Stauffer Notes from ASOPOS 2.0 AGU Side Meeting, 11 December 2018, 1400-1640:

Quadrennial Ozone Symposium in late summer 2020 is a good target for completion of these projects. Another ASOPOS meeting in fall 2019 is a good intermediate progress target. Roeland suggests holding the meeting in Brussels.

Should we set up a Webex-style meeting for May or June 2019?

Going point-by-point through the Task Leader list sent out by Herman. The Task Leader for each point will be responsible

1) Background currents and 20 minute time response. Lead: Tarasick (plus Holger and Gary)
    a. Can we improve the agreement with the OPM without having the use the K86 or K95 "fudge factors?"
    b. David says he should be able to get to it the next few months.
    c. Suggestion to hold a separate meeting (not AGU or some other large meeting), because it's easier for some to get travel approval.
    d. Will work with Davies on this problem.
    e. Bryan: Will we continue work on getting sites proper zero-air or drying filters? We should attempt to standardize this, especially at humid tropical sites. Perhaps a schedule should be set by NOAA and others to consistently replenish drierite filters.
    f. Holger: We must also consider how to handle measuring and reporting the background currents.
    g. Herman: Should we organize this by station or by network (e.g. SHADOZ)? Holger notes we must write the recommendations down.
    h. Bryan will send out the recommendations to the group, and we will discuss.
    i. Tarasick: If we compile an ASOPOS 2.0 WMO Report, then we can potentially put all of our recommendations into a single, official document.
    j. Gary: The letter on the new filters is a good idea because it is on a topic that we are immediately certain of. We do not need time to think about it and publish it in ASOPOS 2.0 report like some of the other topics that we are discussing today.
2) Pump efficiencies. Lead: Herman (plus Tatsumi, Bryan, and Roeland)
    a. Will continue the work done by Bryan, Roeland, and Tatsumi.
    b. The data for new pump efficiencies already exists. We just need to compile all of the data and generate accurate pump efficiencies. Replacement of Komhyr pump corrections with true pump efficiencies so that the traceability goes back to the OPM.
    c. David: Is the purpose to derive a calibration function for each sonde, or an average for all the sondes? Herman: We need to look closer at the data to see if there is truly variability from sonde-to-sonde, or if it is more of a batch problem.
    d. Roeland: We do not have the necessary measurements for Science Pump sondes. Herman: We will do more tests and get the data.
    e. Holger: We need to continually evaluate both EN-SCI and SPC sondes, and we must make sure the manufacturers know that pump assembly and is a critical step and should not be altered.
    f. Herman: Tatsumi will do the pump analysis by around February 2019. Paper by June 2019? Masatomo may be able to help encourage Tatsumi to publish.

g. Jacquie: It may also be possible for Tatsumi to write a technical report rather than a full peer-reviewed paper.
h. Bryan: There seems to be a gap in pump efficiency measurements from 2002-2010. NOAA has a few 6A and 1Z sondes to perform some of these measurements. David: We first need to figure out how large the variability from sonde-to-sonde is. It seems to be pretty low based on what we have already seen.
i. Herman: We should look at historical pump efficiencies, the current status, and recommendations for moving forward. Are SPC and EN-SCI pump efficiencies the same?
j. Jacquie: Does Wallops have older SPC sondes that we can check? Even the new 6A SPC sondes will be good to check.
k. Jonathan: We have a whole room of old sondes. Are they new?
l. Bryan will take charge of collecting and reporting on the older sonde pump efficiency measurements. Herman: we need to put all of the data on a server.
m. Bryan suggests making sure that the pump efficiency results are reproducible.
n. Herman: We will derive the calibration functions from past JOSIE results.
o. Humorous Side Discussion: Who would have thought 20 years ago that we would still be using ozonesondes?

