October 2008 Board of Directors Teleconference Meeting

Minutes and Briefing Package

Board of Directors Teleconference Meeting Minutes
Monday, October 20, 2008

Call to Order: 4:05 pm

Roll call and determination of quorum (Dressler)

BOD:

Term expires 12/31/2008
Jay Famiglietti, University of California – Irvine X
Praveen Kumar, University of Illinois X
Venkat Lakshmi, University of South Carolina (Science Plan Liaison) X
Greg Pasternack, University of California - Davis (HMF Liaison) X
Fred Scatena, University of Pennsylvania X

Term expires 12/31/2009
Efi Foufoula, University of Minnesota X
Larry Murdoch, Clemson University (Synthesis Liaison) X
Fred Ogden, University of Wyoming X
John Selker, Oregon State University X
Juan Valdes, University of Arizona (HIS Liaison) X

Term expires 12/31/2010
David L. Freyberg, Stanford University X
Patricia Maurice, University of Notre Dame X
Jim McNamara, Boise State University X
Kenneth Potter, University of Wisconsin X
Claire Welty, University Maryland - Baltimore County X

Officers: Kevin Dressler, Richard Hooper, Brian Waldron

Others: David Kirschtel, David Maidment

Approval of Minutes from July, 2008 (Hooper) (Appendix A)

Motion to Approve: Selker

Second: Freyberg

Discussion: Typos to fix (correctly spell Greg Pasternack and Juan Valdes names)

Approval: Yes

Senior Advisory Council (Foufoula)
Summary of Report and Action Items (Appendix B)

- Generally good comments
- 7 member (Bras and Dietrick not present but contributed to report)
- Education and Outreach was supported
- Five major categories explored
    - How do we better communicate our science with NSF
    - Should we engage other federal agencies and/or other partners (e.g., private sector, state agencies)? Which should be invited to January Board meeting? Suggest specific people.
    - How can CUAHSI use events, such as the Midwest floods, to advance opportunities in hydrologic science? What is the role of CUAHSI versus individual investigators?
    - How should CUAHSI grow and evolve to better serve the "community"? How should CUAHSI help you and your colleagues to pursue research?
    - How should CUAHSI help to increase the visibility of hydrologic science in public policy debates?
- Efi suggests to invite the SAC chair to attend the January BOD Meeting
- SAC should meet once a year
    - Need management plan and renewal activity comments, for example

CUAHSI Hosting of Wiki for Collaborative Teaching (Hooper)

- Report from Laurel Saito, Univ. of Nevada, Reno (Appendix C)
- Enabled professors across the country from multiple universities to access and use the service for free

HIS Project

- Standing Committee Report (Paul Houser)
    - Positive towards the HIS accomplishments
    - Consolidate the gains that have been made so that the technologies are hardened into an operational system
    - Need user group to further develop
- HIS Project Plans (Maidment)

- AGU CD (Excel spreadsheet that accesses the data services) will show people how to sue the HIS data services
- Working with agencies (NCDC, USGS, etc) to serve out their data on a national and even global scale

Adoption of CUAHSI Data Publication and Data Use Policy (See Appendix D)

- If CUAHSI takes on responsibility to access and serve people's data, CUAHSI needs some sort of documentation to document that actions that were taken
- Standing committee found it standard and okay
- McNamara states that there is nothing specific that states that data that is accessible a potential user can publish freely
  - Is anything that is displayed available for anyone to use for publication?
    - As stated, yes, anyone can use – Hooper
    - One thing to do is publish the metadata – Scatena
    - The standard of the community access sites has been that it is open for use, but to make reference to origin – Kirschtel
    - One could be sent an email when someone accesses their data – Maidment
    - There is also a "switch" in the system that allows for both public and private data
    - Tiered access system is preferred, but it is not yet fully implemented

  Motion to Approve the CUAHSI Data Publication and Data Use Policy as presented: Foufoula

  Second: Selker

  Discussion: No further than above

  Approval: Yes

Announcements

Preparation for NSF Review Panel (Foufoula and Hooper) – October 27

- Conflict of interest led to either presenting a new proposal 1 yr later or 2nd option of presenting same proposal with a new panel
- 26 mail reviews – huge amount of community input (rankings from fair to excellent)

- Need to better educate the constituents better on what CUAHSI is doing – McNamara
    - There is still a perception that CUAHSI was only observatories
- May need to focus on a smaller set of activities – based on some the critiques in the reviews

Plans for Annual Membership Meeting and Fall AGU

- Any ideas on how to make the meeting more engaging is helpful
- What would be a substantive history or background document to help those who could be better informed of CUAHSI activities?
    - Foufoula suggests a subcommittee to continue working on community engagement and what is useful for informing member and others
        - Could focus on what further to do at the Tuesday AGU reception

Other Business

None discussed

Adjourn: 5:25 pm

Motion to Adjourn: Foufoula

Second: Potter

Approval: Yes

Appendix A

CUAHSI BoD meeting
Boulder, CO July 2008

Minutes

Meeting called to order at 9AM MDT

Rick makes a request that a motion be made for Brian Waldron to act as secretary for the meeting. Venkat moves and Juan seconds, motion carries with no objections.

Efi made suggested changes to the BoD meeting agenda. The new agenda was handed out to members. CUAHSI is at a unique point in time to convey to Tim Killeen CUAHSI's mission and importance in the hydrologic and broader community.

