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# Scientific/Technical/Management

## Workshop Purpose

Currently many researchers in academia, industry (R&D), and government agencies in the US and elsewhere are investigating and attempting to identify flood risk areas and predict changes in flood risk at large scales (temporal and spatial). This urge is not restricted to the USA but is globally and the needs and interests are starting to shift towards identifying this flood risk areas at high resolution. Currently applied research studies either use satellite data to map hazard and exposure to flooding at large scales or use models that are typically run with stochastic data or flow return periods, with large uncertainties in the distribution tails. Furthermore, exposure and derived vulnerability data are often licensed or of restricted access. New technologies (small and cube-satellites, drones) and advances in Artificial Intelligence (AI) and interoperability standards, however, promise significant, even game-changing, progress in this field for the coming years.

Additional, particularly when looking at flood risk, exposure and vulnerability, it is important to understand what data are available and can be used. It is equally important in that context to establish collaborative partnerships between private and public entities, to maximize exchange and value of required data and models. There is thus a clear need to bring together government agencies, humanitarian aid organization, insurance and re-insurance providers, private sector industries, as well as academic and research institutions. To accommodate for that we are proposing a **Flood Risk Workshop** to: a) identify minimal requirements for mapping global flood risk, b) start collaborative partnerships, c) identify achievable short-term goals that do not require significant funding, and d) determine a multi-year plan on how to achieve the workshop goals. Given the recent history of flood disasters worldwide that clearly illustrated that current flood risk and resilience assessment methods should be revisited and require rethinking, this workshop is timely and very much needed to bring together the main actors across various sectors and communities.



During the 3-day E2 NASA Flood Response Workshop (Greenbelt, MD, June 2016), requirements for moving forward were defined. Among other action items, it was clearly argued that flood risk maps, population maps as well as studies and data on vulnerability are most needed (Table 1). There is thus a urgency to bring together the right qualified people of agencies, companies, universities and initiatives that can together bring to the table access to the proper datasets, clearly define needs and requirements to make progress and create better flood risk and vulnerability information as well as exposure maps at the global scale while providing actionable material at the local level.

**Table 1.** Ties to the 2016 Flood Response Workshop outcomes

|  |  |  |  |
| --- | --- | --- | --- |
| ***2016 Workshop Session*** | **Recommendation** | **Role in Flood Response “Cycle”** | **Comment** |
| *Poster Exercise* | Flood Risk Maps, Population Mapping | Preparation | Only relevant suggestions to proposed Flood Risk Workshop are listed |
| *Breakout Session 1: Existing Response Systems* | Study and understand vulnerability; tapping more in social sciences; researching risk perception; | Product Dissemination and Delivery | Identified as one of the top priority action items for the coming 1-3 years |

To have attend the best qualified people, there is a need to form an eclectic planning committee for this (follow-on) meeting “Flood Risk Workshop” (see Section 1.5). This workshop would in first instance bring together various PIs and lead experts from NASA’s flood projects to discuss and formalize the points outlined in Section 1.2. The program committee will discuss how to form new partnerships between the public and private sectors, so that the best efforts and solutions to this global challenge can be made – possibly including Planet, NASA, USACE, the World Bank, Red Cross and various private sector companies and public stakeholders. However, as identified during the 2016 Flood Response Workshop, scalability of a single country or regional paradigms will be a significant challenge to address as well.

The planned “Flood Risk Workshop” will not be a typical science meeting nor a research review; rather it will be a pro-active discussion, generating actionable output on how to proceed to build a coordinated global effort to create better flood exposure and vulnerability maps with the overall aim to reduce local impacts of flood disasters worldwide.

## Workshop Theme and Relevance to ASP Goals and Objectives

The proposed workshop contributes directly to the NASA Applied Sciences (AS Disasters) Program, which has various tasks towards society. The NASA Applied Sciences Program partners with many public and private organizations, facilitate data flow from NASA's environmental satellites and data-based scientific findings to decision-making activities and services, helping to protect the environment, improve the quality of life, and strengthen the economy. The workshop addresses exactly that.

NASA’s “toolbox” currently comprises but is not limited to SAR, MODIS/VIIRS, Landsat, and other mapping products which have all shown great value for both strategic planning and tactical response and damage or exposure assessment. NASA and their relevant Disaster Response Coordinators, as well as their flood product producers understand that future research and product development activities will require an integrated solution for better flood risk management.

In this context, the theme and goal of this workshop is to look at **coordinating efforts for mapping global flood risk, including vulnerability and exposure**. Such efforts should not be looking at supporting single basin or regional capabilities that are not immediately globally extensible. R&A and SERVIR do that in a number of ways, so a global effort should leverage those capabilities if and when they may be needed. It [a global effort] would also need to leverage and support ongoing international initiatives and programs such as Copernicus for instance, which has proven to be of great value. Also, with the advent of new technologies, including small and mini satellites (cube satellites) as well as Unmanned Aerial Vehicles (UAVs; like drones) and the use of social media streams (e.g. Twitter) and citizen science, the workshop will also include important actors in those arenas (e.g. Planet).

