**Reactor 24 | Aug 2022 - Oct 2022 Summary**

**\*\* The project lead is responsible for double checking all laboratory normalizations and applying any additional corrections, as needed.**

**Session information:**

## Responsible for QC and corrections to final lab data: Kirsten Andrews [December 2022]

Add any significant updates in a different color or link to a new summary file: here.

## Description of session: Reactor 24 lasted 2 months from the end of August to the end of October. Reactor 24 started because Ben and Kirsten were having issues getting a forward flow reading when trying to inject water samples on Reactor 23. The T9 trap was replaced during this time, but there was still no forward flow, so Reactor 23 was replaced with Reactor 24. After still getting no forward flow with Reactor 24, it was found that argon gas was being used throughout the system instead of helium, once the switch back to helium was made, a normal run session on Reactor 24 began (8/25/22). Reactor 24 ended at the end of October after ~200 water injections went through the reactor and the data started becoming variable with high d33 err and d17O err values (which we now associate with the scroll pump issue seen at the end of Reactor 24 and the start of Reactor 25).

Decisions about correction of data (breaks, linear vs basic correction etc):

We reduced Reactor 24 in 3 different ways. In the first version, named Ver.1, there were no segments in the reactor, however we noticed a clear decrease in SLAP values throughout the reactor and that USGS49 values were also low. After seeing this, we tried segmenting Reactor 24 into 2 different segments at 2 different locations in Ver.2 and Ver. 3. In both version 2 and version 3, we used a linear correction for the start of the reactor and a basic correction for the end of the reactor (because the second segment only contained 1 set of SMOWs/SLAPs). Version 3 is preferred as our standard lab correction. Version 2 makes the cut between segment 1 and segment 2 earlier in the reactor; Version 3 makes the cut later in the reactor. This primarily impacts some western US waters. For these samples, D17O values in Version 2 generally range in the mid to high 30s; in version 3, D17O values range from high 20s to low 30s, similar to the values we saw for similar western US waters in Reactor 23). For this reason, Version 3 is our preferred lab correction.

Version 3 starts the new segment at IPL-17O-4363 USGS47-B1-R24-5. This version changed the SLAP values of D17O at the end of the reactor from -16 to -12 per meg to values of -1 to 2 per meg and USGS 49 D17O values from -8 to 5 per meg to 5 to 19 per meg, which is within the range of values for both standards according to Aron et. al. 2018.

Versions used to reduce data:

Ver.1: No segments. Linear correction used.

Ver.2: Segment at IPL-17O-4337 USGS47-B1-R24-3. Segment 1 was linear and segment 2 was basic.

Ver.3: Segment at IPL-17O-4363 USGS47-B1-R24-5. Segment 1 was linear and segment 2 was basic.

## Notable Events:

* Power event: 8/29/22 (2 samples lost during/after this power outage - noted in Robocap Notebook #8, page 99)
* USGS45 bottle 1 ended: 10/5/22 - USGS45 bottle 2 will be used now
* USGS48 bottle 2 opened: 10/10/22 - because bottle 1 was left unparafilmed for an unknown amount of time.
* Tightened bolts on robot and fixed 1st checkpoint: 10/12/22
* During the last 8 analyses of reactor 24 we noticed higher d33 err and d17O err values than normal. This was caused by the scroll pump backing the turbo on the mass spec not being able to stay down at low pressure, but instead oscillating between values of 10^-1 and 10^0. This continued into reactor 25 until we figured out what the issue was and replaced the tip seals and swapped scroll pumps, then the issue was resolved. The last 8 analyses of reactor 24 were flagged.