

Additional Reporting Requirements

Metrics. Performance metrics for the SSCZO fall under three categories: output metrics, outcome metrics, and impact metrics. Output metrics include the publication of data and results online in our digital library and through peer-reviewed publications. The amount of data and number of publications are tracked.

During the past year the core SSCZO team had 16 journal papers citing the SSCZO published and in review in leading peer-reviewed journals. This does not include papers by SSCZO cooperators. SSCZO research was also highlighted by team members in presentations at many conferences over the past year, and many more seminars and public talks. We are implementing tracking for publications by collaborating and cooperating investigators, but those data are not yet available.

Data are housed in an online digital library that is hosted on UC Merced servers and also accessible through the new website portals. Core measurements including water-balance instrument clusters, soil-moisture, and flux-tower data are posted in raw format promptly after retrieval from the field. Processed data, including full QA/QC procedures are posted at least annually for core measurements. SSCZO staff (the data manager and the field manager) help coordinate the compilation of data and appropriate metadata in the digital library. In accordance with the cross-CZO data-management policy, data from all projects will be posted within two years, with the possibility of restricting access for a third year if needed by the investigator for the purposes of publishing. During the last year we met these goals. Most core data underwent quality assurance and quality control and were posted within a few months after the end of the water year.

As part of our effort to measure outcomes, we tracked citations of our peer-reviewed papers, use of our data, and online reach. For forty articles published since 2008, number of citations ranged from 0 to 107, with an average of 14 citations per paper, including several new publications. We also track the number of scientists interested in coordinating with the SSCZO. As listed above, there are more than 25 collaborators working on active projects or pursuing new projects with the SSCZO team.

The depth and breadth of our reach online is tracked through several metrics, including use of our data from Google Analytics for our main website, tracking activity on Twitter and Facebook, and the use of data from the digital library. As an online resource, the Sierra Nevada-San Joaquin Hydrologic Observatory (SNSJHO) digital library is accessed not only by SSCZO team members but also by the broader population of researchers online. We now have a several dozen registered users for SSCZO data on the digital library; eight of those users registered since our last annual team meeting. Note that many of our data are public, and it is not necessary to register to access those data.

Since we started tracking website activity with Google Analytics in September 2013, we have had more than 37,837 page views, 6,457 unique visitors, and an average site visit time of 4:00. Usage spiked around the All Hands Meeting, when we used the page to disseminate information for the meeting. From Sep 30, 2014 through the end of May 2015, we have had 4,491 site visits, with 2,746 unique visitors. The Southern Sierra CZO is maintaining a Facebook page. Through Twitter, the SSCZO connects with others observatories and researchers interested in critical zone science. Since beginning early in 2013, we have 150 followers, have posted a total of 267 tweets and 27 photos, and 35 favorites. Since starting in Dec 2014, SSCZO PI R. Bales has sent 343 tweets, and has over 320 followers.

We conducted a RHESys training workshop using CZO data for Ph.D. students from multiple universities, which focused on implementing the model to investigate forest management and climate change impacts on watershed hydrology.

We also track the adoption of our technology at other sites. The wireless sensor network developed at the SSCZO has been implemented in the American River Basin project west of Lake Tahoe. Work completed in 2014 included instrumentation at 10+ sites in the American River Basin project. Water and power utilities in the Southern Sierra Nevada also have a vested interest in snowpack distribution and water runoff. Further proposals to expand these systems are pending with state and local agencies.

Impacts include better decision making because of our research findings, and improvements to the research process. To achieve broader impacts, we have developed an extensive dissemination network. Our dissemination strategy reaches stakeholders and resource managers as well as researchers. To that end, we have published opinion pieces in local newspapers, produced video and radio segments through collaborations with regional television and radio stations, presented at numerous stakeholder meetings, and hosted visits to our field sites and laboratories. We have communicated with everyone from foresters and other resource managers, to legislative staff and policy makers at the state and Federal level. In aggregate, SSCZO investigators average at least bi-weekly presentations to public audiences.

