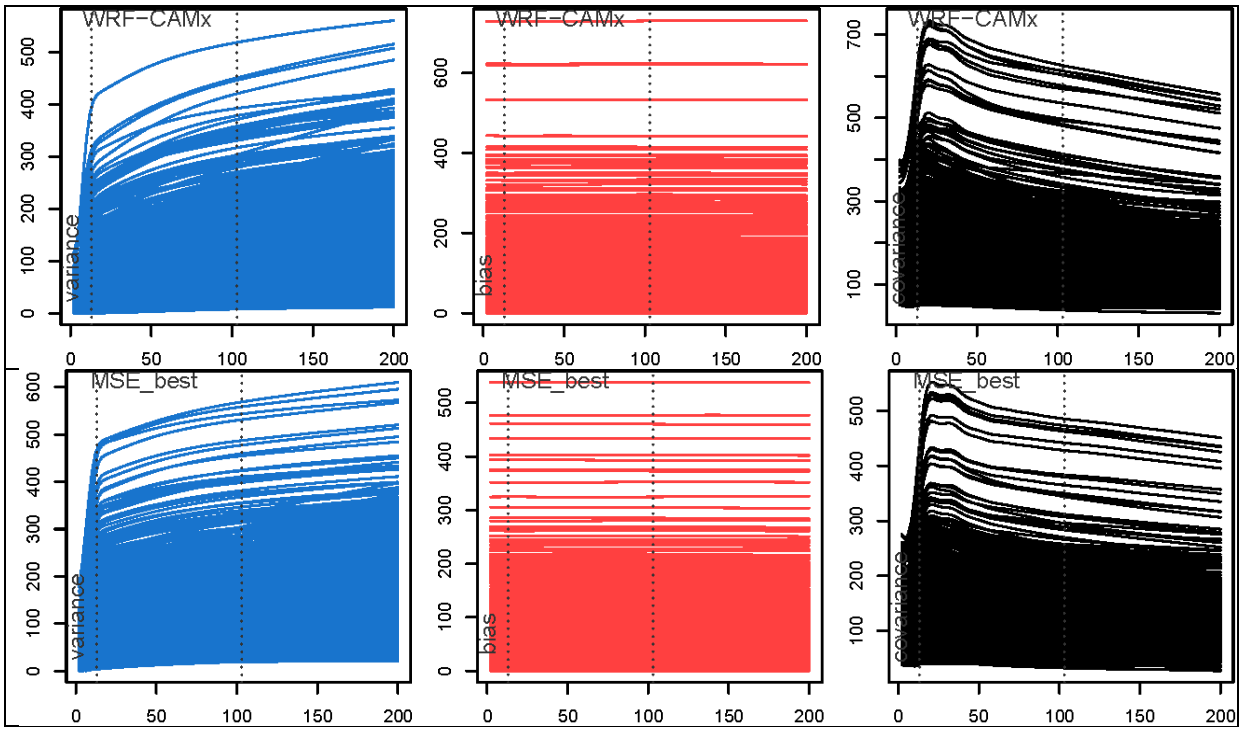
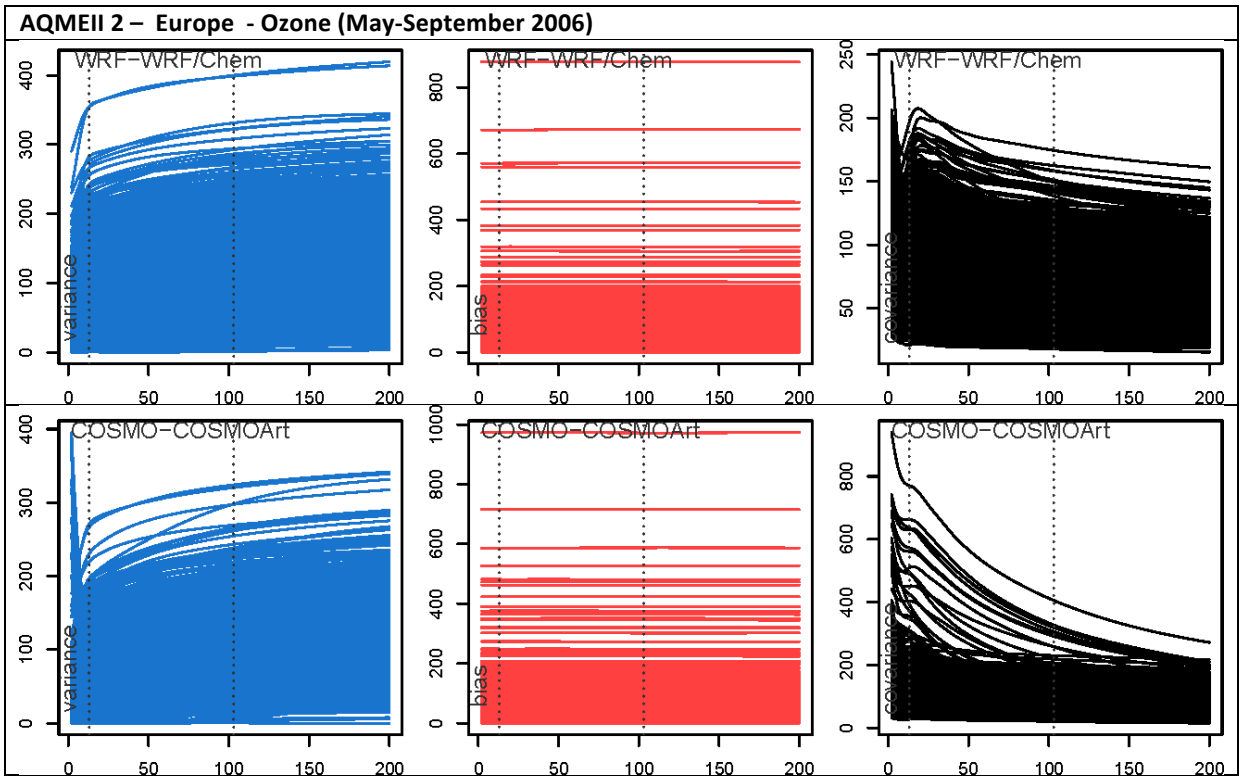
