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Model evaluation of short-lived climate forcers for the Arctic Monitoring and Assessment Programme: a multi-species, multi-model study

Cynthia H. Whaley et al.

Correspondence to: Cynthia H. Whaley (cynthia.whaley@ec.gc.ca)

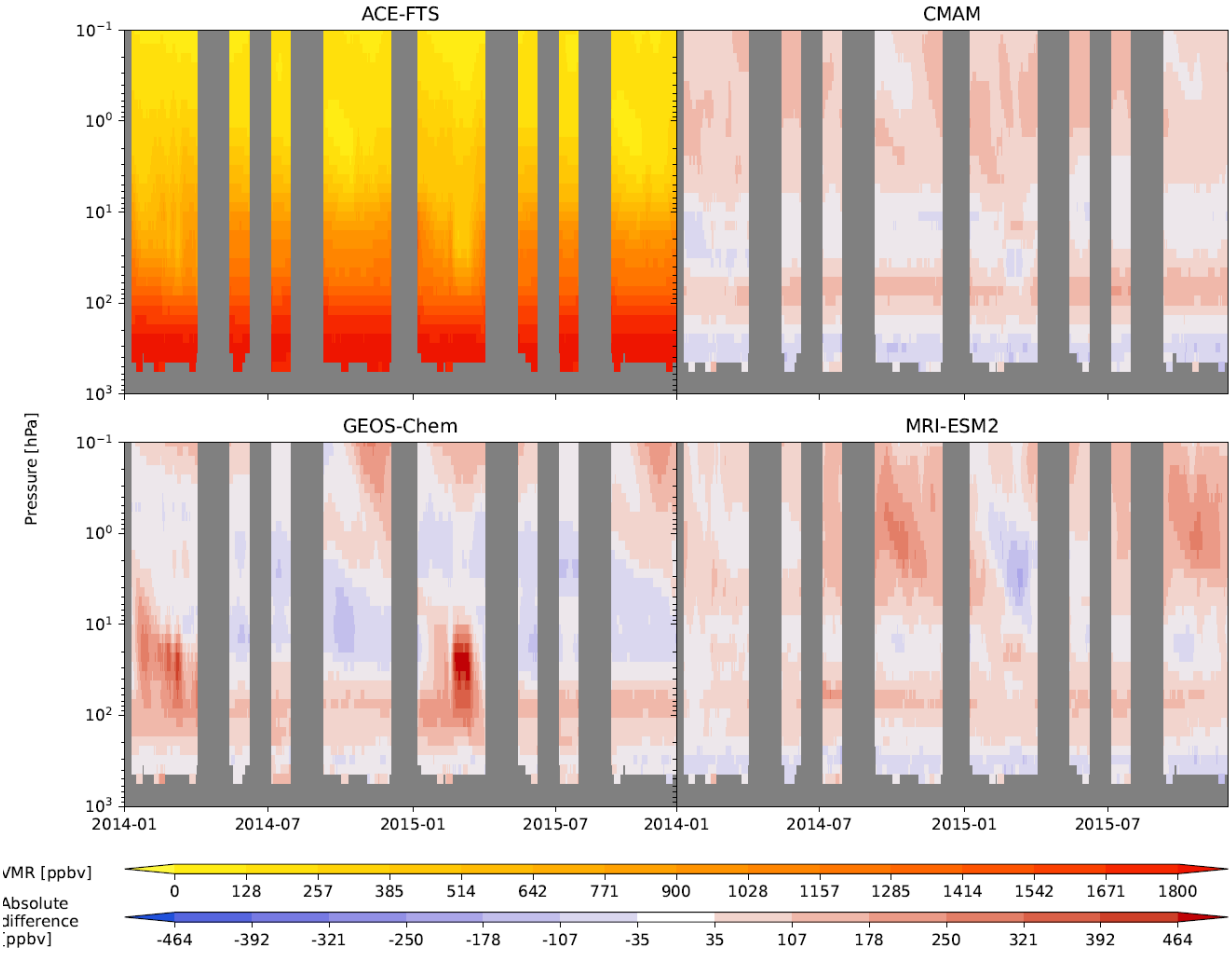

Fig S1. (top left) ACE-FTS measurements of Arctic CH_4 vs month (in ppbv, top colour bar) and (rest of panels) model biases for 2014-15 (model minus measurement, also in ppbv, lower colour bar). Results for 2008-9 are similar and not shown.