We have employed evaluation forms to assess multiple events. Among these are the 2013 Annual Meeting, the 2013 public field tour, and visiting researchers. Feedback from the 2013 Annual Meeting has directly informed agenda structure and logistics for the 2014 meeting. For the field trip, we had nine responses from 19 attendees. A mix of public, university associates, and people in legislative and resource management specialties responded. Positive changes were reported for knowledge about Southern Sierra CZO and environmental hydrology. The change in knowledge about wireless sensor networks was more variable, as attendees had widely variable points in starting knowledge.

Response rate from visiting researchers is low. The one form we received about an exploratory trip was positive but sparse. Evaluation forms will certainly be included as part of the approaching Wireless Boot Camp and All Hands Meeting.

CZO network activities. The Southern Sierra CZO hosted the 2014 All Hands Meeting for the CZO Network in Sep 2014, attended by researchers from the other 9 observatories, as well as prominent researchers from outside the network and country. We led two scientific field trips: one to SSCZO field research sites, the other to the Rim Fire; where 125 collaborators could share their results and interact across agencies in the field. The meeting provided a venue for presenting research results. Several products from this researcher meeting also included outlines for journal articles, workshop proposals and modeling collaborations. The meeting was held at a comfortable, remote venue designed to minimize other distractions, and was housed in a facility that enabled productive interactions between participants, including both formal and spontaneous discussions. The program for the three-day meeting was designed and run by a cross-CZO-network team. Themes for the meeting were carefully chosen to emphasize CZO-network science and activities. Consideration of each topic included audience discussion and subsequent working groups. The meeting also included a full day of field-site visits, with SSCZO PIs and students serving as hosts. Informal feedback from a large number of participants suggests that the meeting was well run and organized, was productive and stimulating for participants, and stimulated network thinking, planning and science.

Cross-CZO work was used to finalize a method using LiDAR data, computer vision, and machine learning to optimally configure multi-node snow observatories. We gathered data from Jemez River and Boulder Creek CZOs to examine the effect of site physiographic variables on the optimal number and distribution of sensor nodes. We use snow on / snow off LiDAR data to determine site-specific correlations with independent physiographic variables. Optimal sensor locations at each CZO were determined using the

expected values from a Gaussian Mixture Model applied to the site data. The results were presented at the AGU conference and are being submitted to Water Resources Research.

A CZO National Office-funded proposal by E. Aronson (SSCZO), Rachel Gallery (CJCZO), and S. Hart (SSCZO) will support a CZO Biogeochemistry Workshop this fall. The meeting will be held Sept. 28-29 at UC Riverside. Goals will be to agree upon and address a set of cross-CZO questions, with future cross-CZO sampling to test and validate these conceptual models. Participants were recruited through the CZO PI network and through recommended international participants.

SSCZO team members are also participating in other cross-CZO working groups and workshops. Plans were made during this past year for several meetings in fall 2015.

Thirty-five researchers and students from across the CZO network participated in the Wireless Sensor Bootcamp, hosted August 11-13 in Berkeley, CA. Prominent domain experts showcased the core theory of real-time environmental monitoring, structural health monitoring, and energy management. This wireless sensor workshop was originally scheduled for Year 5, but moved earlier due to demand for training in this field.

C. Tague and colleagues received a National Socio-Environmental Synthesis Center grant that will support a two-year working group on integrating economic and biophysical models to examine pre- and post- ecosystem service impacts of wildfire and fuel treatment using several Western US case study sites, including the Sierra CZO. Work by B. Kastl and C. Tague will investigate how science-based model presentation influences the way stakeholders understand the complex watershed dynamics studied by scientists at the CZO. The SESYNC working group will involve forest managers from agencies as well as communication expertise through COMPASS (compassonline.org), a group that specializes in science based communication for the public. Establishing these two outreach/broad impact initiatives was an important product from 2014-2015.

CZO program budgets. See attached budget summary.

Additional funding. CZO investigators routinely leverage funding to support students and postdocs, install equipment, engage collaborators and initiate complementary research. All of the students listed above were supported at least in part by non-CZO funds, and most were largely supported by non-CZO funds. Leveraging with the USDA Forest Service is also important, and the SSCZO is in part co-located with Forest Service research programs. UC Merced provided institutional support for four incoming graduate students last year. The U.S. Forest Service provides a budget of several hundred thousand dollars per year for the streamflow, met station and stream geochemical measurements and data, as well as some vegetation surveys used by the CZO team and collaborators. The U.S. Forest Service and UC Merced also jointly supported a research scientist whose main focus was on the SSCZO, and the co-located Kings River Experimental Watersheds program.

