



# HIWeather

**6<sup>th</sup> November 2015**

HIWeather is approaching the end of its first year and in a couple of weeks I shall make my first report to the Science Steering Committee of the WWRP. It has been a year of mobilising support and building foundations. The task teams are gradually coming together and taking ownership of the objectives they hope to deliver in the next few years. At the same time, national and regional consortia are bidding to funding agencies. I am very grateful to those who feed back to me their progress in gaining funding for HIWeather-related projects. Whether or not HIWeather is explicitly mentioned, it is these projects that will deliver the scientific advances promised by HIWeather.

The HIWeather Steering Group held its third teleconference recently. With members spread from the west of the USA to New Zealand, several participants end up losing sleep, so I am very grateful to them for putting in the effort. Our focus was on planning the kick-off workshop for next April 27-29 in Exeter, UK. It will be great to spend time together, just sharing ideas – something that is very difficult to do in a teleconference call. We hope that as many as possible of the task team members will be able to attend, subject to limited funding.

Although I like to get to as many of the big meetings as I can to “wave the flag” for HIWeather, I am keen for that to become a shared activity. So Carolyn Reynolds and Sharan Majumdar will be hosting the Town Hall on behalf of the three post-THORPEX projects, including HIWeather, at the AMS annual meeting this year. If anyone has an opportunity to advertise HIWeather at a conference, please feel free to get in touch with me for presentation material.

One of the key partnerships for HIWeather is with the World Climate Research Programme, WCRP. This may seem strange at first sight, but in the context of building resilience in a changing climate, the provision of weather-related hazard warnings is an important adaptation response. Indeed this was recognised in the Sendai Framework for Disaster Reduction, agreed by UN delegates earlier this year. I recently attended a workshop in Oslo, organised by the WCRP Grand Challenge on Extreme Events. The predictability of change in long duration extreme events is challenging for climate models due to the complex feedbacks that generate the global circulation anomalies with which they are associated. However, when we came to discuss the predictability of change in the short duration extremes that HIWeather is concerned with, the challenges were clearly substantially greater. Research into the nature and predictability of these weather events in HIWeather will be a crucial input to understanding what dangers future climates might pose.

Wishing you all every success in your HIWeather activities

Best Wishes,

A handwritten signature in black ink, appearing to read 'Brian Golding', with a long horizontal stroke extending to the right.

Brian Golding

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## **Project News**

### **Steering Group**

Co chairs: Brian Golding, Met Office and David Johnston, Massey University

Theme 1, Processes & Predictability - George Craig, DLR

Theme 2, Multi-Scale Coupled Forecasting - Jenny Sun, NCAR

Theme 3, Impacts, Vulnerability & Risk - Brian Mills, Waterloo University

Theme 4, Communication – temporarily David Johnson, Massey University

Theme 5, Evaluation - Beth Ebert, Bureau of Meteorology

We are considering who might lead the Communication theme.

**Funding.** The project desperately needs additional countries to contribute to the Trust Fund if the planned programme of meetings and workshops is to go ahead in support of HIWeather objectives.

### **Multi-Scale Coupled Hazard Forecasting Theme**

The draft objectives and task team leads in the multi-scale coupled hazard forecasting theme are being refined and are currently:

- **Observation and nowcasting** (Paul Joe or Rita Roberts)
  - Improvement of rapid updated (~10min) analysis for nowcasting high impact weather utilizing remote sensing and in-situ boundary layer observations
  - Development of techniques of combining observation based and NWP-based nowcasts
  - Use of unconventional high density new observation sources such as automobile, crowd sourcing, X-band radars, lightening data, etc.
- **Data assimilation** (Peter Steiner)
  - Improved utilization of high spatial and temporal resolution observations in high resolution NWP models, including radar, satellite, AWS, profiler & other unconventional observations
  - Development of techniques that can effectively assimilate small scale observations without distorting the large scales to obtain multi-scale balanced initial conditions
  - Characterization of observation errors and background errors and biases applicable to convective-scale data assimilation
- **Model development** (Jim Dudhia)
  - Development of a new generation of scale adaptive parameterization schemes, with emphasis on PBL, microphysics, and cloud-related turbulence
  - Optimization of ocean-atmosphere-aerosol-land surface coupling strategies for small scales and short-to-medium lead time forecasts
- **Ensemble forecasting** (Sharan Majumdar)