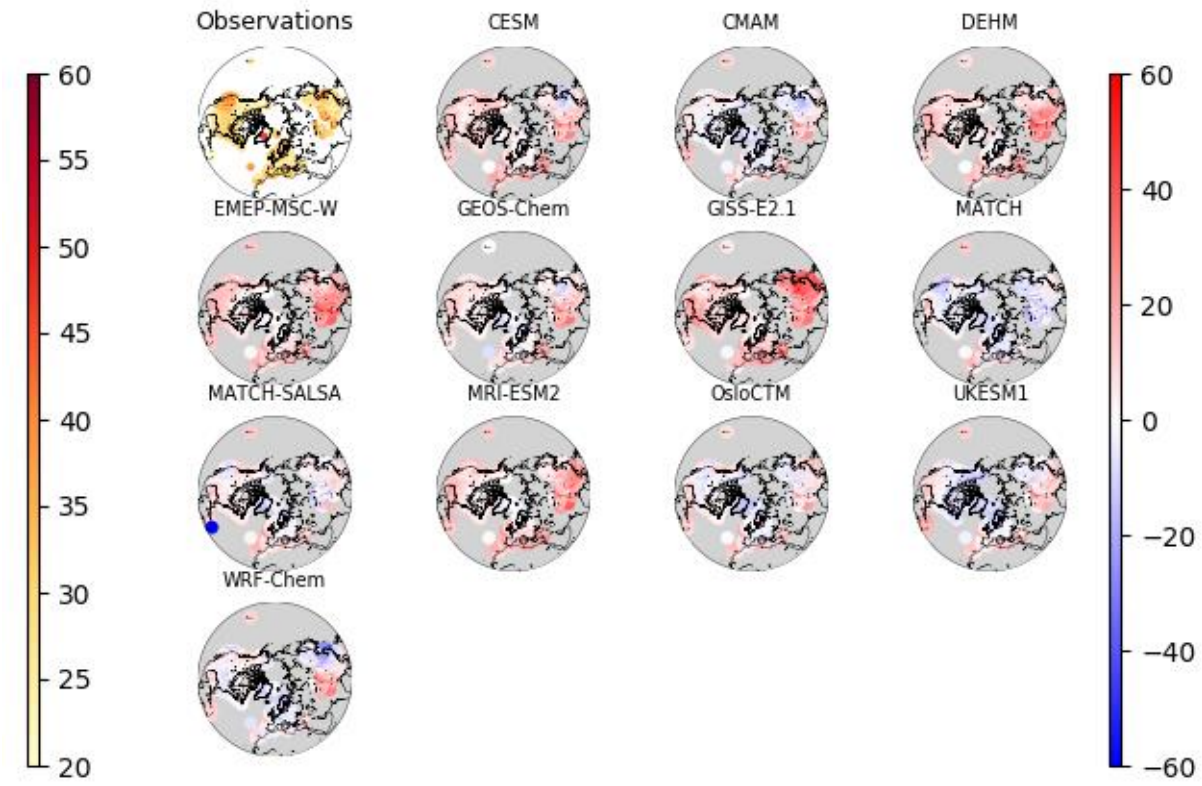

Fig S2. Annual mean O3 volume mixing ratios (ppbv, left colour bar) at surface measurement sites, and model bias (model minus measurement in ppbv, right colour bar) for 2014-15. Results from 2008-9 are similar and not shown.

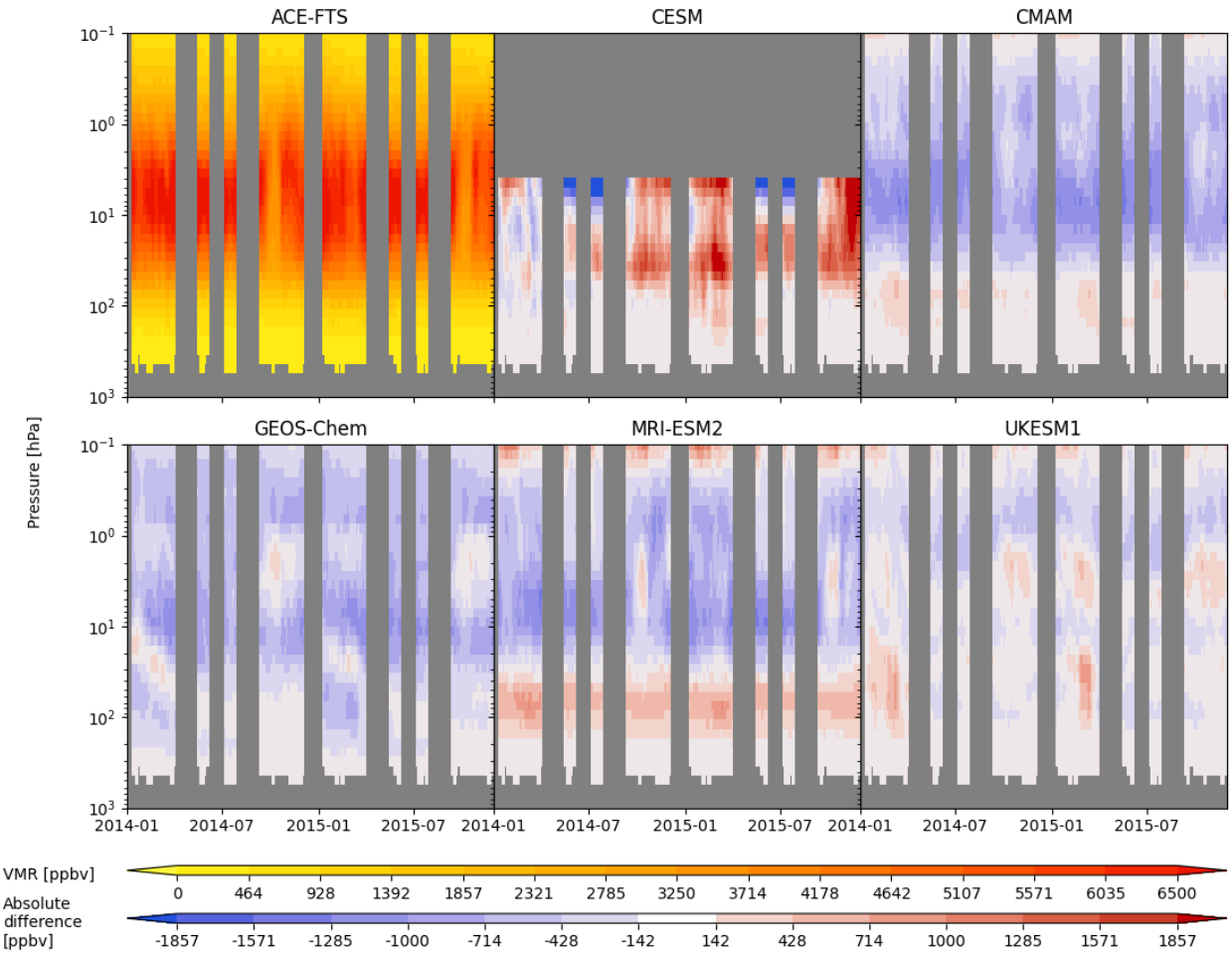

Fig S3. (top left) ACE-FTS measurements of Arctic (>60°N) O3 vs month (in ppbv, top colour bar) and (rest of panels) model biases for 2014-15 (model minus measurement, also in ppbv, lower colour bar). Results for 2008-9 are similar and not shown.

