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Dear Working Group Colleagues,

The NASA Surface Water Working Group (SWWG) has made important advances this past year and it is my pleasure to update you on our progress. I thank each of you for participating in the SWWG; clearly, all of us pulling together have made our group both strong and an important part of the NASA Earth Science Enterprise (ESE). I would like to particularly acknowledge Jared Entin, program manager of ESE's Terrestrial Hydrology Program (THP), for his continued support of our working group. Please note that this letter is available on our working group web page at: www.swa.com/hydrawg/, click on the "letters" button.

Accomplishments:

We have made tremendous progress this past year toward establishing our hydrologic science goals. This science is the foundation of our future. I typically comment that our goal is not to launch a satellite, rather to answer important hydrologic science questions. However, our science questions cannot be answered from measurements collected by traditional in-situ methods and instead require the vast spatial view afforded from space. (Note: most of the following documents and presentations are available on our working group web page.)

(1) EOS Paper: In July 2003, we published in *EOS* our first peer-reviewed, SWWG authored manuscript (reference noted below). This paper indicates open hydrologic science questions resulting from a lack of globally measured runoff and confirms our ability to answer these questions from spaceborne platforms. Such questions form an important component of ESE's focus on the water cycle and climate change.

(2) Science Perspective: In September 2003, Dennis Lettenmaier and I published a "Perspective" article in *Science* that further elaborated on our working group science questions and detailed several different approaches for collecting hydraulic measurements from space (reference noted below). A senior editor at *Science* invited this high profile article, which has now generated strong interest amongst NASA HQ, those developing technology, and international researchers.

(3) Presentations at Meetings: A number of working group members presented abstracts on our science and technology agendas at national and international meetings this past year, including annual meetings of the American Meteorological Society, Association of American Geographers, European Geosciences Union, and American Geophysical Union. Dennis Lettenmaier and I hosted a special session on satellite observations of rivers and wetlands at the April 2003, EGS-AGU-EUG meeting in Nice, France. This session was joint with one hosted by Isabella Velicogna and Jay Famiglietti on the Gravity Recovery and Climate Experiment mission (GRACE). We also presented our thoughts at the "Workshop on Hydrology from Space" in

September 2003, which was a particularly exciting meeting sponsored by the Centre National d'Etudes Spatiales (CNES) and Chaired by Anny Cazenave. I'm also quite pleased that other agencies are taking an interest in our efforts: Dan O'Connell of the U.S. Bureau of Reclamation presented our science goals to a joint meeting of the USBR and NASA in November.

(4) First ESSP Related Presentation: In November 2003, Paul Houser made an extremely important presentation of our science goals to the New Business Review Panel of NASA's Goddard Space Flight Center (GSFC, this Panel makes decisions regarding GSFC's submissions to ESSP). Paul also outlined a couple of candidate technologies and, afterwards, noted that the Panel was remarkably receptive to our goals, even more so than many previous years' participants.

(5) ESTO Letter: Also in November 2003, we sent a letter to NASA's Earth Science Technology Office (ESTO) which is primarily responsible for technology development through its various NRAs (e.g., the Instrument Incubator Program, IIP). The letter alerted ESTO to our technological goals and suggested the inclusion of these goals in their future NRAs.

(6) Virtual Mission: We had an informational meeting in December at the Fall 2003 AGU meeting in San Francisco. The meeting was attended by 18 people. After I presented our accomplishments, we discussed a virtual mission concept and the importance of working with our international colleagues. The virtual mission is designed to determine the spatial and temporal resolutions required to answer our science questions. I discussed these concepts with Jared Entin and we determined that a two-staged approach would ideally prepare us for a successful ESSP submission process. Stage one is an assemblage of three models with synthetic data which is specifically targeted to supply initial resolutions so that a viable ESSP proposal can be submitted to this year's AO. Stage two will use existing satellite data over broadly distributed hydro-climatic environments to determine the potential of existing technologies to answer our science questions. Stage one is necessarily brief to allow an ESSP submission this year whereas stage two is envisioned as a longer term, more expansive proposal. Both stages include important international participation. Although stage one was submitted January 7th, participation in both stages is open and very much welcomed. Please contact me for more information.

