Activity 2 Participant Call February 7, 2023

Participants: Stefano Galmarini, Olivia Clifton, Christian Hogrefe, Limei Ran, Jesse Bash, Laurens Ganzeveld, Anam Khan, Paul Makar, Jon Pleim, Johannes Flemming

For her overview manuscript, Olivia received outstanding model documentation and answers to clarification questions from everyone she had requested this information from, except for final model documentation and results from Lisa which were expected by February 13. Submission of the final manuscript may happen by the end of February.

The group discussed which potential reviewers to suggest to ACP upon submission. Names suggested were Jeff Geddes, Anthony Wong, Tilden Meyers, William Massman, LaToya Myles, Catherine Hardacre, Oliver Wild, Erwin Personne, and Giacomo Gerosa. Olivia asked call participants to email her suggestions for additional potential reviewers after the call.

Olivia then introduced Anam Khan, a Ph.D. student from the University of Wisconsin Madison who is interested in ozone dry deposition modeling for the third chapter of her PhD. Anam shared an outline of her planned work using AQMEII4 data. The overarching topic of her planned work is a comparison of stomatal ozone deposition across the single point versions of the air quality models and observation based estimates from carbon and water fluxes. Details of her outline are contained in the few slides copied below.

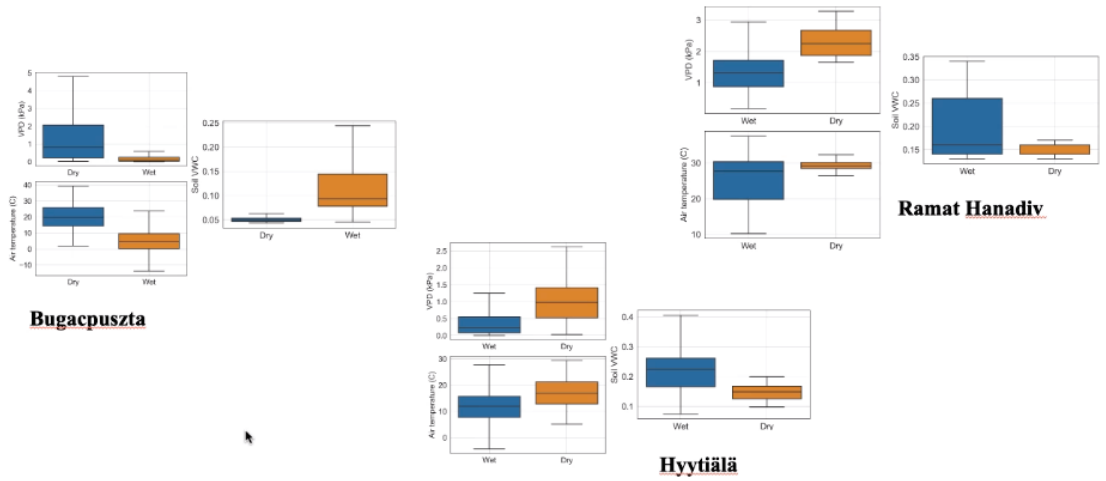
Key questions and motivations

- Do air quality models capture the stomatal conductance, the stomatal ozone sink, and the stomatal fraction of deposition inferred by observations across ecosystems?
  - What about during times of water stress?
- What are the sources of disagreement across the models for the different ecosystems?
- How does the cumulative stomatal ozone sink vary between observations and models?

Proposed methods

- Identify periods of water stress
  - Declines in soil volumetric water content
  - High VPD
- Compare stomatal conductance/resistance and stomatal fraction of deposition velocity between air quality model schemes and the stomatal fraction estimated from observed ozone fluxes
- Observation based

Identify periods of water stress



Anam and Olivia's next step is to make sure they have all the necessary data to do this analysis, and if not contact the site data providers.

Anam is interested in examining the impacts of drought, but it doesn't look like there are episodes of extreme water stress in the datasets, although it's hard to tell. The group discussed that using the observed soil moisture data (as currently done for the base runs) may not be the best approach to represent the actual drought stress vegetation at the flux sites is experiencing, partially because of uncertainties associated with the depth of these observations. There was discussion to include analysis of actual vs. equilibrium ET and Bowen ratio as potential top-down constraints. Laurens noted via chat that as reviewer of the overview manuscript he would definitely raise questions about this sensitivity to assumptions on soil moisture control on the intercomparison and suggested that combining the information on LE, O3, and CO2 fluxes would give maximum constraints on stomatal conductance.

The group then discussed whether - if sensitivity simulations were to be part of the future work envisioned by Anam (not decided yet, but probably yes) – it would at some point be useful to try to code up all models in a single framework, or just keep asking modelers to rerun with perturbed inputs and/or

parameters. No decision was reached as it may depend on the number of sensitivities to be simulated, but several participants noted an initial preference for following the current model of asking modelers to run the simulations themselves (with exactly specified modifications to inputs and/or parameters) to keep everyone engaged. There was discussion of making an official announcement for Activity 2 regarding sensitivity testing and figuring out the protocol. Stefano also raised the point with respect to the sensitivity simulations that it will be important to clarify to the modelers what is acceptable in terms of the range of the modeled sensitivities.

Laurens noted that his group was looking at drought impacts at Borden Forest but the work is going very slow. He says hopefully they will pick it up again. Olivia says to be in touch so that we don't step on each other's feet.

Jesse suggested that the planned work shouldn't necessarily aim at refining soil moisture functions in the current model setup (in part due to the uncertainty in the soil moisture data and the ad-hoc nature of some of the functions), but rather to try and constrain and optimize modeled stomatal conductance with observation-derived estimates. Johannes suggested that future analysis (following up on the overview manuscript, but not necessarily part of Anam's work) could try to answer the question under which conditions do the (current) models do well, and when not (or when are they very variable), taking the observations at face value, and what are the most important things to fix in models?

At the end of the call, Christian asked call participants that prior to the next call they think about whether they would be interested in being involved in the work proposed by Anam (and possibly other proposals that may be developed by Chris, Paul, and/or others), and if so, whether they would be able to perform sensitivity simulations for such analyses if necessary. Christian's default assumption was that any model contributing to the overview manuscript would be a valuable contributor to any follow-on work, including but not limited to the work proposed by Anam.

Next call Tuesday March 7, 2023.