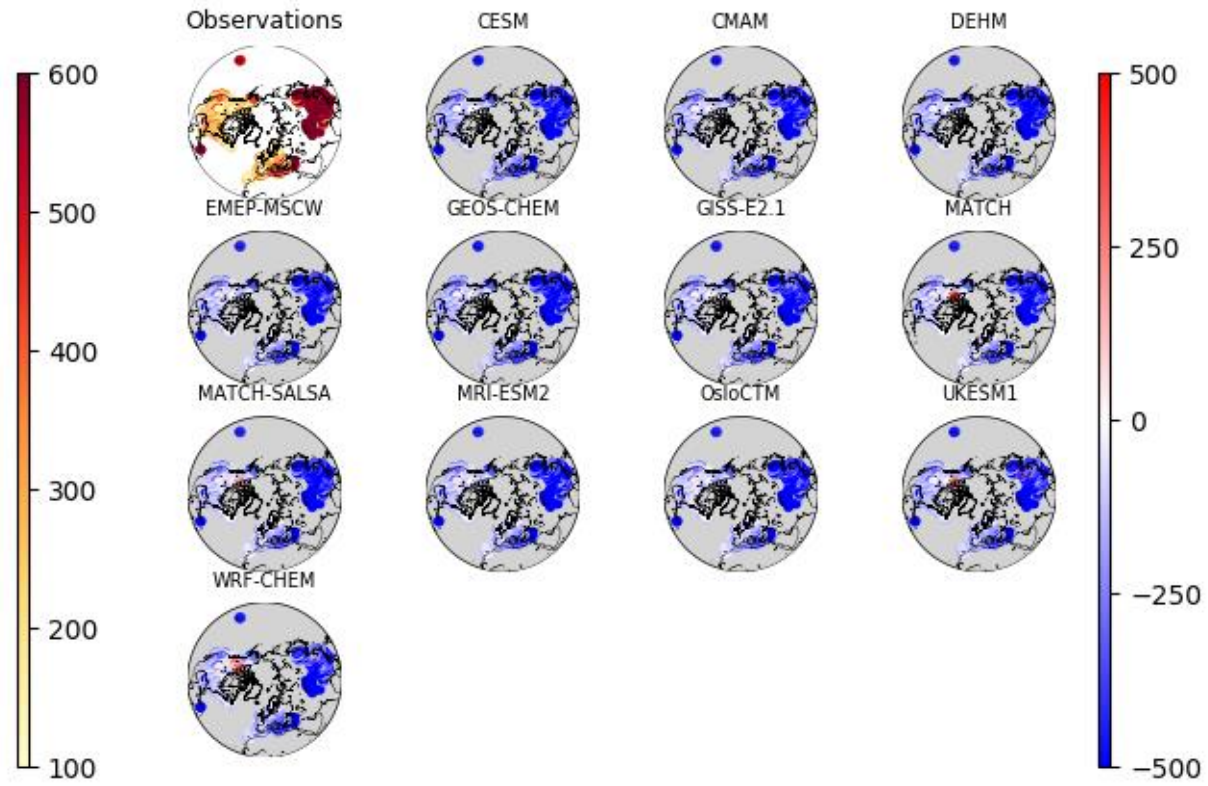

Fig S4. Annual mean CO volume mixing ratios (ppbv, left colour bar) at surface measurement sites, and model bias (model minus measurement in ppbv, right colour bar) for 2014-15. Results from 2008-9 are similar and not shown.

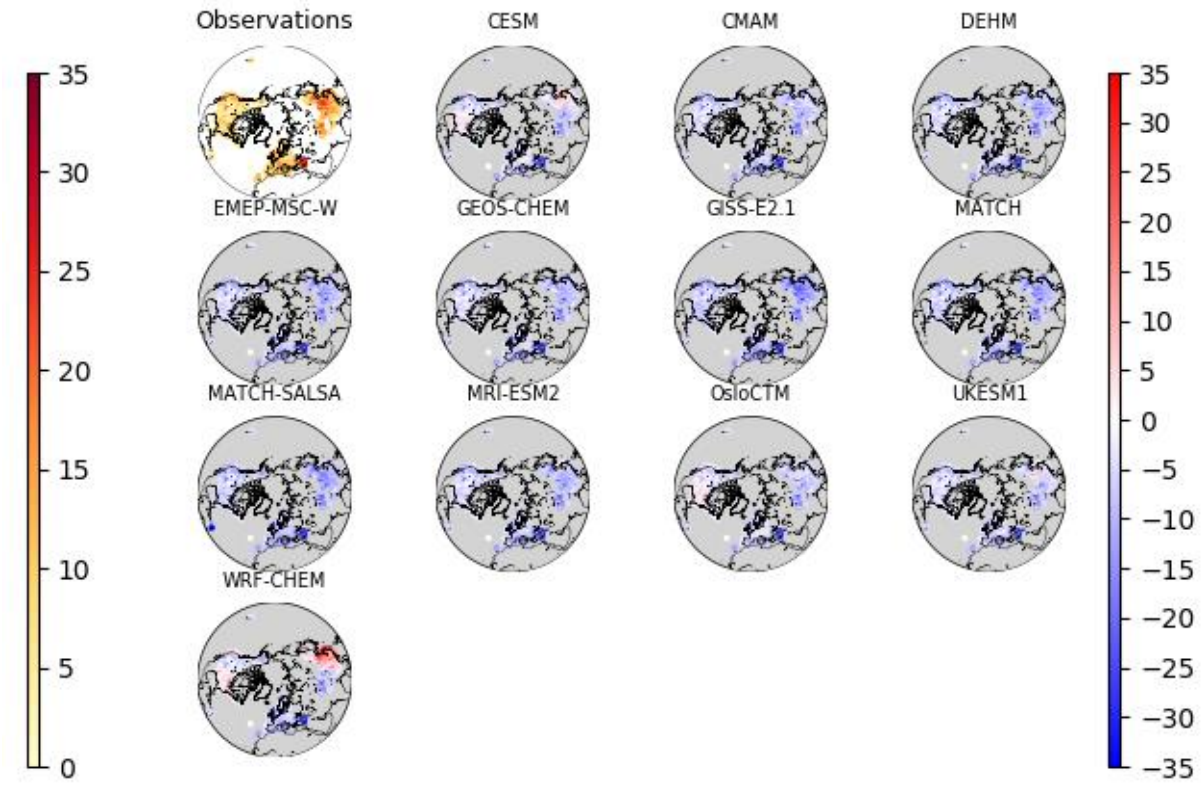

Fig S5. Annual mean NO_2 volume mixing ratios (ppbv, left colour bar) at surface measurement sites, and model bias (model minus measurement in ppbv, right colour bar) for 2014-15. Results from 2008-9 are similar and not shown.