The upcoming Geo Sciences GeoVision 2010 report does not have an *organized* hydrology component. This has been raised as a concern. Tim Killeen is not completely pleased with the report which to date has not been approved. The report is to be completed by October 2008.

- Efi suggests that we need to keep an eye out for making a strong case for compelling examples that illustrate lack of data and predictions that would help to justify our mission and presence in the community.
- We need to continue engaging the community, reconnecting the communities, including those who may have become disconnected from CUAHSI.

Question raised on how connect the community to the decision makers on the Hill. Rick has had discussions with a firm who, for a relatively cheap rate, would be watchdogs on the Hill to look for bills/opportunities for CUAHSI to be a voice for the hydrologic community. How will the Hill request advice from the hydrologic community? Would they come to CUAHSI or go another route? Should CUAHSI engage those other routes? It is suggested that AGU would be very receptive to incorporating CUAHSI's desire to be a sounding board on hydrologic science to the Hill. This avenue should be explored further.

Venkat made a point that other agencies should be brought into CUAHSI. Discussion on this point will be addressed later in the data per the agenda.

Rick is running through his panel review presentation.

- NSF wants to know the overall strategy to address water issues. We need to be able to layout for these big science questions that have continued to be developed/refined the strategy to link the science to the action needed and why it should be supported.
- We need a very tight purpose for our justification for needed facilities. We are competition with a number of other programs who require facilities.

- CUAHSI design plan should include four steps: Conceptual → pilot → developmental → operational
    - Question raised: Should CUAHSI become the managing agency for hosting the hydrologic community metadata repository? This pertains to HIS.
    - Funding for components under HMF is unknown. We are still trying to find a funding home and competition is high for equipment centers.
- Hydrologic observatory effort, as originally conceptualized, is dead
- WATERS is not an easy fit in a MRFC. We should not use NEON as a gage for NSF potential support for MRFC funding under GeoSciences.
- Jun stated to Rick that CUAHSI does not have a NSF sanctioned role in providing anything toward the CZO effort. CUAHSI should simply see itself as a user.
- WATERS 2: we need to inform the community on the status of this effort. NSF requested a fast turnaround on the proposal that in part hampered communication to the community. However, now that it is in CUAHSI should make an effort to inform the community.

Efi is requesting feedback from the BoD on an outline for presenting to someone like Tim Killeen about what is CUAHSI. Generally, discuss the mission of CUAHSI, big picture plan, make very compelling case that there are unknowns across scales with complex couplings that need addressing, and illustrate those CUAHSI programs (HIS, HMF, etc.) and outreach efforts that can help the hydrologic community further hydrologic science.

- Praveen: CUAHSI needs to be relevant to the community and not just a voice. We have no projects to claim as our own, they are all PI-based. There is no required feedback mechanism for PI's to connect their effort to CUAHSI. CUAHSI needs to move beyond being a facilitator.
- Fred Scatena: It may be as easy as having NSF RFP's require data be placed into the CUAHSI HIS system (require some kind of feedback)

A lively discussion began on the renewal proposal status and WATERS 2 proposal. NSF is conducting a new external review and panel review for CUAHSI's renewal proposal. The proposal is not under Doug but under the program director under education. Doug will still be over HIS and HMF. Panel review should begin in Oct. NSF has awarded supplemental funding to keep CUAHSI going until January 2009.

CHyMP: Oct. 9-10 workshop tentatively planned in Memphis. Doug has offered more money via a submitted proposal, but would require moving the workshop to Nov. A subsequent workshop will be held in the spring.

Closed session minutes emailed to Efi

Invite Ana Barros to be the chair of CSDMS with Jay Famiglietti as co-chair.

Rick's 2008 goals:
Strategic Planning task 2: Writing the plan

- Making the linkages (broad themes to regional application) a critical piece to the plan
- Whitepaper documents have this information, but this info will need to be compressed into something a program officer will read.
- Have the Executive Summary of science plan (different than the implementation plan) completed by AGU ready to be read by NSF management.
- Need to have NSF say what infrastructure they are willing to support. This will help to guide the development of linkages.
- This document goes beyond the program officer, but be sold to the program director and AD for the purpose of focusing monies into hydrologic science research
- Where does the directory tree begin from which subordinate program initiatives spawn: the overarching science questions or the National Water Model?
- Would like to have a draft implementation plan by the January meeting.

Science meeting idea to be held as a town hall meeting during AGU, then have the group attend the reception afterwards. If we have a science meeting, should we pay for a university member and one young, upcoming scientist (tenure-tract?) from each member university to attend? There are recollections of the Logan meeting. We need to identify persons to be the Program Committee. BOD needs to be on the lookout for people from the Biennial Colloquium to serve on this committee.

Kumar will send out emails for the Cyberseminar Series. Request made of David 2 months prior to block dates for fall meeting. Dates not blocked yet due to preparing for the Boulder meeting/colloquium so there is concern that we may be out of luck. Four speakers have been identified for both the fall and spring cyberseminar series.

CHyMP meeting: We have $30K in residual funds for the conference. Doug would entertain a proposal for additional money for the meeting. We expect ~80-100 people attending. Nov. would be the earliest award date for funding. Plan to have it at the FedEx Institute of Technology in Memphis. Looking to change the dates from Oct. 9-10 to sometime in Nov.