Design of perturbations in convection-permitting models to represent initial uncertainties for different time scales and new perturbation strategies to overcome underspreading in surface weather parameters
- **Post-processing, product generation, and human interpretation** (Jianjie Wang)

Post-processing and interpretation of ensemble products for the application of convective-scale high impact weather forecasting

### **Human Impacts, Vulnerability and Risk Theme**

The newly-formed Human Impacts, Vulnerability, and Risk (HIVR) Task Team (TT) held its inaugural teleconference in October. Current members of the TT include: Michael Kunz (Karlsruhe Institute of Technology, Germany); Jeff Lazo (National Center for Atmospheric Research, USA); Brian Mills (Environment Canada); Joanne Robbins (UK Met Office); and Isabelle Ruin (National Center for Scientific Research-CNRS, France). The meeting was used to review the overall HIWeather project, introduce and begin discussing specific HIVR objectives and proposed activities contained in the draft implementation plan, and identify current research interests and on-going or planned research projects being undertaken by TT members. The next few TT conference calls will aim to refine HIVR goals, objectives, priorities and content ready for the April 2016 workshop in Exeter. A selection of recent TT member publications is referenced below. Additional members with experience conducting HIVR research in Asia, Africa, and South America are being sought and the

Theme Lead (Brian Mills – [bmills@uwaterloo.ca](mailto:bmills@uwaterloo.ca)) would appreciate receiving recommendations from the newsletter readership.

**Kunz, M.**, B. Muhr, T. Kunz-Plapp, J.E. Daniell, B. Khazai, F. Wenzel, M. Vannieuwenhuysse, T. Comes, F. Elmer, and K. Schroter, 2013. Investigation of superstorm Sandy 2012 in a multi-disciplinary approach, *Natural Hazards and Earth System Sciences*, 13(10):2579-2598.

**Robbins, J.C.**, M.G. Petterson, K. Mylne, and J.O. Espi, 2013. Tumbi Landslide, Papua New Guinea: Rainfall induced? *Landslides*, 10(5):673-684.

**Ruin, I.**, C. Lutoff, B. Boudevillain, J.D. Creutin, S. Anquetin, M.B. Rojo, L. Boissier, L. Bonnifait, M. Borga, L. Colbeau-Justin, L. Creton-Cazanave, G. Delrieu, J. Douvinet, E. Gaume, E. Grunfest, J.-P. Naulin, O. Payrastre, and O. Vannier, 2014. Social and hydrological responses to extreme precipitations: An interdisciplinary strategy for postflood investigation, *Weather, Climate, and Society*, 6(1):135-153.

Anderson, G., J. Carson, J. Clements, G. Fleming, T. Frei, H. Kootval, D. Kull, **J. Lazo**, D. Letson, **B. Mills**, A. Perrels, C. Vaughan, and J. Zillman, 2015. *Forecast Value: Economic Assessment of Meteorological and Hydrological Services*. World Meteorological Organization, The World Bank, and Climate Services Partnership. Geneva. WMO No. 1153.