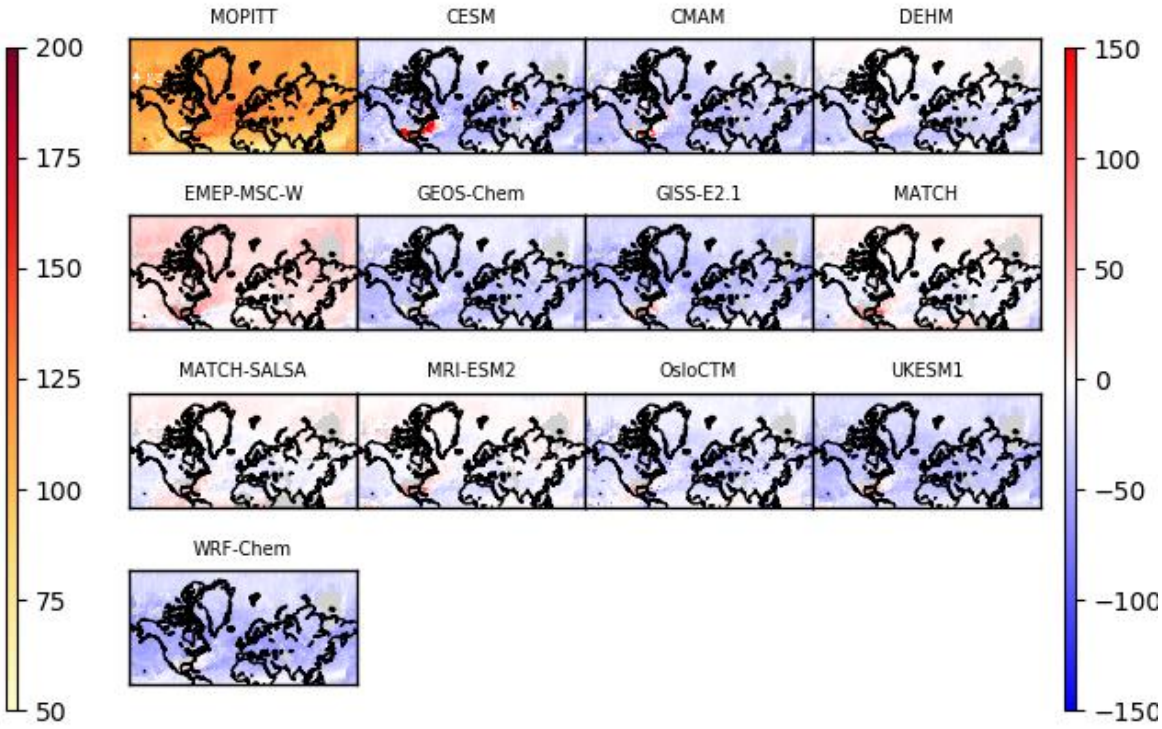

Fig S6. Springtime (MAM) mean CO at the 600 hPa level in the free troposphere (ppbv, left colour bar), as measured by MOPITT, and the model minus measurement biases (in ppbv, right colour bar) for each model for 2014-15.

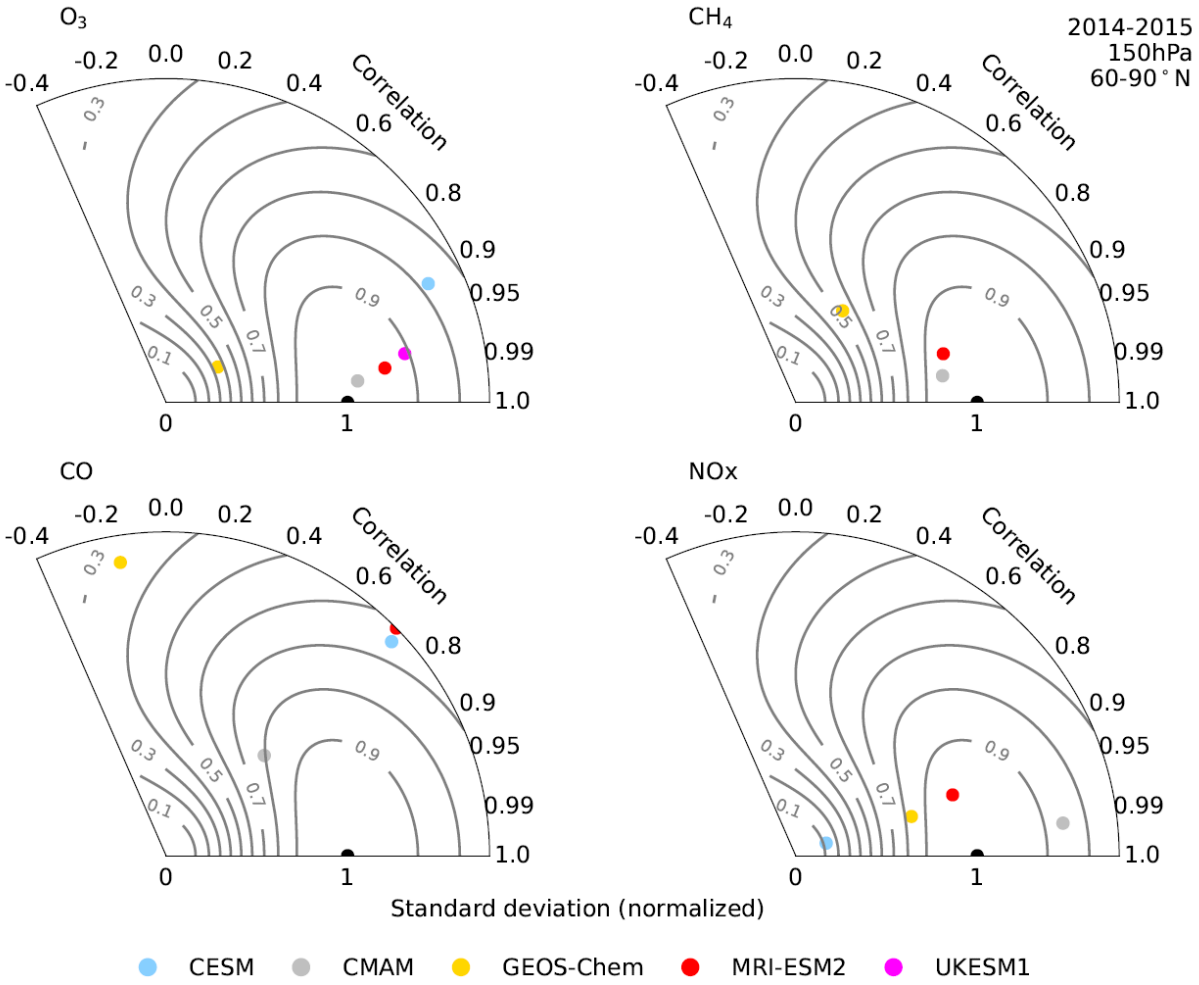

Fig S7. Taylor diagrams showing model performance for 2014-15 monthly average trace gases in the Arctic UTLS region at 150 hPa as evaluated against ACE-FTS satellite measurements. The grey contours indicate the skill as defined in Hegglin et al (2010).