In this context, the proposed workshop will address the following points as a primary objective in order to start formalizing requirements for producing detailed global maps of flood risk:

* Develop requirements (and possibly standards) for Earth Observation (EO)- and auxiliary data-based flood risk assessment at the global level.

Future AS Disasters solicitations from NASA should be looking toward integrated or complimentary flood risk proposals that will be sustainable for the NASA AS Disasters program or fully transitionable to outside operations. This has **already** been **initiated with the ROSES 18 A-37 call for proposals**.

Furthermore, there should also be an attempt to build this into the hydrology and socio-economic research strengths at the NASA centers (for example SEDAC), which will require discussions with relevant PIs, and initiative leads.

Many flood related actors, including NASA are members of the Global Flood Partnership, an international community of stakeholders and scientist as well as many others with a common interest in flooding. We propose to use the GFP annual meeting of 2019 to report back the workshop findings as well as using the GFP platform this year to announce the workshop to invite potential participants.

## Workshop Agenda

*NASA is the primary sponsor of the workshop.* The workshop will be moderately small (see list of participants, Section 1.5.2) and will include a combination of key invited participants and other interested experts selected from NASA’s “expert pool” as mentioned earlier. A small core of the participants will be funded by this project, while the majority will have to use alternative resources to cover their meeting expenses. Due to the shortness of planning time (see Section 1.4), participation of the proposed workshop will be by invitation only (see Section 1.5). From budgetary reasons, we propose to host the workshop somewhat central in the USA to reduce travel time and expenses for participants of both USA coasts (see Section 1.4). That would also minimalize costs for a critical mass of NASA flood researchers, experts and stakeholders that is stationed in the close vicinity of the proposed location.

The workshop is designed to continue for 2.5 days. Presentations on the first morning will focus on state of the art (NASA and non-NASA) flood risk datasets focusing on vulnerability and exposure, associated impacts, existing methods and issues/limitations, and will also include existing new initiatives. The afternoon will be reserved to present and discuss the needs and wishes from the various stakeholders and how to address current issues of systems and brainstorm about potential future systems and data collection coordination.

The morning of the 2nd day will commence with summaries of the current state of (flood) risk maps, revolving around Earth Observation under the present setting of NASA AS, presenting outstanding challenges and priorities. Specifically, we aim to make substantial progress in addressing the following three key questions:

1. What is the current status and state-of-the-art for mapping flood risk, exposure and vulnerability?
2. What is required to progress the state-of-the-art for achieving better, more actionable flood risk maps or indices at the global level with local impact assessment
3. What are the current three biggest challenges in mapping flood risk, exposure and vulnerability that need addressing?
4. What needs to be done to overcome these challenges and allow a more coordinated global effort (action plan for next ROSES, etc)?

The afternoon of day 2 will continue item 3 on the question list and define the action plan.

The morning of the third day of the workshop will recap the meeting and formalize an immediate action plan that can address the key challenges swiftly but sustainably.

The preliminary workshop agenda is given below. Note that the chairs will be determined during the monthly or bi-weekly telecon meetings by the organizing committee.

**Day 1**

8:30-9:00 Coffee & Welcome

9:00-9:30 Opening plenary (NASA AS Disasters)

Current state-of-the-art: Data and Methods for Mapping Flood Risk, Vulnerability and Exposure

9:30-10:15 Session 1: Current Capabilities (Chair: TBD)

10:15-10:30 Coffee Break

10:30-11:15 Session 2: Existing data (Chair: TBD)

11:15-12:00 Session 3: Existing methods (models) (Chair: TBD)

12:00-1:30 Lunch Break

1:30-3:00 Session 4: What is Required to Progress (Chair: TBD)

3:00-3:15 Coffee Break

3:15-5:30 Session 5: Pro-active discussion rounds (Limitations and Requirements; Chair: TBD)

6:00-8:00 Social dinner

**Day 2**

8:30-9:00 Coffee

9:00-12:00 Session 6: Defining the Biggest Challenges (Chair: TBD)

(10:30 – 10:45 Coffee break)

12:00-1:30 Lunch Break

1:30-5:00 Session 7: Actions to Overcome Challenges (Chair: TBD)

(3:00-3:15 Coffee Break)

**Day 3**

8:30-9:00 Coffee

9:00-12:00 Workshop wrap-up: summary, future plans, and assignments (e.g. report-writing committee)

(10:30-10:45 Coffee Break)

12:00 Adjourn

## Workshop Location, Date & Management Plan

The workshop is planned in early October of this year (2018), tentative date is 2-4 October. Since this workshop is by invitation only and participants will also include the planning committee members (see table in Section 1.5.2), invitations will be circulated two months prior to the workshop (early August). The planned venue for the workshop will be in the Sustainability, Energy and Environment Community (SEEC) building of the University of Colorado (CU) at Boulder CO, which is an ideal venue as it is more or less in the center of the USA, and hosting already a number of NASA “Flood” PIs.