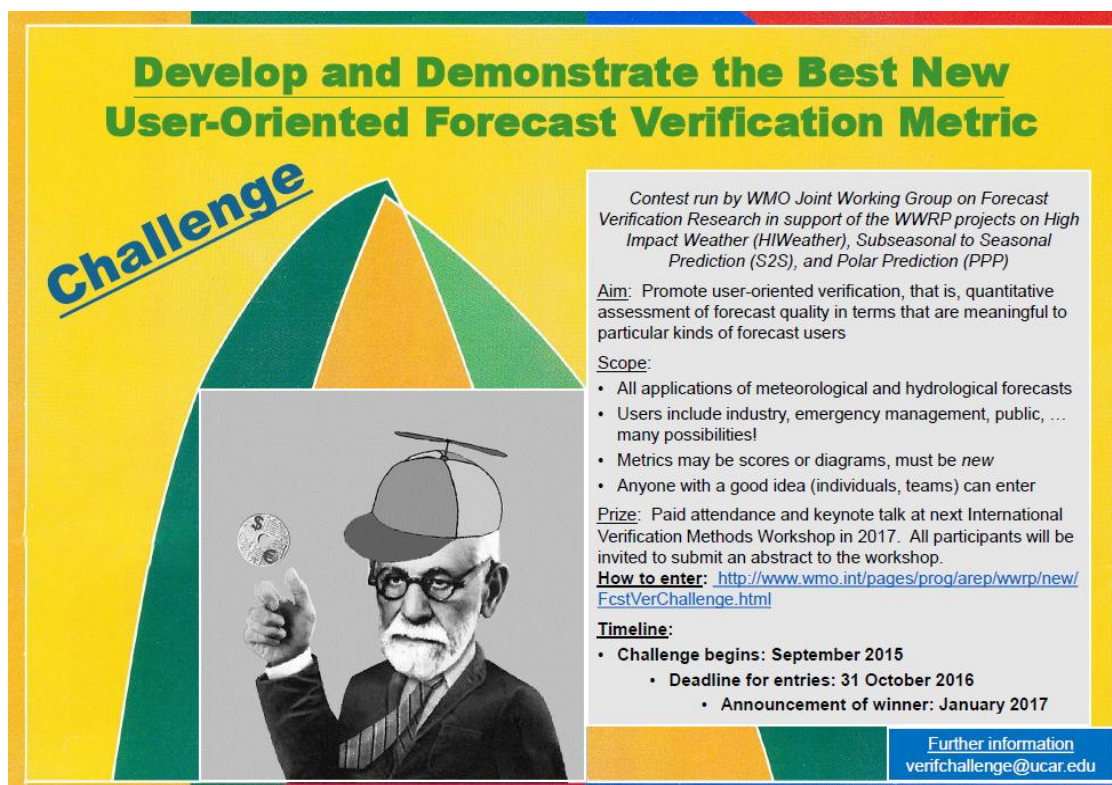
### **Evaluation Theme**

The evaluation task team currently comprises Beth Ebert (BOM Australia); Barb Brown (NCAR); Julia Chasco (Met Service Argentina); Jing Chen (CMA); Manfred Doringner (Univ. Vienna); Martin Goeber (DWD); Marion Mittermaier (Met Office); Pertti Nurmi (FMI); Anna Scolobig (ETH Zurich); Helen Titley (Met Office); Nanette Lomarda (WMO).

### **Joint Working Group on Forecast Verification Research (JWGFVR) challenge**

The public, industry, emergency managers and other decision makers can use weather, climate and impact forecasts more effectively in their decision making when the quality of forecasts is measured in terms that are meaningful to them. Yet very few metrics exist to measure forecast quality in user-relevant terms. To encourage the development of user-oriented verification approaches, the JWGFVR has issued a challenge to develop and demonstrate new user-oriented forecast verification metrics. The new metrics will support the WWRP High Impact Weather, Subseasonal to Seasonal Prediction (S2S), and Polar Prediction (PPP) projects. The JWGFVR warmly encourages all interested researchers and practitioners to participate. The deadline for entries is 31 October 2016: More information and an entry form is available at:

<http://www.wmo.int/pages/prog/arep/wwrp/new/FcstVerChallenge.html>



**Develop and Demonstrate the Best New User-Oriented Forecast Verification Metric**

**Challenge**

Contest run by WMO Joint Working Group on Forecast Verification Research in support of the WWRP projects on High Impact Weather (HIWeather), Subseasonal to Seasonal Prediction (S2S), and Polar Prediction (PPP)

**Aim:** Promote user-oriented verification, that is, quantitative assessment of forecast quality in terms that are meaningful to particular kinds of forecast users

**Scope:**

- All applications of meteorological and hydrological forecasts
- Users include industry, emergency management, public, ... many possibilities!
- Metrics may be scores or diagrams, must be *new*
- Anyone with a good idea (individuals, teams) can enter

**Prize:** Paid attendance and keynote talk at next International Verification Methods Workshop in 2017. All participants will be invited to submit an abstract to the workshop.