There is discussion on the continued funding for CUAHSI by NSF. Should we begin to entertain other agencies to assist in funding components of CUAHSI? It is suggested that we wait until the January to invite them to the annual CUAHSI meeting. We may be in a unique opportunity to act on this. We would not ask for funding on the outset, but simply provide information about CUAHSI.

UMRB SGER

Ken stated that the Upper Mississippi flooding is related to unprecedented high ground-water levels. Factors to this fact may be ET, increased precipitation, and improve land management. GW levels in the Iowa basin are primarily control by the drainage tiles. This area does not have a good handle on snow melt quantities, suspecting that much of the recent record snow melt infiltrated rather than running off. Mountain/hill interflow is keeping valley floors flooded. LIDAR will help them get critical data such as identifying outlet flow points and depression storage more accurately. Science questions pertaining to snow melt, ice forming, tilling practices need to be formed. How will the role of gw/sw interactions impact land use change? Why are gw levels rising in the mid-west flood area? Is there a reason for CUAHSI to be involved to put in a proposal or just have the PI's submit to NSF? Under a CUAHSI umbrella, we would be able to look beyond just the gw/sw interaction and look at nutrient loading, retention, land use impact, a large integrated model. Someone should submit a proposal that looks at how a physical model of a system (tile drain structure) became something opposite than what was expected. This approach may be too much of an individual investigator project and less something CUAHSI can handle. CUAHSI could host workshops that would look at this flooding situation that would result in assisting scientists to submitting proposals to address the various integrated components. Use SGER money to pay for the workshops. Submit another SGER to hire HIS to synthesize data in the region for a rather specialhydrologic situation (possibly get one of David M. grad students to perform this task). Modeling the system will aid researchers in recognizing what the data gaps are (physical and mental). Let this process show how CUAHSI can act in a timely manner to address a time-sensitive hydrologic issue, and from this exercise CUAHSI can make determine any necessary improvements. Synthesizing of the data by CUAHSI would be low hanging fruit to showcase the organization's capabilities. If requests by the hydrologic community came through CUAHSI for the purpose of approaching NSF for funding (e.g., SGER), project requests would appear to be more organized and coordinated.

- Develop a poster to promote a Upper MS flooding discussion forum for Monday evening to interested parties.
- Rick sent email to David M. to see if the relevant data in the upper mid-west on the flood could be pooled together and showcased via the web.
- We can watch to see if people actually use the website to view/download data.

Science plan to implementation

We need to move from these broad topics to an actual implementation plan. NSF says we are doing too many things and that what we're doing don't seem to relate to one another. This is more so a perception. We need to change how we package our science to show the interrelationships. NSF doesn't understand that we can answer the numerous science questions posed with the current products of CUAHSI (HIS, HMF, community integration, etc.). We have said in the past, "if we have this [observatory/equipment], we can answer all of these questions." We need to invert this thinking. We do not need to waste our time on how to phrase the overarching science question (singular). We need to spend our time on how to express implementation of the plan. Where would we be if we had not submitted our summary of function to Tim Killeen? More than likely we would not have to redefine our science plan to

include science questions. Having science questions is not enough, we need the community to buy into *and* reference the questions ("That question is relevant to my research.") Is NSF looking for questions that are general with regard to application location, or can our questions be provided as *examples* and thus be site specific?

- Let's take advantage of the EarthScope effort to collocate instrumentation with the permanent sites. Good way to show CUAHSI taking advantage of other NSF funded effort including also NEON and NCAR.

Preparation for SAC meeting on Sunday

Efi covered the Charge to the Council as stated on the Advisory Council Charter document.

- Engage them positively
- Let them know what is happening
- Listen to their advice to enhancing CUAHSI's success.

The SAC has the Killeen briefing document plus his comments, CUAHSI BoD purpose and bi-laws, Advisory Council Charter, and the renewal proposal. Develop PP slides stating the science questions. Have Cindy from UCAR to talk about how they engage with the Hill. We will focus on what HIS has done, its accomplishments, and any PR venues that have stemmed from the effort. Rick will cover HIS and HMF with interjections by the PI's/co-PI's. David M. will not be in Boulder until late Sunday afternoon/early evening. David F. suggested that the presentation slides remain very concrete and not acronym heavy. Don't just state what the project is, but be sure to clearly define what is *does*. By engaging the SAC, they become vested in CUAHSI and will fight for its success. Venkat suggested that we request a report on suggestions for moving ahead by the SAC to be provided in four weeks. This will afford an opportunity for the missing SAC members to get engaged. Some questions should be posed to the SAC to address in their report: how do we proceed forward, how do we better engage the community, what gaps exist in the science plan, should we involve other agencies in CUAHSI's basic functions (help in maintaining base funding), how do we capitalize on the Upper MS flooding to illustrate CUAHSI's effectiveness in the hydrologic community, what projects should CUAHSI pursue verses PI's pursue. Rick suggested reserving a table for the SAC at the Tuesday banquet to encourage further discussion and to engage Wilfred Brutsaert.

January meeting in DC set for January 8-9, 2009. We will invite other agency members to attend. Rick will entertain pertinent people from these agencies about what CUAHSI is. Suggested use of AGU's large meeting room, NSF meeting room, or other nice space in DC.

Specific questions for the SAC to address follow:

1. How do we better communicate our science with NSF?

2. Should we engage other federal agencies and/or other partners (e.g., private sector, state agencies)? Which should be invited to January Board meeting? Suggest specific people.