Affordable lodging and a variety of restaurants are located in the vicinity of the hotel. Transportation between the meeting venue and hotel will be provided by a chartered bus service of CU, assuring to start on time and allowing to keep the logistics simple and cost low.

To facilitate additional time for interactions, the meeting will provide coffee in the mornings and during the breaks. A social get-together is planned in the evening of day 1 (location TBD, but there are various venues in Boulder that can host up to 100 people). Lunch and dinner will not be provided, but SEEC has a nice cafe that provides coffee and lunchs and there are other options on campus nearby.

### Location Details

The workshop will take place in Boulder, Colorado, at the Dartmouth Flood Observatory, which is situated in the new Sustainability, Energy and Environment Community (SEEC) building on East Campus of the University of Colorado, Boulder, Colorado. The building has all facilities needed to host a successful workshop (see Facilities and Equipment document). Participants will stay as much as possible at the Millennium Harvest House Boulder, which is situated near the SEEC building. DFO will make use of the Univ. of Colorado negotiated rates to host participants at the Millennium Harvest House and as such can offer reduced hotel rates to participants. The 2.5-day meeting is scheduled for 2-4 October 2018 and as such SEEC facilities are already reserved.

### Meeting space

INSTAAR is the anchor of the new SEEC campus that is part of the University of Colorado at Boulder, East Campus. The new SEEC campus offers 10 conference rooms, 6 classroom-style teaching facilities, a cafeteria, and a major conference facility (auditorium) that can host up to ~700 people, all equipped with Wi-Fi. All conference rooms, class rooms and auditorium come with projectors and projector screens.

The main auditorium (C120) dimensions are 44’ x 53’. If combined with the side rooms C120A/B and C120 C/D), the dimensions are 79’ x 50’. SEEC has for the main auditorium 300 chairs total for use in the rooms and the main auditorium can fit approximately 250 chairs. The side rooms can seat individually 30 to 60 depending on format. C120A/B is 17’ x 50’ when combined. C120A is 17’ x 25’, C120B is 17’ x 25’. C120C/D is 18’ x 49’ when combined. C120C is 18’ x 24’ and C120D is 18’ x 25’. The rooms are separated by sound-proof, movable walls and can be divided in five, four, three, two or one separate space. Maximum room occupancy limits are C120 (412), C120A (81), C120B (64), C120C (82), C120D (65), with a total of 704.

The auditorium has a ceiling-mounted Epson G7905UNL 7000 lumen projector and 137-inch tensioned motorized screen with HDMI, VGA, and Mini DisplayPort connections. A Vaddio RoboSHOT 30x HD PTZ rear camera and Vaddio RoboSHOT 12x HD PTZ front camera provide web-based conferencing video possibilities. For voice amplification, the room is equipped with two Shure WL185 lavalier microphones and two Shure SM58 handheld microphones. The auditorium comes with two floor mic stands and two table top mic stands. Wall-mounted JBL line array speakers are on the front wall for program audio and ceiling-mounted speakers provide voice reinforcement. There is an ADA-compliant height-adjustable motorized lectern.

The side rooms each have a ceiling-mounted Epson 2255U 5000 lumen projector and 137-inch tensioned motorized screen with HDMI and VGA connections. The content display can be duplicated across screens. Recording is provided by software-based applications running on a laptop connected to the system.

### Data Management Plan

#### Types of data

The proposed work will not generate field data or numerical simulations that would require archiving but will produce attendee presentations that we will store and distributed utilizing the DFO web server if the presenters agreed, for those that are interested. Recorded keynote presentations will be distributed on agreement of the presenters through the YouTube channel. The University of Colorado, DFO team, has over a decade of experience in sharing material and has the hardware and infrastructure to do so. The DFO team typically makes available submitted abstracts, poster presentations, records of keynote speakers and where possible hands-on exercises for people to use after the meeting as well. All of this data will be in the DFO meeting archive and will be available publicly and freely from the original data sources and same policy applies to the proposed meeting material.

#### Data and metadata standards

We will rely heavily on providing access to the data through web services, such as the DFO Web. Meeting material on the DFO web will utilize standard tools and rely heavily on data standards that gain widespread adoption. For example, presentations will be made available in PDF and where possible in PowerPoints’ PPTX format. Abstracts are uploaded as text on registration to the meeting website through a web form and will be made available as PDF. Recordings of the keynote speakers will be made available on YouTube and can be viewed directly through YouTube or downloaded in a variety of standard movie formats with free online available tools.