(7) Meeting with Jack Kaye: Also during the Fall AGU, Dennis Lettenmair, Charles Vörösmarty and I met with Jack Kaye to discuss the working group goals, our role within ESE, and our readiness for an ESSP submission. This was a very positive meeting that led to several more discussions with colleagues during the AGU meeting. ESE is supportive of our overall goals and would like the synergies with soil moisture and precipitation missions further enhanced.

The Future:

Our efforts are now focused on an ESSP class satellite mission. The seven accomplishments noted above, coupled with the strong heritage of certain spaceborne technologies, demonstrate that we are now very well poised to submit a highly competitive ESSP mission proposal. However, this mission effort requires a tremendous amount of commitment

and thus we will all need to work together to ensure a successful submission. I trust that you will want to be a part of this very exciting future!

(8) March 22nd & 23rd SWWG Meeting: We are now scheduled to meet on March 23rd of this year to discuss the technologies that are immediately available for an ESSP submission. Primarily, these technologies need to make measurements of surface water area and elevation, although slope or velocity may also be required. The rich heritage of radar altimetry and the growing importance of spaceborne lidar make for clear candidates. However, both methods will need an imaging capability, in addition to their elevation measurements. Please also note that this working group meeting will be combined with GRACE (Gravity and Recovery Climate Experiment) hydrologists who will meet on March 22nd. Everyone is strongly encouraged to attend both meetings.

(9) October Meeting of THP Working Groups: In addition to the SWWG, the THP includes soil moisture and cold land processes working groups. All three working groups will present their efforts to NASA HQ as well as using the meeting time to ensure that our overlapping interests are well linked. This meeting will be held in Washington D.C., likely on October 6th through 8th.

(10) Stage Two Virtual Mission Proposal: The second stage of the virtual mission effort will be submitted to NASA THP in 2004, likely in response to the upcoming NRA. As noted in bullet 6 above, this is a more involved effort than the first stage and will include our collective efforts.

(11) ESSP Proposal: Writing and submitting an ESSP proposal is a two step process. The first step is largely focused on establishing our science agenda whereas the second step is a complete proposal for the entire satellite mission. Step-1 is an open submittal process whereas submission to step-2 follows only from passing the step-1 review. The agenda for the March 23rd meeting includes more discussion regarding the ESSP process.

(12) International Collaborations: Our international colleagues have a strong interest in our hydrologic science goals and there are a number of opportunities for collaborative efforts. The ESSP submission requires international partnerships to ensure well-rounded science and technology as well as a cost-effective mission. Both virtual missions include opportunities for collaboration, essentially forming the foundation of the ESSP partnering. All of our meetings are very much open to everyone!

(13) Additional Efforts:

A. AGU: We plan to host a special session at the Fall 2004 AGU on remote sensing of surface waters: please plan to submit your abstract to this session!

B. Web Page: I plan to update the working group web page with a complete reference section, links to a variety of hydrologically important pages, sections with a broader appeal, our contact list, etc. Your suggestions for improvement are most welcome.

C. Presentations: If you would like to make a presentation regarding the working group, please let me know because we have plenty of ready-made PowerPoint files for your use.

D. CUAHSI "Vision Paper": The Consortium for the Advancement of Hydrologic Science, Inc. (www.cuahsi.org) has a call for "vision papers". The goal for these papers is for each to provide a perspective on the future of some aspect of hydrologic science. CUAHSI will provide funding for a small writing workshop, but the deadline for proposals is February 1.

I trust that the future efforts of our working group are equally exciting to you, so please know that your participation is very much welcomed! Always feel free to contact me for more information, especially as we move forward with the ESSP submission.

Sincerely,

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References:

Alsdorf, D., D. Lettenmaier, C. Vörösmarty, and the NASA Surface Water Working Group, The need for global, satellite-based observations of terrestrial surface waters, *EOS Transactions AGU,* v. 84, p. 269-276, 2003. [Note: this was the lead, top-front page article of the issue.]

Alsdorf, D. and D. Lettenmaier, Tracking fresh water from space, *Science,* v. 301, p. 1485-1488, 2003. [Note: A senior editor invited this "Perspective"]