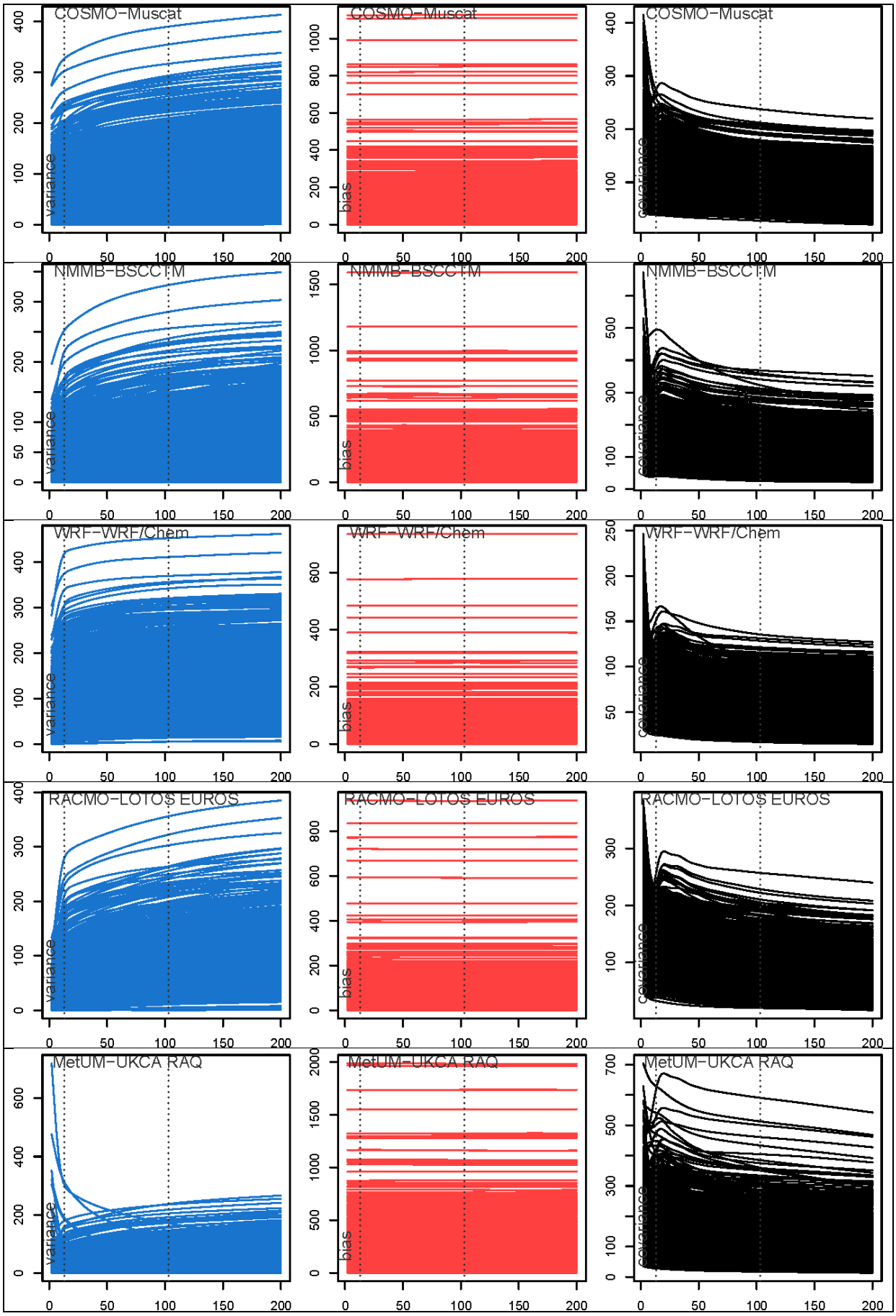


Figure S 5. As in Figure S4 for AQMEII1 - NA




COSMO-Muscat
variance