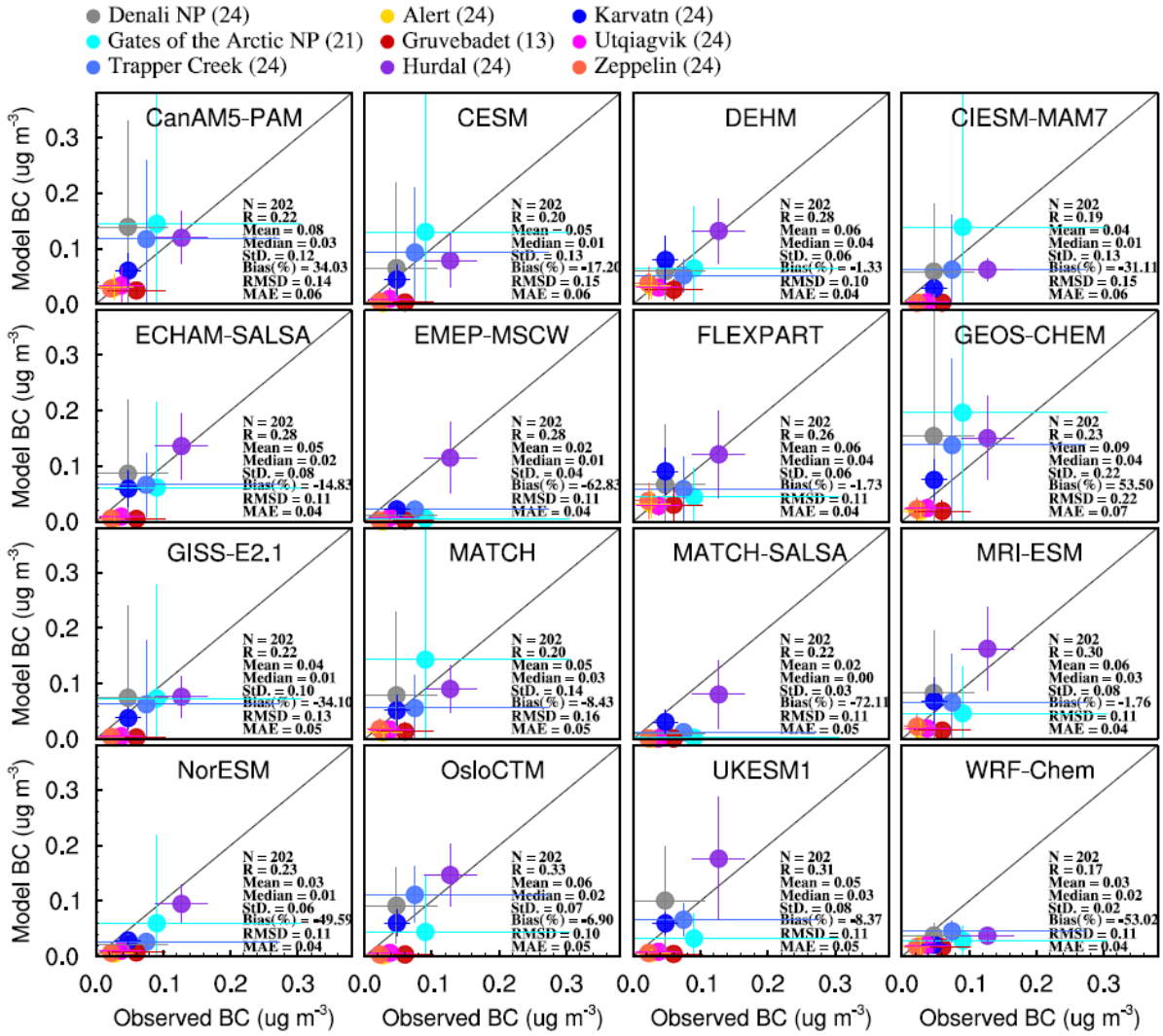

Fig S8. Modeled vs measured BC concentrations at surface Arctic measurement sites in 2014-15. Results for 2008-9 (not shown) had lower correlation coefficients and higher biases. Filled circles represent the mean for each location and the lines represent ± one standard deviation from mean. The number of monthly mean values available from individual sites is shown in brackets next to site names in the legend, with a max of 24 months in the 2 years.