3. How can CUAHSI use events, such as the Midwest floods, to advance opportunities in hydrologic science? What is the role of CUAHSI versus individual investigators?

4. How should CUAHSI grow and evolve to better serve the "community"? How should CUAHSI help you and your colleagues to pursue research?

5. How should CUAHSI help to increase the visibility of hydrologic science in public policy debates?

Motion to adjourn

Fred Ogden made the motion to adjourn
Praveen Kumar seconded
Meeting adjourned at 5:18 Mountain time

Attendance

Rick Hooper
Claire Welty
Juan Valdese
David Freyberg
Ken Potter
Jim McNamara
Fred Ogden
Praveen Kumar
Venkat Lakshmi
Jay Famiglietti
David Kirschtel
Brian Waldron
Fred Scatena
Efi Foufoula-Georgiou
Larry Murdoch
John Selker

Appendix B

REPORT OF THE CUAHSI SENIOR ADVISORY COUNCIL, JULY 2008

The CUAHSI Senior Advisory Council met for the first time on Sunday, 13 July. Present at the meeting were Soroosh Sorooshian (Council Chair), Rick Anthes, Jeff Dozier, and George Hornberger. Rafael Bras, Wilf Brutsaert, and Bill Dietrich saw the draft of this report and their comments were used to form the final version.

The first order of business for the Council was to elect a Chair. By a vote of 3 to 1, Soroosh was elected. (His Shemanesque speech was to no avail.)

The Council was briefed on the CUAHSI renewal proposal that is pending at NSF. Discussion of the plans described in the proposal ensued. We were impressed with both the accomplishments of CUAHSI to date and with the plans for continuing in the hydrological instrumentation and the hydroinformatics areas. These strike us as being very valuable things that CUAHSI can do to further hydrological science. We also think that the idea of a platform for a "Community Model" is worth exploring. We think that the planned workshops should consider carefully what already has been done (e.g., George Leavesley's work) and what added value is anticipated from the proposed community modeling effort. The planned Education and Outreach efforts also sensibly build on the accomplishments and experience of the past few years. We find these to be well worthwhile.

The major question that we think needs to be addressed over the next several years is exactly how CUAHSI will position itself to further the objectives of the science community. The "observatories" portion of the original CUAHSI vision has now been folded into WATERS. If WATERS (and NEON, OOI, and other observatory programs at NSF) develops, it will be necessary to be clear about how collaborations will be structured and to define appropriate governance for different entities. It does not seem to us that the NSF can afford to fund numerous different consortia (or other forms of incorporated non-profits) within the geosciences. The key for the future will be (as we mention below in regard to the specific question about how CUAHSI should grow) to have a clear statement for a limited horizon of what CUASHI's agenda is and what the strategy to achieve it will be. An action plan for the organization should follow from this vision statement.

The Council addressed the five questions that were put to us as an agenda. The remainder of this report is a summary of comments made by members related to the questions.

(1) How do we better communicate our science with NSF?

- CUAHSI should communicate with people at all levels of the Foundation as often as possible. Communications with program managers in EAR are particularly important.

- When meeting with Tim Killeen in September, make sure to have a strong science message (a "good story") with focused priorities[1]. CUASHI should seek to inform well those who frequent NSF about its goals and opportunities so that a consistent and exciting message is conveyed to managers. CUASHI is known as a program, but is not known for its science goals. This does not mean that CUAHSI should overreact to shifting winds. We need to put forward a good story but it has to be OUR story.
- Part of the message to Tim should be that CUAHSI is ready to help him advance his agenda. In Killeen's own words—"compelling science" is what he has emphasized.
- A key message to convey at this time is that it is critical to have continued strong leadership in hydrology at NSF. Specifically, with the anticipated retirement of Doug James (which he has openly indicated will happen), this means CUASHI already should be preparing names of possible candidates (specifically individuals who would be willing to take this responsibility and who have the energy and credentials to carry HS forward).
- One or two examples of hydrology "success stories," preferably ones supported by NSF EAR would be good to include. The NCALM lidar sensing of fine-scale topography is one example. Others include work at SAHRA such as the work on the GW/ Rio Grande issues between El Paso, TX and Juarez Mexico. The SAHRA team in cooperation with Mexican colleagues were able to use isotope tracer work to characterize movement of water. Also, Fred Phillips can discuss work on dessert floor recharge in NM.

(2) Should we engage other federal agencies and/or other partners (e.g., private sector, state agencies)? Which should be invited to January Board meeting? Suggest specific people.

- Part of an annual Board meeting in DC should include agency (e.g. NASA, NOAA, USGS as well as NSF) program managers who are invited to make a 15 or 20-minute presentation. To keep a focus, the agency people might be asked to address a specific question of interest to the Board and to try to promote a dialog amongst all parties. For example, they might be asked to discuss how their programs support the advancement of hydrologic sciences and applications, and their vision for the future of hydrology.
- JPL/UCSB is holding a meeting in September on future microwave satellites with a hydrologic focus (http://microwave-workshop.jpl.nasa.gov/), so it might be a good idea to invite Mike Freilich to the January meeting. Another idea is to invite Matt

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[1] One example mentioned at our meeting is the following.

How will the regional-scale fresh water supplies and demand change in the future?

Future includes time scales from days to decades.
Change includes quantity and quality.
Requires many scientific disciplines, including social sciences, to answer this question, with the hydrological sciences being central to the effort.