**How to enter:** <http://www.wmo.int/pages/prog/arep/wwrp/new/FcstVerChallenge.html>

**Timeline:**

- Challenge begins: September 2015
  - Deadline for entries: 31 October 2016
  - Announcement of winner: January 2017

Further information  
[verifchallenge@ucar.edu](mailto:verifchallenge@ucar.edu)



to impact the La Plata Basin, often initiate, will be collected. In addition, a hydrometeorological instrumentation suite will be requested from the US National Science Foundation (NSF) to overlap with this period to observe streamflow and flooding along the Caracaña River basin (from Sierras de Cordoba to plains), understand the connections between regional surface fluxes and connections to boundary layer dynamics in the region. The US Department of Energy has already committed to funding the Gulfstream-I aerosol and microphysics aircraft as part of the CACTI project, intended to coincide with the RELAMPAGO IOP.

FDP/RDP. Forecast and training activities will be conducted in during RELAMPAGO field experiment in order to produce significant impact on capacity building in the region on nowcasting and short term forecasting techniques. Multiple data assimilation techniques, nowcasting systems and short term modeling systems will be tested after the field campaign is a unique testbed considering the expected available information.

ALERT.AR. This program provides multiple short-term forecast and nowcasting tools at NWS-Argentina. During 2015 radar quality control algorithms, radar based precipitation estimation, hydrometeor classification algorithms, data assimilation techniques were tested during HIW events detected in the region. A significant high performance computing system was acquired by the NWS-Argentina to implement these tools in real time. SMN is collecting public weather reports through a free app available called Alertamos for smart phones, mobile devices and web page, the tool is in a beta-tested phase to be launched in near future (<http://alertamos.smn.gov.ar/>). Second TPMAI (Taller Interinstitucional de Pronostico de Eventos de Alto Impacto Meteorologico) was organized at Cordoba city, the participation of multiple actors: emergency managers, forecasters and developers interacting to improve forecasts and their communication allow a unique experience in South America. During RELAMPAGO, ALERT.AR will provide two upper air stations, integrated local radar information from Argentina to Southern Brasil, precipitation and DSD sites, personnel and logistics.

SATREPS. There is also ongoing collaborations between Argentina and Japan in order to contribute to ALERT.AR and RELAMPAGO. RIKEN Advanced Institute for Computational Science in Japan and NWS-Argentina has presented to SATREPS (Science and Technology Research Partnership) a project in order to improve modeling for very-short range forecasting, data assimilation of non-synoptic observation and nowcasting techniques on extreme HIW events and also provide instrumentation to RELAMPAGO.

### **SURF (Study of Urban Rainfall and Fog/Haze)**

The Institute of Urban Meteorology in Beijing is carrying out the SURF field experiment. A planning workshop was held in October and was a very successful meeting with 10 participants from the United States representing several universities and institutes. Two invited participants from UK and Russia were not able to make it. The sharing of data was previously a concern, but this time it was clear that all of the meteorological data will be shared among the participants with no government restrictions. The air pollution data remains unclear, though. The emphasis on urban research is very strong. Jenny Sun's participation will strengthen the links with HIWeather as well as the data assimilation and convective weather modelling aspects. The meeting reviewed the trial experiment conducted in summer 2015 and proposed some enhancements of the observational network for next summer. The PI has drafted a RDP proposal to be submitted soon to WMO.