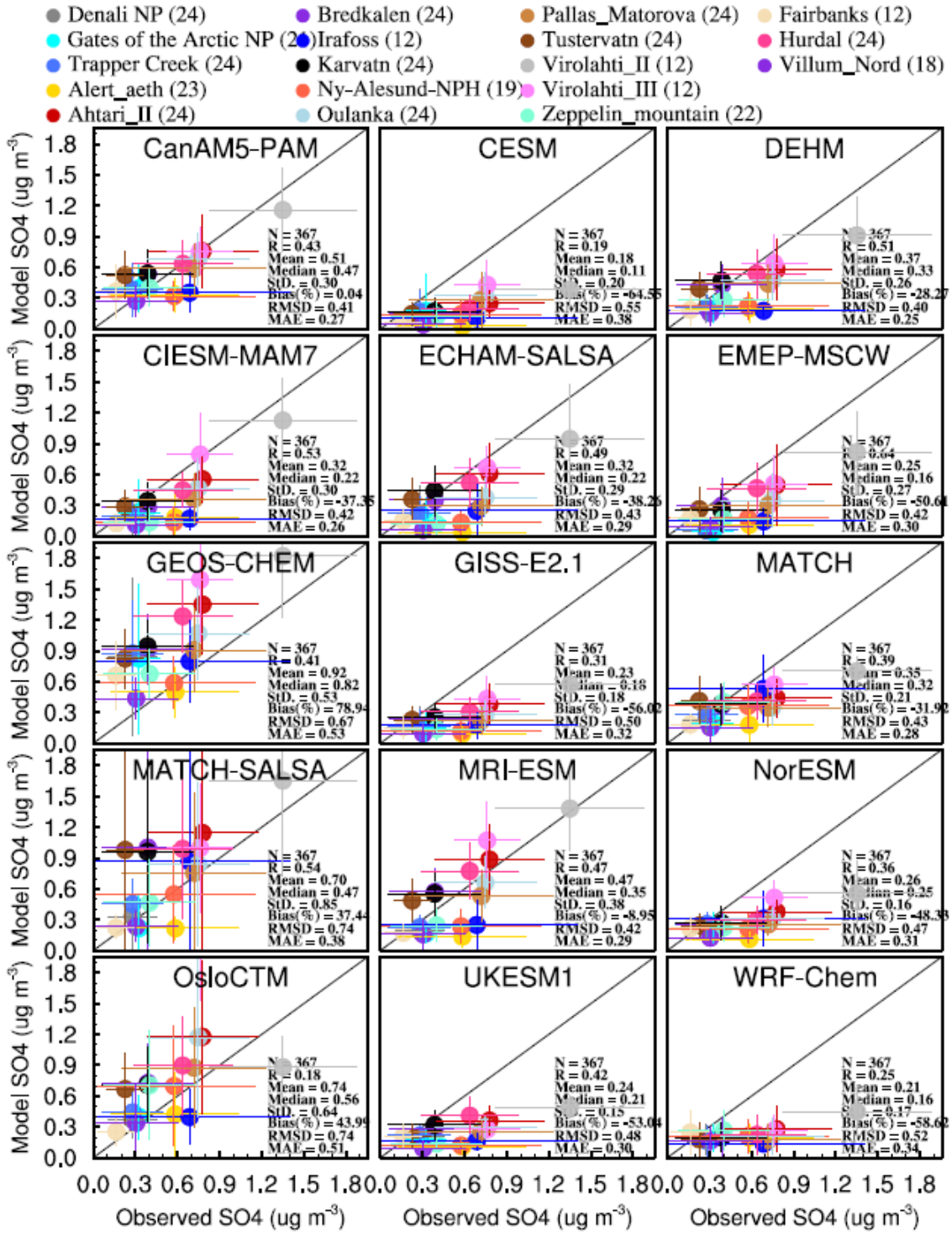

Fig S9. Modeled vs measured surface SO_4^{2-} concentrations at Arctic measurement sites for 2014-15. Filled circles represent the mean at a site and the lines represent +/- one standard deviation from mean based on available monthly mean data. Numbers in brackets show the number of months used, with a maximum of 24.

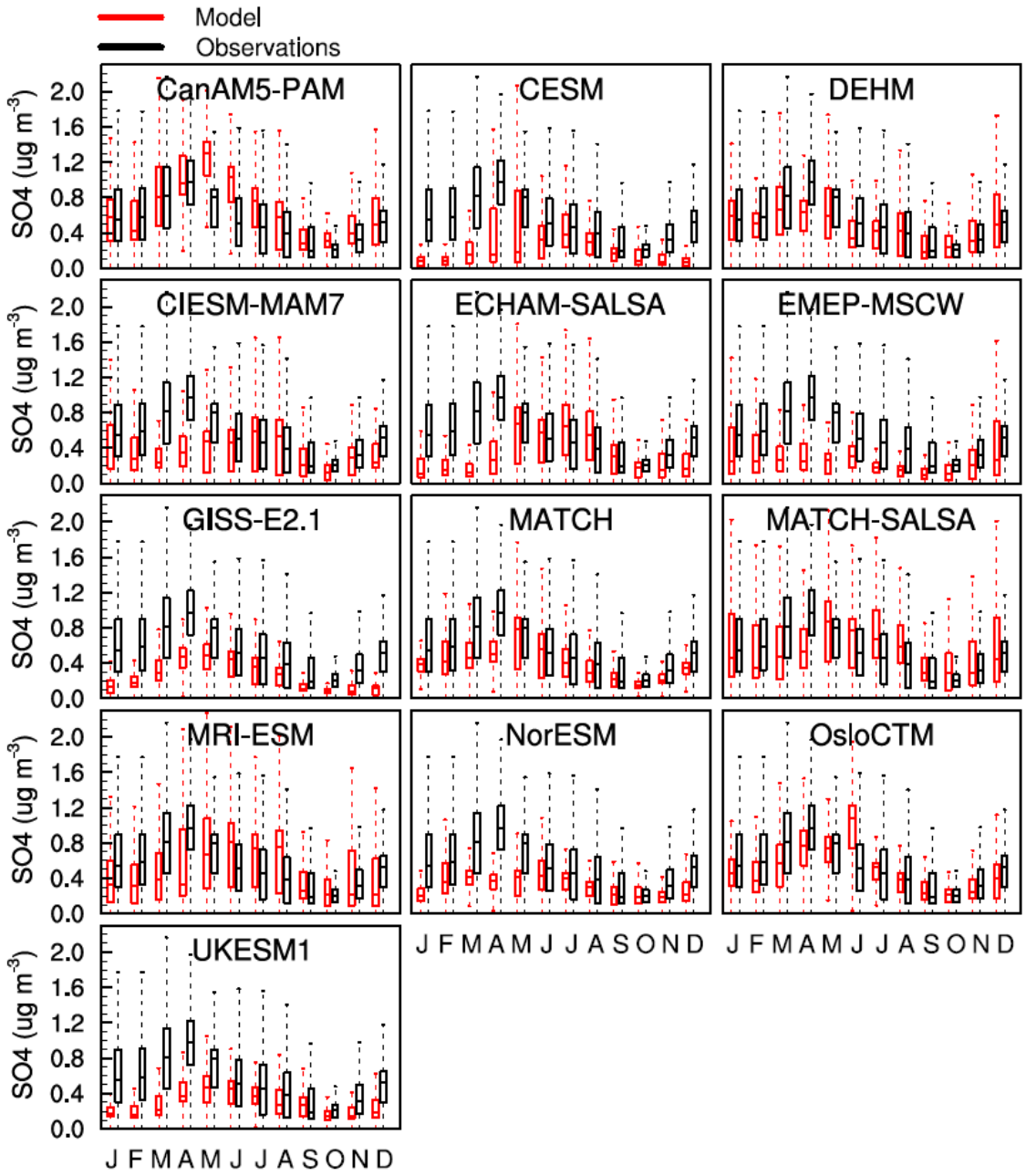

Fig S10. Measured (black) and modeled (red) SO_4^{2-} seasonal cycle, where box and whiskers represent the range from all Arctic sites grouped together for 2008-9.