Larsen (now USGS Associate Director for Water) to discuss common research and monitoring goals.

(3) How can CUAHSI use events, such as the Midwest floods, to advance opportunities in hydrologic science? What is the role of CUAHSI versus individual investigators?

- Must be selective as there is always something going on.
- Publicize, for the selective events, the science that has contributed to understanding the problem. (Take credit for lots – don't be bashful. See comments about "success stories" above.)
- CUAHSI can alert scientists to the opportunity to apply for fast turnaround funding from the NSF for work that must be done right away. For example, right now NSF is moving money to SEGR grants specifically for the Midwest floods.
- There may be things that CUAHSI can do to help mobilize people, for example by ensuring that pertinent data are made available as soon as possible.
- With regard to the Midwest floods, there may be a role for CUAHSI to get the laser altimetry data readily available to all in a timely way. NCALM has already delivered data and the PI (Witek Krajewski) has said he wants it released.

(4) How should CUAHSI grow and evolve to better serve the "community"? How should CUAHSI help you and your colleagues to pursue research?

- It is not clear that CUAHSI needs to grow, at least not until new or expanded roles are identified. What is needed is a clear statement for a limited horizon of what CUASHI's agenda is and what the strategy to achieve it will be. Linked to that would be the action plan of the organization.
- CUAHSI's main role should be to facilitate research, to expand opportunities, and to work to create priorities for the community.
- CUASHI should continue to play a leading important role in identifying compelling scientific questions and providing a clear, persuasive message to NSF and others about future needs and opportunities. The compelling science message will help everyone.

(5) How should CUAHSI help to increase the visibility of hydrologic science in public policy debates?

- CUAHSI should not try to duplicate the efforts made by UCAR and other organizations.
- However, CUAHSI should work with other entities (e.g., UCAR, UCOWR, AGU) to leverage the work of others in furthering hydrologic science. For example, CUAHSI should join The Weather Coalition (www.weathercoalition.org/). This is just an example. There may be additional entities for supporting the broad interests of the community including groundwater, water quality, and other important areas.
- CUAHSI's main role may be to provide a list of experts who can testify (or lobby) to, say, UCAR and perhaps provide modest financial support to UCAR to engage hydrologists in education, outreach and advocacy efforts as appropriate.
- Another possibility might be for CUASHI to publish informed statements about key issues (e.g. water demand by energy crops, conjunctive use opportunities, etc.) although there are already various NGO's issuing things like this.

Appendix C

Summary Report of Use of Wiki

This brief report summarizes our experience with using the wiki hosted by the Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI) for a course on interdisciplinary water-related modeling that was offered in Summer 2008 jointly by the University of Nevada Reno (UNR) and the University of California at Davis (UCD). See https://cuahsi.centraldesktop.com/intmod/ for the wiki being summarized here.

Background

The overall goals of this course were to introduce students to models used in many different disciplines to address water-related issues, talk about issues related to using models from different disciplines to address water-related issues, and give students experience in working with other disciplines to address such issues. The course involved 17 faculty and 1 post doc from UNR, UCD, and the Desert Research Institute (DRI) who taught the course, and 8 graduate students from UNR. No students participated from UCD this year, although it is intended that the course will continue to be offered jointly by UNR and UCD so that students from the two institutions can interact. Enrollment was also open to graduate students from other institutions through UNR Extended Studies.

The course was modeled after a workshop funded by the National Science Foundation in 2005 that involved developing the curriculum for a course on interdisciplinary modeling for aquatic ecosystems (Saito et al. 2007). For that course, we used a wiki hosted by the Digital Learning in Environmental Science Education (DLESE). We were asked to remove our materials from the DLESE wiki within a year, and we moved the materials to www.cabnr.unr.edu/saito/intmod, which is not an interactive website.

Use of wiki

For the 2008 course, we used the CUAHSI-hosted wiki before and during the course. Items posted to the site included logistical information for participants, materials for lectures and exercises, required and recommended readings for topics, and materials for the class projects. The wiki was used extensively during class to share lecture, exercise, and project materials. This was possible because the classroom in which the course was held had wireless internet access, and we had borrowed or rented laptops for the students to use during the course. The wiki was also used by some faculty to develop collaborative exercises.

Postings to the wiki were predominantly done by the lead instructors (Dr. Laurel Saito at UNR and Dr. William Fleenor at UCD) and the course assistant, Amaya Smith. Many of the instructors and collaborators gave their files to one of these people who then uploaded the documents to the wiki. Several faculty did also get logins and passwords and uploaded their own material to the site.

Feedback regarding wiki

The use of a wiki for a course like this with multiple instructors facilitates simpler interaction and independence in providing materials. The interdisciplinary nature of this course requires that individual faculty select their own materials to use in the course and design their own lectures. However, it is also helpful to see what others in the course will be covering, and the wiki enables all to have access to this information even as the lectures and exercises are being developed.

Numeric course evaluation ratings of the wiki indicated students found it to be somewhere between "moderate help" and "much help." Comments from students regarding the wiki included:

- Really enjoyed the online wiki and reducing paper through the use of online tools
- Always appreciated getting presentations in hard copy/online availability
- The class wiki was great. The entire class was really impressively organized and it was great to know that the notes and readings were all right there.

