

F. Special Reporting Requirements

Please describe inter-CZO activities that individuals in teams pursued.

H1. Bierman has continued work with W. Ouimet and D. Dethier on data from the Boulder Creek CZO. Nikki West and Susan Brantley are working closely with Daniella Rempe at Eel River CZO and Suzanne Anderson at Boulder CZO to organize a cross-CZO workshop on deep CZ evolution (June 2015). Representatives from the Jemez-Catalina, Southern Sierra, Eel River, Calhoun, Boulder Creek, Reynolds Creek, Christina River, Shale Hills, and Luquillo CZOs will be in attendance. West is testing a model developed by R. Anderson and S. Anderson at Boulder CZO with data from SSHCZO.

H2. Seed grant recipient Carl Bern (USGS Denver) is investigating the role of submicron particles in weathering at Boulder CZO and Shale Hills. J. Kaye is participating in the inter-CZO working groups on Biogeochemistry and Organic Matter. Graduate student A. Dere (now a faculty member at Univ of Nebraska, Omaha) has submitted a paper testing the EEMT model developed by the Jemez Catalina CZO.

H3. Dave Eissenstat and S. Brantley are organizing a tree workshop that will bring together CZO and non-CZO scientists to study how trees interact with the CZ.

H4. The team is working with IML-CZO on an international CZO collaboration with China. Brantley is hoping to facilitate involvement at SSHCZO with X. Comas, the geophysicist currently working at the Luquillo CZO.

H5. The team is actively involved in the Cross-CZO C-Q relationship workshop, potentially teaching or using RT-Flux-PIHM for other CZOs.

H6. The team communicated with the Christina River CZO group about the scan instrument and calibration methods. H. Kim and B. Hoagland will be attending the concentration-discharge cross-CZO working group meeting at UNH this July. The team has been working with B. Parker and J. Cherry at Univ of Guelph because they are world leaders in drilling and sampling water in the subsurface CZ. The H6 team has been trying to bring Parker and Cherry into the CZO National Program to enhance the CZO's abilities to sample water in the subsurface. The H6 team includes postdoc H. Kim who earned a PhD at Berkeley while working at the Eel River CZO. Kim has implemented a sampling device in the Shale Hills CZO which allows measurement of iron concentration and speciation as particulate or solute (and which allows inferences about ferrous versus ferric nature of the iron). Her work is moving forward the goal of understanding iron cycling in the subsurface. Brantley and Kim are in discussion with the Luquillo CZO to enhance efforts to measure and model iron biogeochemistry. Brantley and Kim would like to install a similar unit in the Luquillo CZO (approximate cost, \$10k).

H7. The H7 team engaged in discussion regarding cross-CZO hydrologic modeling at the CZO National All-Hands workshop.

H8. The H8 team engaged in discussion regarding cross-CZO hydrologic modeling at the CZO National All-Hands workshop.

H9. This team is promoting the idea of earthcasting for CZOs. The team will also be submitting a paper describing the suite of measurements being made at the CZO: it is the hope of the CZO that other observatories will publish similar papers.

USGS Seed grant to C. Bern: The Seed Grant PI has initiated collaboration with several investigators from the Luquillo CZO to investigate the role of colloids in soil development, has analyzed some Luquillo colloids, and has tentative plans to conduct fieldwork there this fall.

The CZO is promoting CZ-tope, an international initiative led by J.C. Austin (Georgia Tech), G. Steinhofel (Penn State) and P. Sullivan (formerly Penn State, now Univ of KS) to promote the application of multiple isotope systems to identify, quantify and model the interaction of Critical Zone processes. The Susquehanna Shale Hills act as a model for the CZ-tope initiative, where an international researcher team addresses fundamental CZO questions: 1) What controls CZ processes, 2) What controls chemical weathering and elemental fluxes, 3) How does human perturbation alter CZ fluxes, and 4) How do vegetation-regolith dynamics influence water & C? For example, at SSHCZO, U series isotopes, meteoric ^{10}Be and $\delta^{18}\text{O}$ revealed that aspect controls regolith creep efficiency. Isotopes of B, Li, Mg and Fe also indicated micro-sized particles are a missing component in shale weathering. Finally, Pb, Zn and Cd isotopes indicated that even in relatively pristine environments like the SSHCZO, pollutants are present at the soil surface with the potential to be translocated into streams. This work was presented during the 2014 National CZO All-Hands Meeting and a manuscript is in preparation for publication. Future work aims to elucidate the variation of isotope systems across gradients of climate, lithology, and vegetation through cross-CZO collaborations. A talk on CZTope was presented at the 2014 AGU. A special session “Multiple isotopic proxies for weathering processes and mechanisms in the critical zone” will focus on this topic at Prague Goldschmidt 2015, and regular meetings of the CZ-tope group will be initiated.

Sue Brantley helped organize and she gave a talk at the Town Hall in Dec 2014. She also gave a CZO webinar for the national CZO team on 12/08/14. Brantley and Williams have been working very closely through the years with K. Lehnert on the geochemical database. They also work closely with CUAHSI on water quality data for Pennsylvania.