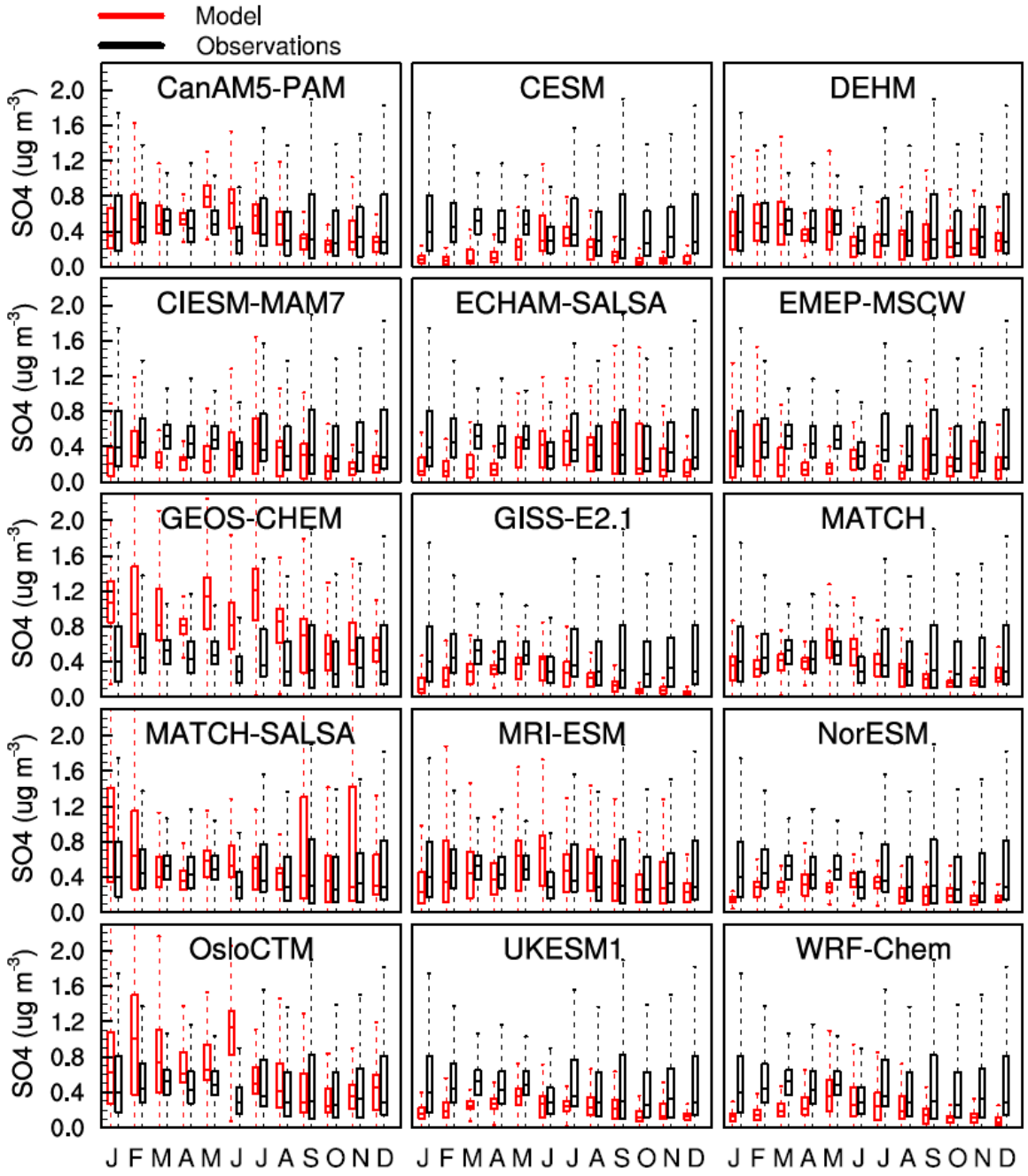

Fig S11. Measured (black) and modeled (red) SO_4^{2-} seasonal cycle, where box and whiskers represent the range from all Arctic sites grouped together for 2014-15.