#### Policies for access and sharing and provisions for appropriate protection/privacy

The meeting material sharing policy is driven by openness. We will not impose restrictions on accessing or distributing data unless the license agreement with the original data providers (presenters) limits how their presentation can be redistributed. Presenters will receive in advance a consent form to sign, agreeing to share their presentation at no cost. The proposing team is committed to release the meeting material within 2weeks after the meeting, so without any additional grace period.

We anticipate that the data handled in our system will not contain sensitive information that would require the protection of privacy or national security

## Workshop Funding, People Efforts, Deliverables and Participants

### Funding and Deliverables

To ensure a quality workshop and to generate the strongest interest, the workshop itself will be funded through this NASA grant. We request funds to pay for the travel and lodging of about 6-7 essential participants that require support (TBD). Funding will pay for participant airfare or mileage and a maximum of 3 nights lodging.

Funding will also be requested to support the **PI G. J-P. Schumann**’s time (at Remote Sensing Solutions, Inc.) for successful management and for the outcome deliverables, which include a report to be published in a community magazine (e.g., AGU Eos) as well as an academic paper and a report to be circulated to NASA and other relevant organizations. Also, a teleconference spin-off series will follow the workshop where science and science action items will be discussed and formalized, involving most of the workshop participants. Thereafter, additional funding to work on some of those action items will be necessary.

Funding will also be requested for **Co-I Dr. A. J. Kettner** at CSDMS, INSTAAR (CU Boulder). Dr. Kettner will spend 0.6 months, or 0.05 FTE of his time on this project for a period of 1 year. His tasks are directly relevant to the success of the workshop and its outcome. He will contribute to all meeting deliverables as defined above and be co-host of the meeting; leading the logistical support for the meeting, including reduced cost hotel contract and arranging transport to meeting from hotel. He will also handle onsite registration (name tags and have keynote speakers sign agreement of releasing any presented material). Additionally, Dr. Kettner will provide meeting website support: setting up a website to announce meeting, handle expressions of interest, and confirmations, as well as abstract submissions. Post-meeting support is also provided by ensuring meeting material is available, not only for attendees but for everybody that is interested. Recording of the meeting and the possibility to have online participation, at least during the plenary presentations will also be provided. Because of the logistics items and various other support outlined above, the subaward from Remote Sensing Solutions to CU will include the necessary direct costs as well as Dr. Kettner’s time (labor).

We will also request funding for **Co-I Beth Tellman** (Cloud2Street, Beth & Bessie Inc.) for assisting with the workshop planning, especially invitation and connection to various participants (including data providers and insurance, etc). She will also assist with all deliverables.

### Project Timeline

{INSERT SIMPLE GRAPH WITH MILESTONES & DELIVERABLES HERE}

### Participants

Our goal is to include the necessary range of participants so as to have a critical mass while keeping the size moderately small. For applicants, not able to attend the workshop or not selected for live presentations, an opportunity may be provided to participate in the workshop via online participation as noted in the previous section.

The structure of the workshop will be organized by the following planning committee:

|  |  |  |
| --- | --- | --- |
| **Name** | **Organization** | **Role** |
| **David Green** | NASA HQ | NASA ASP Disasters Program Manager |
| **John Murray** | NASA LaRC | NASA ASP Associate PM for Atmospheric and Hydrological Disasters |
| **Guy Schumann** | RSS | Lead workshop coordinator & responsible for deliverables |
| **Albert Kettner** | DFO | Co-host and logistic as well as science co-lead |
| **Beth Tellman** | C2S | Workshop coordinator & Co-Investigator |
| **Andrew Smith** | Fathom Global | Flood Hazard & Risk Modeling at high resolution and global |
| **Andrew Kruczkiewicz** | IRI Columbia/Red Cross | Humanitarian Response/Flood Vulnerability |
| **Kevin Dobbs** | NGA | Risk mapping |
| **Keiko Saito** | GFDRR | Flood Exposure & Risk |
| **Megan Linkin** | Swiss Re | Insurance (exposure & risk) – no response yet |
| **Eylander, John B.** | USACE | Exposure & Risk |
| **Jim Mitchell** | LA DOT | Coastal Infrastructure Exposure – no response yet |
| **Andrew C Zolli** | Planet | Data sets from high res satellites |