bias
covariance
NMMB-BSCCTM
WRF-WRF/Chem
RACMO-LOTOS EUROS
MetUM-UKCA RAQ

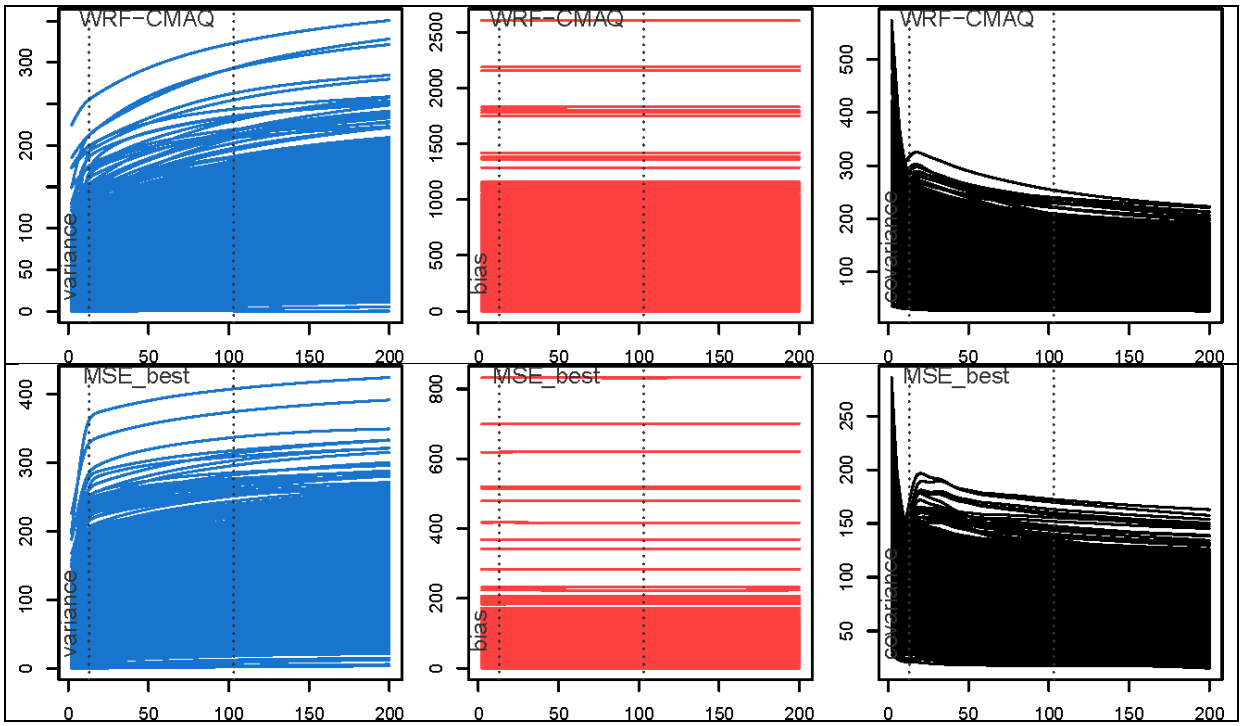