Faculty did not fill out formal evaluations of the wiki, but overall verbal feedback during the course was positive. For those that posted materials extensively to the website, there were some limitations of the site in terms of how it automatically set up the navigation bars at the top (this was a problem if a page was moved to a different location from where it was originally created), and options for layout of materials on the page. However, we were able to work around these limitations to accommodate our needs.

Future plans for wiki

It is our intention to continue to offer this course and to continue to develop the wiki as a virtual textbook for the course. Furthermore, we'd like the resources to be available to others who may be interested in teaching a course like this. Developing effective exercises for an interdisciplinary modeling course involves some trial and error – we learn a lot as we attempt to do things in class. As we develop exercises that work well, we can post the exercises and materials to save others course development time. The virtual textbook could then be in an ongoing state of development as instructors from different institutions added their expertise to the site.

Hosting the wiki through CUAHSI would hopefully also provide good publicity about the availability of the site, resource, and course to a broader audience that would have interest in the content (and possibly contributing to the content). We had hoped that the current wiki would have been accessible to people browsing the CUAHSI website so that we could attract students from other institutions to the summer 2008 course. In the future, it could hopefully be used in that capacity. If the CUAHSI governing board feels that this type of use of the wiki is appropriate, we would be very interested in permanently housing the wiki through CUAHSI with a link to the main CUAHSI website.

Dr. Laurel Saito is committed to continuing to coordinate this and offer this course, which will be offered every two years. She is also committed to continuing to maintain and develop the wiki.

Please contact Dr. Saito at lsaito@cabnr.unr.edu or 775.784.1921 with any questions about the wiki or regarding further development of the wiki.

Reference

Saito L, Segale HM, DeAngelis DL, Jenkins S. 2007. Developing an interdisciplinary curriculum framework for aquatic ecosystem modeling. Journal of College Science Teaching 37(2):46-52

Appendix D

Publishing Data with CUAHSI Water Data Services

The CUAHSI Hydrologic Information System (HIS) is designed to improve access to the nation's water data. An important part of this information are time series of observations made at point locations, such as precipitation and streamflow gages, soil water and climate stations, groundwater wells and water quality sampling sites in surface and groundwater. These data can be stored in the CUAHSI Observations Data Model, communicated through the internet using the WaterML language, and cataloged in a national water metadatabase. Individual researchers and research organizations can use these facilities to publish their water data as a CUAHSI Water Data Service.

This document provides the interim data policies for data use and for data publication with CUAHSI Water Data Services. These policies are subject to review and to revision. Any changes to data use policies will be posted to the CUAHSI web site. Any changes to data publication policy will be distributed to all those who have published their data and subject to these policies. Comments on these policies are welcome and may be sent to exdir@cuahsi.org.

Guiding Principles

CUAHSI exists to serve the academic research community. Core corporate values are objectivity, transparency, and cooperation. CUAHSI WDS contribute towards achieving the goals of the hydrologic science community by making data more readily available and by enabling academic researchers to share data that they have collected. Furthermore, CUAHSI WDS strive to meet the requirements of NSF's data publication policy, so that data providers who choose to publish using WDS meet all NSF requirements.

Data users outside the academic research community will benefit from CUAHSI WDS and CUAHSI encourages others to use these services. These principles, however, will guide the allocation of limited resources of the CUAHSI WDS project.

Modes of Data Publication

There are three steps to the establishment of a CUAHSI Water Data Service:

(1) Storing observations data in the CUAHSI Observations Data Model (ODM) ;

(2) Providing access to these data through WaterOneFlow web services;

(3) Indexing the resulting water data service at HIS Central in the national water metadata catalog.

For more information about these steps, see http://his.cuahsi.org

Any organization or individual is free to using CUAHSI Hydrologic Information System tools to accomplish the first two of these steps, and thus to establish their own water data services. This document applies mainly to the third step in this process whereby the water data service becomes part of CUAHSI national inventory of water data services.

The database schema (Observations Data Model or ODM), Water Markup Language (WML), the web services developed for ODM, and all tools developed for the ODM (e.g., data loaders and editing tools) are freely distributed subject to the terms of the BSD License (http://www.opensource.org/licenses/bsd-license.php).

Data Service Registration

CUAHSI will maintain a website (http://hiscentral.cuahsi.org/) for the receipt of Web Service registration requests. This website will maintain a list of registered Web Service URLs and brief description of the content of the data service. The listing page and an example network page are shown below.

CUAHSI will maintain a system that populates these pages with user responses gathered during the registration process and by using web services to query the published data base. Those fields, such as number of variables, will be updated weekly by making calls to the registered WSDL address. If these calls fail to return a result, an e-mail will be sent to the registered data manager for the data service and a note will be placed on the network web paged that the web service was down when last tested. Four successive failures will result in placement of the data service on inactive status. Data publishers may request de-registration from the service at any time.

CUAHSI will maintain this registration service so long as it has resources to do so. If, at the end of the current project, additional funds are not available for maintaining the page, the service will be suspended and all data publishers notified. The current CUAHSI HIS project is funded through December 31, 2011.