The following table is a non-exhaustive list of expected workshop participants (or part. orgs):

|  |
| --- |
| "Murray, John J. (LARC-E303)" <john.j.murray@nasa.gov>, "GREEN, DAVID S. (HQ-DK000)" <david.s.green@nasa.gov>,  “Guy Schumann” <gjpschumann@gmail.com>  “Liping Di (GMU)” <[ldi@gmu.edu](mailto:ldi@gmu.edu)>, "LIMAYE, ASHUTOSH S. (MSFC-ZP11)" <ashutosh.limaye@nasa.gov>, "Bob Adler (UMD) " <radler@umd.edu>, "Molthan, Andrew L. (MSFC-ZP11)" <andrew.molthan@nasa.gov>, "Bolten, John D. (GSFC-6170)" <john.bolten@nasa.gov>, "Stough, Timothy M (JPL-398H)[Jet Propulsion Laboratory]" <timothy.m.stough@jpl.nasa.gov>, "Yun, Sang-Ho" <sang-ho.yun@jpl.nasa.gov>, John Jones-Bateman <Jones-Bateman\_John@bah.com>, "Kirschbaum, Dalia B. (GSFC-6170)" <dalia.b.kirschbaum@nasa.gov>, "Soja, Amber J. (LARC-E303)[NATIONAL INSTITUTE OF AEROSPACE]" <amber.j.soja@nasa.gov>, "Kenneth Duda (duda@usgs.gov)" <duda@usgs.gov>, "fmeyer@gi.alaska.edu" <fmeyer@gi.alaska.edu>, "Davies, Diane K. (GSFC-619.0)[SCIENCE SYSTEMS AND APPLICATIONS INC]" <diane.k.davies@nasa.gov>, "Goodman, Michael (MSFC-ZP10)" <michael.goodman@nasa.gov>, "Frye, Stuart W. (GSFC-581.0)[SGT INC]" <stuart.w.frye@nasa.gov>, "G. Robert Brakenridge (robert.brakenridge@Colorado.EDU)" <robert.brakenridge@colorado.edu>, "Bell, Jordan R. (MSFC-ZP11)[UAH]" <jordan.r.bell@nasa.gov>, "Policelli, Frederick S. (GSFC-6170)" <frederick.s.policelli@nasa.gov>, "Slayback, Dan (GSFC-618.0)[SCIENCE SYSTEMS AND APPLICATIONS INC]" <dan.slayback@nasa.gov>, "Webb, Frank H (JPL-8300)[Jet Propulsion Laboratory]" <frank.h.webb@jpl.nasa.gov>, "Diaz, Ernesto (JPL-382B)[Jet Propulsion Laboratory]" <ernesto.diaz@jpl.nasa.gov>, "Sullivan, Donald V. (ARC-SGE)" <donald.v.sullivan@nasa.gov>, "Roman, Miguel (GSFC-6190)" <miguel.o.roman@nasa.gov>, "Reed, Jacob B. (GSFC-617.0)[TELOPHASE CORP]" <jacob.reed@nasa.gov>, "Irwin, Daniel E. (MSFC-ZP11)" <daniel.irwin@nasa.gov>, "Searby, Nancy D. (HQ-DK000)" <nancy.d.searby@nasa.gov>, "Anderson, Eric (MSFC-ZP20)[UNIV ALABAMA HUNTSVILLE]" <[eric.anderson@nasa.gov](mailto:eric.anderson@nasa.gov)>,  "Bruce Chapman (JPL/UAVSAR)"*<*bruce*.*chapman*@*jpl.nasa.gov*>,*  "Noosha Taheby (World Bank)"<ntayebi@worldbank.org>,  "Konstantinos Andreadis (JPL/SERVIR/SWOT ST)"<Konstantinos.M.Andreadis@jpl.nasa.gov>,  "John Eylander (USACE) "<John.B.Eylander.civ@mail.mil>,  "Brenda Jones (USGS)"<bkjones@usgs.gov>,  "Gordon Wells (CSR)"<Gordon Wells <gwells@csr.utexas.edu>,  "Teresa Howard (CSR)"<howard@csr.utexas.edu>,  "Victor Hom - NOAA Federal" <victor.hom@noaa.gov>,  "Glen Russell (FEMA)"<glen.russell@fema.dhs.gov>,  "Chris Vaughan (FEMA)"<[Christopher.Vaughan2@fema.dhs.gov](mailto:Christopher.Vaughan2@fema.dhs.gov)>,  "Porter, Daniel (OGA)" <[daniel.porter@associates.fema.dhs.gov](mailto:daniel.porter@associates.fema.dhs.gov)>,  "Vanessa M. Escobar (NASA EA)" <[vanessa.m.escobar@nasa.gov](mailto:vanessa.m.escobar@nasa.gov)>,  "Cameron, Brian R (OGA)" <[brian.cameron@associates.fema.dhs.gov](mailto:brian.cameron@associates.fema.dhs.gov)>,  "NGA-AIAW USA CIV" <[Brian.R.Cameron@nga.mil](mailto:Brian.R.Cameron@nga.mil)>,  "James Verdin (USGS)"<[verdin@usgs.gov](mailto:verdin@usgs.gov)>,  "Kevin Dobbs (NGA)"<Kevin.E.Dobbs.ctr@nga.mil>,  "Tyler Erickson (Google EE)"<tylere@google.com>,  "Josh Livni (Google Crisis Response)" <jlivni@google.com>,  "Kashif Rashid (former UN WFP)" <krpelham3@gmail.com>,  "Jim Cormany (DigitalGlobe) ”<[Jim.Cormany@digitalglobe.com](mailto:Jim.Cormany@digitalglobe.com)>,  "Ed Beighley (Northeastern, former FM Global)" <r.beighley@neu.edu>,  "Daniel B. Wright (University of Wisconsin)" <danielb.wright@wisc.edu>,  "Delwyn Moller (Remote Sensing Solutions Inc.)" <dkmoller@remotesensingsolutions.com>,  "Andrew Kruczkiewicz (IRI, Red Cross)" <andrewk@iri.columbia.edu>,  "Faisal Hossain (University of Washington) " <fhossain@uw.edu>,  "Konstantine Georgakakos" <KGeorgakakos@hrc-lab.org>,  "Pete Epanchin (USAID)" <pepanchin @usaid.gov>,  "Rafael Ameller (StormCenter)" <rafael @stormcenter.com >,  "Curt Barrett (Early Warning Systems/USAID/OFDA/World Bank consultant)" <curtiis\_barrett301@comcast.net>,  "Caspar Ammann (NCAR Applications Lab)" <ammann@ucar.edu>,  "Herve Yesou (SERTIT)"<[herve.yesou@sertit1.u-strasbg.fr](mailto:herve.yesou@sertit1.u-strasbg.fr)>, [**INTERNATIONAL**]  "Matgen, Patrick [LIST]" <[patrick.matgen@list.lu](mailto:patrick.matgen@list.lu)>, [**INTERNATIONAL**]  "Paul Bates (University of Bristol/SSBN Ltd)"<[paul.bates@bristol.ac.uk](mailto:paul.bates@bristol.ac.uk)>, [**INTERNATIONAL**]  "Hessel Winsemius (Deltares)"<[Hessel.Winsemius@deltares.nl](mailto:Hessel.Winsemius@deltares.nl)>, [**INTERNATIONAL]**  "Philip Ward (VUA Amsterdam/Aqueduct Global Flood Analyzer)"<[philip.ward@vu.nl](mailto:philip.ward@vu.nl)>, [**INTERNATIONAL**]  "Peter Salamon (JRC)"<peter.salamon@jrc.ec.europa.eu>, **[INTERNATIONAL]**  "Florian Pappenberger (ECMWF)"<Florian.Pappenberger@ecmwf.int>, **[INTERNATIONAL]** |