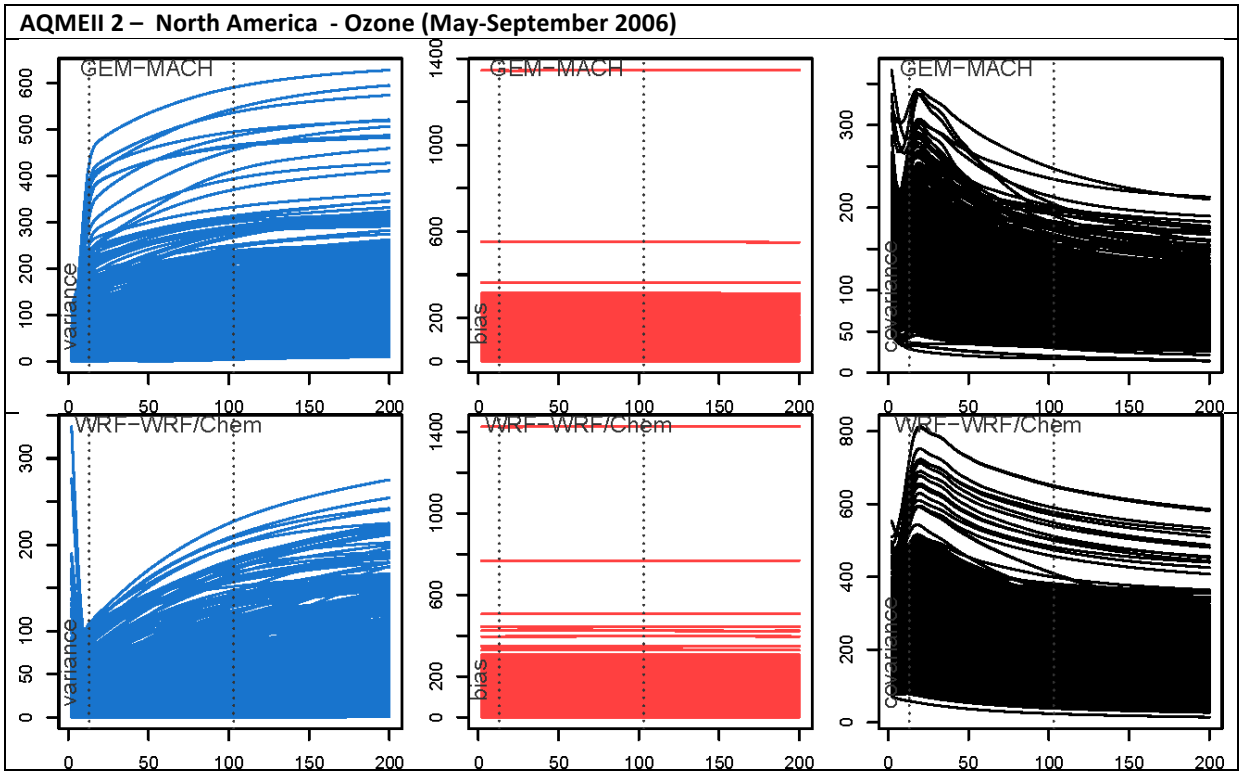


FIGURE S6. As in Figure S4 for AQMEII2 - EU