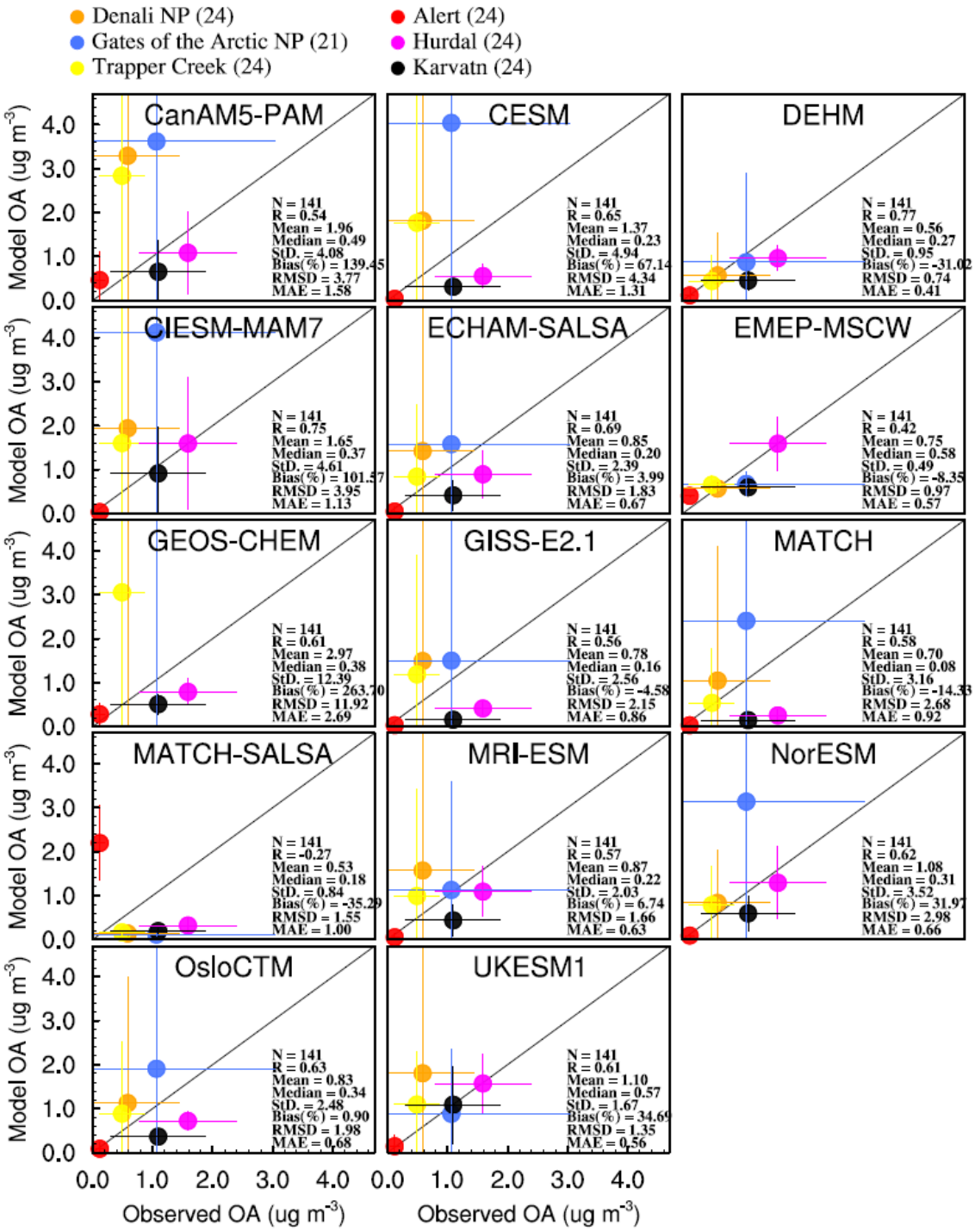

Fig S12. Modeled vs measured surface OA concentrations at Arctic measurement sites for 2014-15. Filled circles represent the mean at a site and the lines represent +/- one standard deviation from mean based on available monthly mean data. Numbers in brackets show the number of months used, with a maximum of 24.

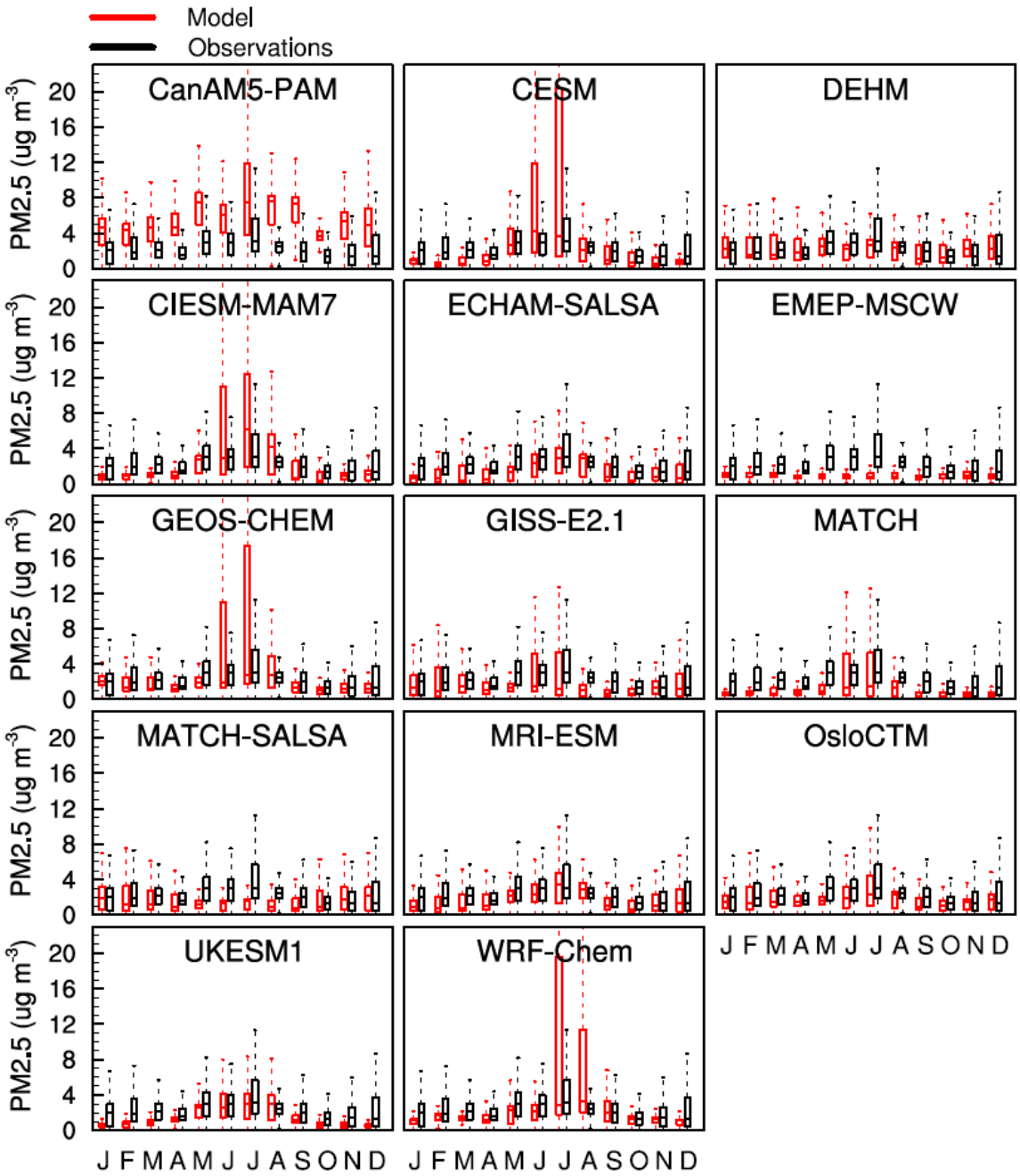

Fig S13. Modeled and measured monthly mean surface $PM_{2.5}$ concentrations in the Arctic for 2014-15.