The following table is a list of the participants of the 2017 GFP annual meeting. This list constitutes another pool of invited participants:



# Resume/CV

**Dr. Guy Jean-Pierre Schumann**

[gjpschumann@gmail.com](mailto:gjpschumann@gmail.com)

**Relevant Experience:**

Dr Schumann has extensive experience in the field of remote sensing data integration with hydrodynamic modeling and particularly radar remote sensing and its use in model calibration and validation. He has done extensive work on flood inundation mapping from SAR and integration of uncertainties. His recent research focuses on large- and fine-scale flood inundation modeling and integration with remotely sensed data.

**Education:**

PhD, Geography, University of Dundee (UK), 2008.

MSc, Remote Sensing, University of Dundee, 2004.

MA Joint Honors, Environmental Science and Geography, University of Dundee, 2003.

**Professional Experience:**

2015–present Scientist, Remote Sensing Solutions, Inc. (West Coast Office, Monrovia, CA)

2014–2015 Visiting Associate Researcher, JIFRESSE, UCLA

2012–2014 Postdoctoral Research Scientist, Jet Propulsion Laboratory

2012–present Visiting Fellow in Geographical Sciences, Bristol University, UK

2011–2012 Associate Professor (tenured), Bristol University, UK

2008-2011 Postdoctoral Fellow, Bristol University, UK

2007-2008 Postdoctoral Researcher, Bristol University, UK

2005-2007 PhD research position at the Gabriel Lippmann Research Centre, Luxembourg

**People Management Experience:**

A 1-year post-doctoral research assistant looking at sonar image data for seabed feature identification and monitoring under the UK DEFRA-funded project

Two 3-year UK NERC-funded PhD students looking at LiDAR data from the ICESat mission to track water levels and hydrodynamics from space and integration with large scale hydraulic modelling

**Previous Research Funding:**

Investigator on a Google Earth Engine Award: *A speed-efficient downscaling method for global flood hazard layers* (100k$, split with University of Bristol) (awarded)