Southern Sierra CZO Budget Summary, May, 2015

Cumulative Year 1 and Year 2

CZO-Core/Main				
Budget Element	Budgeted	Current Expenditures	Commitments through 9/30/2018	Balance
Participant Costs	15,500	12,159	14.00	3,327
<i>Cross-Site Modeling Meetings, Seed Funding, PI Meetings</i>				
Subcontracts*	773,862	434,973	338,889	-
<i>UC Berkeley, UC Irvine, UC Davis, UC Santa Barbara, Univeristy of Wyoming</i>				
Other Direct Costs	60,000	-	10,347	49,653
<i>Drilling Subcontract</i>				
Indirect Costs	41,526	6,688	5,699	29,140
Account Total	890,888	453,820	354,949	82,120

Expenditure pending from prior meeting

To be expended by end of yr 1; billing can lag expenditures by several months

Expenditure for summer 2015 drilling

*Current Expenditures are from Invoices received.

CZO-Project Integration and Management				
Budget Element	Budgeted	Current Expenditures	Commitments through 9/30/2018	Balance
Senior Personnel	277,006	174,308	67,191	35,507
<i>Principal Investigator, Data Manager, Research Engineer, Undergraduate Asst.</i>				
Fringe Benefits	86,347	73,570	18,001	(5,224)
Equipment	65,311	34,366	-	30,945
<i>Tower Rebuild, Equipment Replacement</i>				
Domestic Travel	15,296	5,496	-	9,800
<i>Travel to Field-Site & Meetings</i>				
Other Direct Costs	23,000	9,395	-	13,605
<i>Supplies, Teleconferences, Battery Replarement, Equipment Calibration,</i>				
Indirect Costs	220,910	140,623	46,856	33,431
Account Total	687,870	437,757	132,048	94,659

Additional field engineer, summer/fall 2015 for tower replacement & other repairs

Carry negative balance forward

Expenditure pending, summer 2015

Expenditure pending, summer 2015

Expenditure pending, summer 2015

**This reflects transfer from R1 to MC of ~10k for MC covering CZO 1yr competitive renewal deficit in R1 pimrb

CZO-Education and Outreach				
Budget Element	Budgeted	Current Expenditures	Commitments through 9/30/2018	Balance
Senior Personnel	105,138	25,596	18,514	61,028
<i>Co-Investigator, Staff</i>				
Fringe Benefits	33,894	10,147	1,643	22,104
Domestic Travel	3,200	3,030	229	(59)
<i>Travel to Field-Site & Meetings</i>				
Other Direct Costs	3,200	1,884	-	1,316
<i>Supplies, Teleconferences</i>				
Indirect Costs	79,988	22,361	11,212	46,414
Account Total	225,420	63,018	31,599	130,803

\$20,000 for new outreach & communication manager beginning 7/1, plus balance for research scientist through 9/30

Carry negative balance forward

CZO-Research, UC Merced				
Budget Element	Budgeted	Current Expenditures	Commitments through 9/30/2018	Balance
Senior Personnel	52,474	29,885	26,482	(3,893)
<i>Principal Investigator</i>				
Fringe Benefits	6,946	6,792	1,687	(1,533)
Domestic Travel	17,800	2,991	-	14,809
<i>Travel to Field-Site & Meetings</i>				
Other Direct Costs	18,582	2,615	50	15,917
<i>Supplies, Teleconferences, Publication Costs</i>				
Indirect Costs	50,021	20,588	15,521	13,913
Account Total	145,823	62,871	43,740	39,212

Carry negative balance forward

Carry negative balance forward

Expenditure pending, summer 2015

Expenditure pending, summer 2015

PROJECT TOTALS	1,950,001	1,017,466	562,335	346,794
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Carryover report based on encumbrances. does not include projected expenditures noted on budget report that are not yet encumbered.