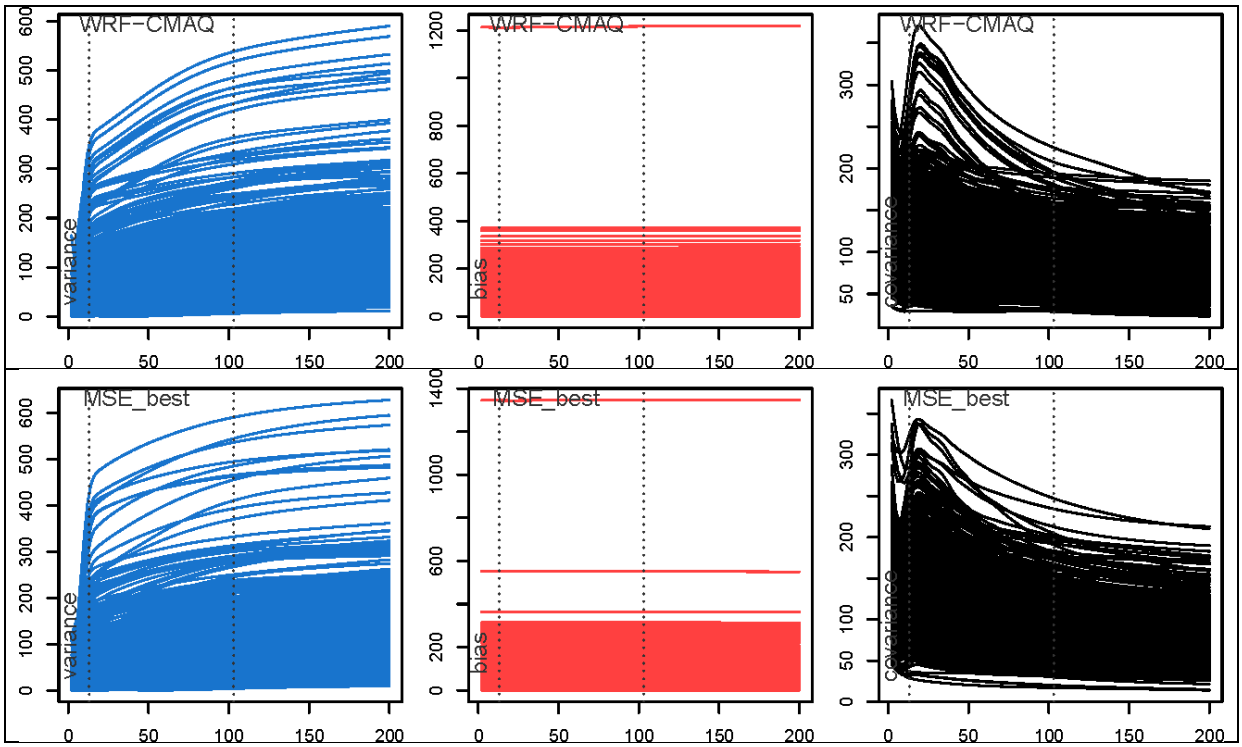


FIGURE S7. As in Figure S4 for AQMEII2 - NA