Investigator on three JPL (Caltech) contract awards (SMAP Science: 25k$; SWOT THP: 20k$; and SWOT ADT: 141k$) (all three awarded)

PI on a DLR IDEM proposal: *Assessing the skill of TanDEM-X for flood inundation forecasting and mapping in the Zambezi basin* (awarded)

PI on a NASA RRN proposal: *Effective integration of EO data and flood modeling for rapid disaster response: the Texas 2015 case* (60k$) (awarded)

Co-I on a NASA THP proposal: *A multi-sensor hydrologic modeling framework to understand the coupled human and natural feedbacks in the Zambezi basin* (400k$) (awarded)

Science-PI on a NASA AIST proposal: *Global Flood Risk From Advanced Modeling and Remote Sensing in Collaboration With Google Earth Engine* (700k$) (awarded)

Investigator on a NASA ICESat-2 Early Adopter project for the Global Flood Partnership: *Assessing the value of the ALT13 water level product for the Global Flood Partnership*

Co-I and contact person on a SMAP Early Adopter project for the UN World Food Programme (WFP): *A simple flood forecasting index for data-poor regions*

PI on a UK DEFRA ALSF-MEPF grant investigating the feasibility of automated processing of SONAR data for seabed features of high conservation status (£ 163,049) (10/09-11/10)

PI on a NERC NCEO small grant investigating the use of low resolution remotely sensed flood imagery and height data for the retrieval of water levels on large rivers around the globe and integration with large scale hydraulic models (£ 25,000) (01/10-06/11) (for a brief summary, see: http://www.bristol.ac.uk/water/news/2010/8.html)

**Relevant Publications:**

G. J.-P. Schumann, P. D. Bates, J. C. Neal and K. M. Andreadis, 2014. Fight floods on a global scale. Nature Correspondence (Technology), Nature, 507, 169 (13 March 2014), doi: 10.1038/507169e

Schumann, G., P. D. Bates, M. S. Horritt, P. Matgen, and F. Pappenberger, 2009, Progress in integration of remote sensing–derived flood extent and stage data and hydraulic models, Reviews of Geophysics, 47, RG4001, doi:10.1029/2008RG000274.

Hall, A.C., G. J-P. Schumann, J. L. Bamber, P. D. Bates and M. A. Trigg, 2012. Geodetic corrections to Amazon River water level gauges using ICESat altimetry. Water Resources Research, 48, W06602, doi: 10.1029/2.

Guy J.-P. Schumann, Jeffrey C. Neal and Paul D. Bates, 2012. Global scale simulation of flood plain inundation with low resolution space-borne data, in C. M. U. Neale and M. H. Cosh (eds.). Remote Sensing and Hydrology, IAHS Publ. 352, pp. 482, 464-467.

J. Neal, G. Schumann and P. Bates, 2012. A sub-grid channel model for simulating river hydraulics and floodplain inundation over large and data sparse areas. Water Resources Research, 48, doi: 10.1029/2012WR012514.

Schumann, G. J.-P., J. C. Neal, N. Voisin, K. M. Andreadis, F. Pappenberger, N. Phanthuwongpakdee, A. C. Hall, and P. D. Bates, 2013a. A first large scale flood inundation forecasting model. Water Resources Research, 49, 10, 6248-6257.

Schumann, G. J.-P., H. Vernieuwe, B. De Baets and N. E. C. Verhoest, 2013b. ROC-based calibration of flood inundation models, Hydrological Processes, doi: 10.1002/hyp.10019.

G. J-P. Schumann, S. Frye, G. Wells, R. Adler, R. Brakenridge, J. Bolten, J. Murray, D. Slayback, F. Policelli, D. Kirschbaum, H. Wu,, P. Cappelaere, T. Howard, Z. Flamig, R. Clark, T. Stough, M. Chini, P. Matgen, D. Green, and B. Jones (2016). Unlocking the Full Potential of Earth Observation during the 2015 Texas Flood Disaster, WATER RESOURCES RESEARCH. (Revision Submitted)

**Biographical sketch: ALBERT JAAP KETTNER**

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| Campus Box 450 or 4001 Discovery drive | *Fax*: 303-492-6388 |
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**Professional Preparation**

B.Sc. Agricultural Univ., Wageningen, Netherlands Forestry 1993

M.Sc. Agricultural Univ., Wageningen, Netherlands Forestry & GIS 1997

Ph.D. Technical University, Delft, Netherland Geography 2007

**Appointments**

|  |  |  |
| --- | --- | --- |
| 2011 –  2018 –  2018 –  2010 – 2018  2014 – 2016 | INSTAAR, Univ. of Colorado  INSTAAR, Univ. of Colorado  Dartmouth Flood Observatory  Dartmouth Flood Observatory  INSTAAR, Univ. of Colorado | Research Scientist  Associate Director  Director  Co-Director  Acting Associate Director |
| 2002 – 2005 | INSTAAR, Univ. of Colorado | Research Assistant |
| 1999 – 2002 | Ministry of Transport, Public Works and Water Management (RWS), The Netherlands | Head GIS cluster |
| 1998 – 1999 | RWS, The Netherlands | Deputy Manager GIS |

**Relevant Publications**

Brakenridge, G. R. Syvitski, J.P.M., Niebuhr, E., Overeem, I., Higgins, S.A., Kettner, A.J., Prades, L., 2017. Design with nature: Causation and avoidance of catastrophic flooding, Myanmar. Earth-Science Reviews, **165**, 81-109.