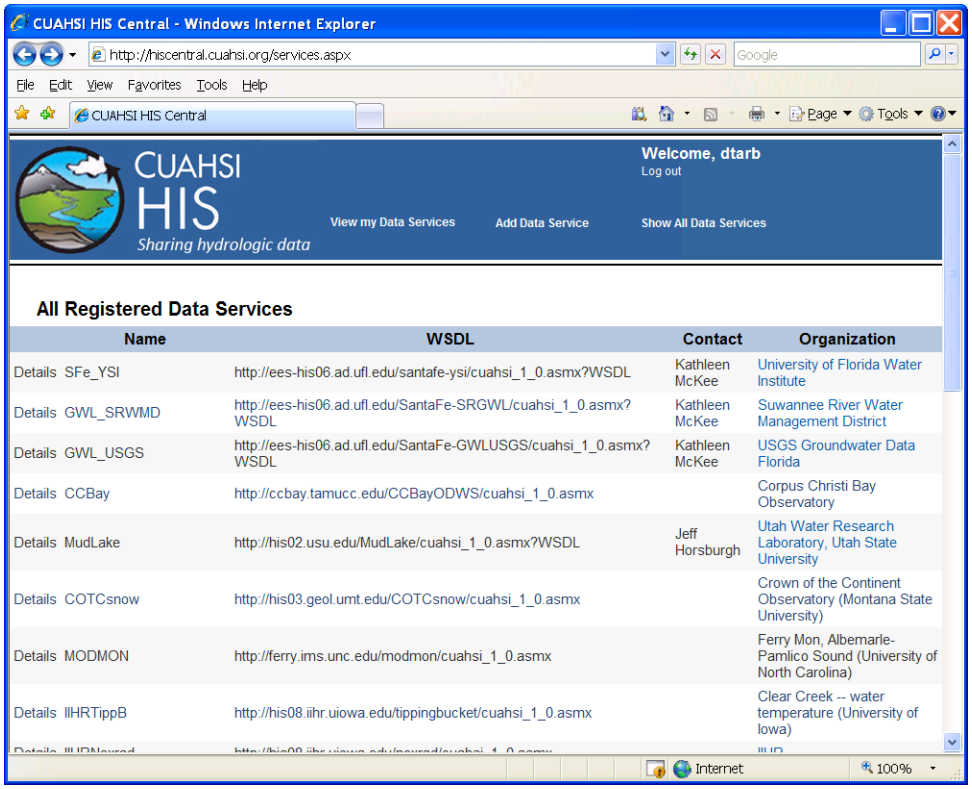

Figure 1. Listing of WSDL's.

Figure 2. Description of data network.

User's Responsibilities

1. Acceptance of data publishing agreement (on-line, as part of registration process).
2. Maintenance of web service on-line

CUAHSI's Responsibilities

1. Maintenance of registration service
2. Maintenance of web pages with weekly updates of catalog information obtained through web services
3. Notification of data manager of service outage

Data Indexing

Beyond simple registration of the WSDL address, CUAHSI also maintains a metadata catalog that enables discovery of data through the use of tools such as HydroSeek. In addition to the

registration process, the data published must use HydroTagger (http://his.cuahsi.org/hydrotagger.html) to link variables in the data base with concepts in the Water Resources ontology that CUAHSI has developed. Some variables will not be included in the concepts contained in the ontology. HydroTagger enables users to request a new concept be added. The ontology will be updated roughly every six months, so that there may be some variables that are not discoverable through the Data Indexing service. Note, however, that these variables can still be accessed using WDS.

To be eligible for data indexing services, various features of ODM must be respected. First, all required metadata fields must be entered. This is consistent with the policy that, while data quality standards cannot be stated a priori, documentation of data collection methods must be done to meaningfully communicate scientific data. Second, the controlled vocabulary contained within the ODM must be respected to maintain homogeneity across data services. If a site would like to include terms not contained in the CV, a request for additional terms, or edits to existing terms may made at http://his.cuahsi.org/mastercvreg.html.

CUAHSI will update the metadata catalog weekly and maintain HydroSeek at production levels through the San Diego Supercomputing Center, at least for the duration of the current project. If the data service fails to respond to this weekly request, the data manager will be notified. If four successive weekly requests fail, the data service will be placed on an 'inactive' status. Sites may be re-activated by requesting re-activation at http://hiscentral.cuahsi.org.

CUAHSI will publish on-line at http://hiscentral.cuahsi.org quarterly reports of data download requests for each data publisher. Reporting web service hits and downloads is a part of our obligations to NSF. With each data download, the data user will be instructed how to cite the data, based upon information provided by the data user. Data publishers who use generic ODM web services to publish their data (as part of HIS Server or HIS Server Lite) can take advantage of the remote web service logging implemented in the services, and have the usage statistics summarized and published on the CUAHSI HIS site as described above (note that port 8090 shall remain open for this functionality to work). Alternately, CUAHSI is requesting that web service requests are logged and a summary is provided to CUAHSI quarterly. If a data publisher chooses not to implement a web service usage logging for his or her data, then CUASHI could only track web service usage and data download requests through Hydroseek.

Because resources are required to maintain the metadata catalog, CUAHSI reserves the right to limit the number of data services it will index. During the current project period, resources will be allocated based upon the following priorities:

1. CUAHSI Members, Affiliates, and International Affiliates
2. Other US universities
3. Other US research institutes and non-profits
4. International universities
5. International non-profits

6. Others

Note that this prioritization applies to data providers who request data indexing services; resources for indexing Federal, State and Local data are decided separately based upon the value of the data to the academic research community.