3) Radiosonde Corrections. Lead: Ryan (plus Holger and Gary)
    a. No new updates on since Geneva. Will attempt to use a constant rise rate in the stratosphere.
    b. Ryan: The iMet radiosonde pressure offsets are not getting better, so even current profiles must be reprocessed.
    c. Jonathan: What about GRAW sondes? Kuala Lumpur is an option. But does it have a pressure sensor or is it only GPS?
    d. Holger will share the rise rate model with Ryan.
    e. Looking to have an update with some results by June.
    f. David: What about very old sondes like VIZ? Holger: There are no timestamps, so this calculation will not be possible.
    g. Herman: Reprocessing and bias correction in the digital era is relatively straightforward. The analogue era is much more difficult.
4) Metadata collection document. Lead: Holger (plus Jacquie)
    a. Holger: We will need to send a document around to the ASOPOS 2.0 panel for input. The software providers must be made aware of these requirements, and they must all capture the same metadata.
    b. Should have a document by March or April, so that ASOPOS can review it before June.
    c. They will be focusing on content, not necessarily the format of the data.
    d. Jonathan: GRAW has been difficult in adding certain metadata and formats, so having an official document to point to will be helpful. We can add Jonathan to this task.
5) Sensing solutions. Lead: Herman (plus David)
    a. Do we want to go with new sensing solutions or stick with what we have already recommended?
    b. Herman and Roeland will look more at JOSIE results to determine the impact of the KBr and phosphate buffers (additional work by Roeland, Bryan, Rene, and Richard)

c. Ground-based laboratory experiments are needed to test the buffers and KBr. David: They added KBr because there was a humidity dependence that is still not understood.
d. David: The buffer is needed because the ozone reaction drives the solution alkaline, which affects the stoichiometry.
e. Recall that Rene showed results with a 1/16 buffer solution. When KI is increased to 2% with no buffer (and no KBr), the results seem better. We will also evaluate the NOAA 1.0%, 1/10 buffer solutions. Summary: These combinations need to be tested and understood.
f. Jacquie: Recall that Wallops did dual flights that tested their operational 1.0%, Full Buffer SPC vs. a few solution variants (around the years 1995-2000). It will be worthwhile to add the analysis of that data.
g. Ryan: Have there been tests with the 0.5%, half buffer, but with the full (25 g rather than 12.5 g) of KBr? David: Much like with the humidity dependence, the effect of the amount of KBr is not well understood.
h. Bryan and Roeland agree to co-lead this task.

6) Solution volume correction. Lead: Rene (plus Jonathan)
   a. Jonathan has a paper that is probably close to ready to re-submit, but no one can remember the problem with the paper that held up the publication.
   b. We will do some experiments in the chamber to see what changes we get with the response time when using 3.5 mL of cathode solution. This may slow the response time.
   c. Bryan: Why 3.5 mL? We should be concerned with spraying and evaporation in the stratosphere. Herman: We may be losing solution with the sonde running on the ground. Is this an issue?
7) Review of SOPs. Lead: Roeland (plus Peter)
   a. Roeland: We will make an inventory of all the current SOPs by asking stations and networks to send documentation of their current procedures.
   b. Jonathan: Has anyone looked at using a Gilibrator flow calibrator? Herman warns of potential problems with the Gilibrator, and that the SOPs with the bubble flow meter are probably the best option.
   c. Bryan: Maybe we could test the flowrates of all the sondes? Would be a lot of work. Jonathan: Well then we might as well use the manufacturer flow rates. Bryan & Holger: No one uses manufacturer flow rates, we all know they are no good. How does the manufacturer measure this? Gary suggested we add the individual flow rates and the manufacturer flow rates into the software.
   d. Bryan: Ideally we would like to record the pump temperature while we are measuring the flow rate in the lab. Jonathan: We could consider trying to record this data with the sonde interface, instead of our own electronics.
   e. Jacquie: Should we put in typical ranges of background current, pump flow rate, etc. in the check sheets/SOPs and software to make sure the operators know what values are acceptable, and what is not? General consensus is that we should to avoid having an operator blindly use a 0.5 uA background current, for example.
8) SOP for used sondes. Lead: Richard
   a. Richard has already begun contacting stations to gather an inventory of current sonde refurbishing practices.

9) Uncertainties. Lead: David (plus Jonathan and Holger)
    a. Discussion on bias vs. uncertainty. We can use the JOSIE OPM to estimate the bias or systematic error in the sondes. The systematic errors (unless they are changing in time) are not necessarily what will affect our trends estimates, those can be corrected, but the random errors will affect our confidence in those trends.
    b. Holger says he will assist with this task.
    c. Masatomo wonders if the bubble flowmeter could be a source of systematic error. Is there a difference in volume from one flow meter to another? Holger notes that at Lindenberg they measured and did not see a difference from 100 mL in two different bubble flow meters.
    d. Herman: We will provide guidance on systematic uncertainty to those interested in trends.
    e. Ryan will work on a paper on the systematic errors of radiosonde corrections (as part of Task 3) that David can cite and put into his paper on uncertainties. These papers will feed in to the eventual ASOPOS 2.0 guidelines.
    f. Jonathan: What software do people use to generate their files? SkySonde, STRATO (older).

Meeting adjourned!