Chen, Y., Syvitski, J.P.M., Gao, S., Overeem, I., and Kettner, A.J., 2012. Socio-economic Impacts on Flooding: a 4kyr History of the Yellow River, China. *AMBIO*

Escobar C., R., Restrepo, J.D., Brakenridge, G.R., and Kettner, A.J., 2016. Satellite-based Estimation of Water Discharge and Runoff in the Magdalena River, Northern Andes of Colombia. In *Remote Sensing of Hydrological Extremes*, pp. 3-19.

Kettner, A.J. Restrepo, J.D., and Syvitski, J.P.M., 2010. A Spatial Simulation Experiment to Replicate Fluvial Sediment Fluxes within the Magdalena River, Colombia. *The* *Journal of Geology*, **118**, 363-379, doi:10.1086/652659.

Kettner, A.J., Gomez, B., and Syvitski, J.P.M., 2007. Modeling suspended sediment discharge from the Waipaoa River system, New Zealand: the last 3000 years. *Water Resources Research,* v. **43**, W07411 dio:10.1029/2006WR005570.

Syvitski, J.P.M., Vrsmarty, C.J., Kettner, A.J., and Green, P.A., 2005. Impact of Humans on the Flux of Terrestrial Sediment to the Global Coastal Ocean. *Science*, v.**308**(5720), 376-380.

Van Dijk., A.I.J.M., Brakenridge, G.R., Kettner, A.J., Beck, H.E., and de Groeve, T., 2016. River gauging at global scale using optical and passive microwave remote sensing. Water Resources Research, **52**, 6404-6418. DOI: 10.1002/2015WR018545.

**64 peer-reviewed journal publications; 3 reports; 2 book chapters; 171 conference abstracts.**

# Personnel and Work Effort

The following table includes a summary of personnel and work effort.

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Organization | Role | Work Commitment |
| Year 1 |
| Guy Schumann | RSS | PI | 0.06 |
| Albert J Kettner | DFO (CU) | Co-I | 0.05 |
| Beth Tellman | C2S | Co-I | 0.1 |

# Budget Narrative (redacted)

## RSS

## CU

### Personnel

Salaries for all named personnel are based upon current University of Colorado Boulder (CU-Boulder) academic and staff salary scales. All personnel budget calculations include salary range adjustments and merit increases as applicable for each year of support in accordance with University policy.

PI: 4.78% effort of 12 months’ salary is requested for the University of Colorado Principal Investigator for this one-year project. The PI, Dr. Albert Kettner is host of the meeting and as such lead logistical support. Dr. Kettner will also be responsible for meeting website support and contribute to the reporting and paper writing.

Support is requested for System Administration. The System Administrators support is requested at 0.15% effort of 12 months’ salary for this one-year project. The System Administrators tasks include maintenance and upgrades for computer networking, printers, communication, network access, software installation, maintenance of INSTAAR'S servers and poster printing. Support at 0.49% effort of 12 months’ salary is also requested for technical assistance that is necessary for executing, administering and accounting for the proposed project. This position provides support in the areas of grant administration, finance, budget, and accounting. Both positions receive no funding from the general fund and perform services only for sponsored projects.

### Fringe Benefits

Fringe benefits are calculated on requested salary per the University’s federally negotiated Rate Agreement with the Department of Health and Human Services (DHHS).

### Travel Costs

A total of $1200 are requested for the ground transportation of the participants between the meeting facility and hotel during the workshop.

### Other Direct Costs

Material and Supplies: We request $950 for meeting supplies and printing material to support the workshop. Items such as paper, printing, mailing costs, etc. will be purchased with these funds.

Publication Costs: $300 publication costs are requested for this proposal to publish a position or white paper.

Computer Services: No computer services costs are requested for this proposal.

Subawards: There are no subawards associated with this request.

Facility Rental/ User Fees: There are no facility rental or user fees requested.

### Facilities & Administration (F&A)

Facilities and administration (F&A) costs are charged according to the University’s federally negotiated rate agreement.

### Inflation Rates

Inflation rates are not applicable for this one-year request.

## C2S