User's Responsibilities

1. Acceptance of data publishing agreement (on-line, as part of registration process).
2. Maintenance of web service on-line
3. Adherence to ODM requirements for metadata and controlled vocabulary
4. One-time linking of variables with concepts in CUAHSI Water Resources Ontology

CUAHSI's Responsibilities

1. Maintenance of registration service
2. Maintenance of web pages with weekly updates of catalog information obtained through web services
3. Notification of data manager of service outage
4. Maintenance of ontology and associated tools
5. Maintenance of Hydroseek discovery tool

Data Hosting

In those instances when a data publisher does not wish to maintain a server for publishing data, data sets may be loaded into an ODM, variable names tagged to concepts, and transmitted to SDSC for data publication and archiving. See http://his.cuahsi.org for details on the procedures for doing this. This service is the most resource-intensive of all the WDS offered. CUAHSI and SDSC reserve the right to limit the number of data sets that will be hosted. The same prioritization applies as with Data Indexing. This hosting service will be maintained at least through the end of the current project (Dec. 31, 2011). Plans for an on-going data center to provide this service are under development.

Users may request that their data sets be deleted from the hosting service at any time by a request filed at http://hiscentral.cuahsi.org.

User's Responsibilities

1. Acceptance of data publishing agreement (on-line, as part of registration process).
2. Maintenance web service on-line
3. Adherence to ODM requirements for metadata and controlled vocabulary

4. One-time linking of variables with concepts in CUAHSI Water Resources Ontology.

5. Verification that data were transmitted faithfully to SDSC

CUAHSI's Responsibilities

1. Maintenance of registration service

2. Maintenance of web pages with weekly updates of catalog information obtained through web services

3. Notification of data manager of service outage

4. Maintenance of ontology and associated tools

5. Maintenance of Hydroseek discovery tool

6. Maintenance of data set on production server

CUAHSI Water Data Services
Data Use Agreement

This document outlines the provisions of a non-exclusive license for use of data shared through the CUAHSI Water Data Services. Consistent with the objectives of CUAHSI, the goal of the CUAHSI WDS is to make data originally acquired with investigator-specific interest available to
the community for further study. All data are freely available to the public. All Users are encouraged to consider sharing resultant data through CUAHSI WDS to extend and strengthen this collaborative environment.

By receipt and use of this data, you agree to the following provisions for yourself *and any collaborators with whom you share these data*:

1. **Data Guarantee:**

   I will employ these data at my own risk, as the quality of these data cannot be guaranteed.

2. **Publication / Acknowledgement of Data Use:**

   Acknowledgement of the data provider(s) is expected as standard practice in scientific publication or presentation of findings based upon these data. Whenever practical, the individual data providers should be acknowledged; when impractical to do so because of the number of sources of data, the use of CUAHSI WDS data should be acknowledged.

I agree to provide to CUAHSI a bibliographic citation of the final published presentation or article for inclusion in the CUAHSI literature archive. I will send this information to **exdir@cuahsi.org.**

3. **Redistribution of Data:**

Redistribution of original data is permitted so long as the data are redistributed under the same terms and conditions as described in this Data Use Agreement.

Data derived from original data may be distributed under terms and conditions established by the creators of such derived data. Users must comply with the terms and conditions of use set by the creators of these derived data.

CUAHSI Water Data Services
Data Publisher's Agreement

To support a collaborative research environment, CUAHSI WDS publishes data generated by the hydrologic sciences research community and makes these data freely available. CUAHSI Data publication services also support fulfillment of the data sharing policy of the National Science Foundation's Earth Sciences Division (http://www.nsf.gov/geo/ear/EAR_data_policy_204.pdf). Your participation will encourage scientific inquiry, enable new research exploration, and facilitate education by providing the scientific community with relevant, easily accessible data. Shared data are available to the public according to the standard CUAHSI WDS Data Use Agreement.

By your acceptance of these terms, you state that you are the owner of the data or have the right to publish the data. You further agree to the following provisions for yourself *and any collaborators with whom you coordinate the submission of these data*:

1. As the Contributor, I am solely responsible for the integrity of these data put forward for submission.

2. I will submit a data publication request to the CUAHSI Web Service registry, giving details pertaining to the dataset being contributed.

3. I will maintain a current contact information, including name, organization, phone number, e-mail address, and acceptance of a standard CUAHSI WDS Data Use Agreement at the CUAHSI Web Service registry (http://hiscentral.cuahsi.org).

4. I will provide a high-level description of the study through which the data were originally acquired.

5. I will provide a minimum set of associated metadata to sufficiently describe submitted data, to ensure that shared data are meaningful and useful to the scientific community.

6. I agree to work with the CUAHSI Hydrologic Information Systems project staff to ensure that these data are provided in readable formats.

7. I agree to make these data publicly available in accordance with an agreed upon timeline with no restrictions for use other than those stated in the standard CUAHSI WDS Data Use Agreement.
8. I understand that upon registration at the CUAHSI Web Service registry, CUAHSI will retrieve and index metadata describing my dataset (information about sites, variables, periods of record) to support rapid data discovery via CUAHSI Hydrologic Metadata Catalog.
9. CUAHSI is interested in reporting web service usage statistics and data downloads to NSF. For this purpose it maintains a remote web service logging

infrastructure which ensures that usage statistics is submitted to a central logging system. As a Data Contributor, I can choose whether to use the logging system and take advantage of uniform quarterly reporting of web service hits and data downloads, or maintain my own usage statistics and provide quarterly updates to CUAHSI. The components of the logging infrastructure are part of the Generic ODM web services, and require port 8090 to be open.