Cost Element	YR1 Sponsor Approved Budget	YR1 Supplemental Funds: REU & All- Hands	YR1 Expenses as of 9/30/2014	YR1 Operating Balance	YR2 Sponsor Approved Budget	YR2 Budgeted + YR1 Carryforward	Y2 Expenses as of 6/1/2015	YR 2 Projections + Commitments through 9/30/2015	YR2 Projected Carryforward	
Senior Personnel										
A.1	Principal Investigator Bales		15,592	9,880	26,235	36,115		28,175	7,940	
A.2	Co-Investigator Conklin		12,522	(600)	12,280	11,680		6,261	5,419	
A.3	Co-Investigator Hart		6,617	(128)	6,683	6,555		6,817	(262)	
A.4			-	-	-	-		-	-	
A.5			-	-	-	-		-	-	
A.6			-	-	-	-		-	-	
A.7	Total Personnel		34,731	9,152	45,198	54,350		41,253	13,097	
Other Personnel										
B.1	Post-Docs		-	-	-	-		-	-	
B.2	Other Professionals		99,745	55,086	175,024	230,110	77,168	50,010	102,932	
B.3	Graduate Students		-	-	-	-	9,554	23,484	(33,038)	*Lucas, Thaw, Rungee - GSR summer
B.4	Undergraduate Students		7,121	604	7,957	8,561	1,470	9,643.00	(2,551)	*PIMRB & Hart's UG
B.5	Clerical		-	-	-	-	-	-	-	
B.6	Other	4,415	3,172	1,243	-	1,243	749	-	494	
Total Salaries and Wages										
C.	Fringe Benefits		46,428	14,243	66,342	80,585	53,291	20,150	7,144	
Total Salaries, Wages, and Fringe										
		5,960	191,197	80,328	294,521	374,849	142,232	144,540	88,078	
D.	Equipment Replacement		17,429	9,882	8,000	17,882	16,237	-	1,645	
	Tower Rebuild		-	30,000	-	30,000	700	-	29,300	
Total Equipment										
			17,429	39,882	8,000	47,882	16,937		30,945	
E.1	Domestic Travel		3,992	14,056	23,748	37,804	9,271	229.27	28,304	
E.2	Foreign Travel		-	-	-	-	-	-	-	
Total Travel										
			3,992	14,056	23,748	37,804	9,271	229.27	28,304	
F.1	PS Stipends	10,000	10,000	-	-	-	-	-	-	
F.2	PS Travel	94,290	1,116	93,174	-	93,174	55,810	-	37,364	
F.3	PS Subsistence	54,825	-	54,825	-	54,825	59,126	-	(4,301)	
F.4	PS Other	50,949	8,990	49,959	2,000	51,959	52,539	-	(580)	
Total Participant Support										
		210,064	20,106	197,958	2,000	199,958	167,475		32,483	
G.1	Materials and Supplies	1,027	6,653	15,736	21,020	36,756	7,236	63	29,457	
G.2	Publication Costs		-	1,200	1,200	2,400	1,429	-	971	
G.3	Consultant Svcs		-	-	-	-	-	-	-	
G.4	Computer Services		-	-	-	-	-	-	-	
G.5	Subawards		246,114	66,605	461,142	527,747	67,106	460,641	-	*Based on invoices posted to
G.6	Other (Drilling Subcontract)	3,040	103	62,937	-	62,937	346	10,347	52,244	account/several invoices pending
Total Direct Costs										
		4,067	252,869	146,479	483,362	629,841	76,117	471,051	82,673	UCLA processing
H.	Total Direct Costs		485,593	478,703	811,631	1,290,334	412,032	615,269	262,483	
I.	Indirect Costs		114,652	93,751	188,369	282,120	77,191	85,241	119,688	
J.	Total Direct & Indirect Costs		600,245	572,454	1,000,000	1,572,454	489,223	700,510	382,721	
K.	Residual Funds		-	-	-	-	-	-	-	
L.	Amount of Request		600,245	572,454	1,000,000	1,572,454	489,223	700,510	382,171	

This includes supplemental funds not reflected on the budget report.