**PC-2018 (The Pyeongchang Winter Olympic Games in Korea, <http://www.pc2018.com/>)** is the venue for a RDP in 2018. A meeting was held in October, attended by Jenny Sun, Alexander Baklanov and Peter Steinle (representing WGNMR). Representatives from Canada, Austria, China, Australia, US, Russia attended the meeting and will be the potential participants of the RDP/FDP. KMA will provide some funds to the participants possibly by establishing a trust fund through WMO. The objectives of the RDP/FDP are similar to SNOW-V10 and FROST-2014, but with stronger emphasis on high-resolution DA and modelling. The observation experiment will start next February and the data will be made available for the participants to test their systems in the RDP mode. Although not finalized yet, the official name of the RDP/FDP might be called ICE-POP2018.

### **US post-THORPEX Committee**

The US post-THORPEX committee is co-chaired by Sharan Majumdar and Carolyn Reynolds. A Town Hall meeting is being arranged for the AMS annual meeting in New Orleans in January.

**W2W (Waves to Weather)** is a German Collaborative Research Center conceived to meet the challenge of delivering the underpinning science needed to identify the limits of predictability in different weather situations so as to pave the way towards a new generation of weather forecasting systems. More information is available from <http://w2w.meteo.physik.uni-muenchen.de/>, where positions are currently being advertised.

**WEXICOM (Weather warnings: from EXtreme event Information to COMunication and action)**  
WEXICOM is a German interdisciplinary collaborative research project aimed at facilitating transparent and effective communication of risks and uncertainties for individual user groups.  
<http://www.geo.fu-berlin.de/en/met/wexicom/index.html>

## **Related Activities**

**Coupled Ocean Modelling:** The November issue of Monthly Weather Review has several papers on coupled data assimilation, a key issue for progress in this area. Also the GODAE Oceanview Science Team is holding a workshop on **High Resolution Ocean Modelling for Coupled Seamless Predictions** at Exeter, UK on 13-15 April 2016. GODAE Oceanview is the ocean modelling activity of the Joint WMO-IOC Commission on Oceanography and Marine Meteorology. See <https://www.godae-oceanview.org/outreach/meetings-workshops/external-meetings-supported-by-gov/international-coupled-seamless-prediction-meeting/>

**PURE (Probability, Uncertainty & Risk in the Environment)** is a UK research programme, which supports an active network called RACER: The Robust Assessment and Communication of Environmental Risk. RACER is currently carrying out an end-user research project to determine how people actually use information on uncertainty when responding to hazards. For more information, see [https://connect.innovateuk.org/web/pure/article-view/-/blogs/racer-bridging-the-gap-between-scientists-providing-uncertainty-information-about-natural-hazards-and-end-users?\\_33\\_redirect=https%3A%2F%2Fconnect.innovateuk.org%2Fweb%2Fpure%2Farticles%3Fp\\_p\\_id%3D101\\_INSTANCE\\_okNCIW6dT09i%26p\\_p\\_lifecycle%3D0%26p\\_p\\_state%3Dnormal%26p\\_p\\_mode%3Dview%26p\\_p\\_col\\_id%3Dcolumn-1%26p\\_p\\_col\\_count%3D1%26\\_101\\_INSTANCE\\_okNCIW6dT09i\\_currentURL%3D%252Fweb%252Fpure%252Farticles%26\\_101\\_INSTANCE\\_okNCIW6dT09i\\_portletAjaxable%3D1](https://connect.innovateuk.org/web/pure/article-view/-/blogs/racer-bridging-the-gap-between-scientists-providing-uncertainty-information-about-natural-hazards-and-end-users?_33_redirect=https%3A%2F%2Fconnect.innovateuk.org%2Fweb%2Fpure%2Farticles%3Fp_p_id%3D101_INSTANCE_okNCIW6dT09i%26p_p_lifecycle%3D0%26p_p_state%3Dnormal%26p_p_mode%3Dview%26p_p_col_id%3Dcolumn-1%26p_p_col_count%3D1%26_101_INSTANCE_okNCIW6dT09i_currentURL%3D%252Fweb%252Fpure%252Farticles%26_101_INSTANCE_okNCIW6dT09i_portletAjaxable%3D1)

### **NHP**

The Natural Hazards Partnership in the UK is focusing on modelling the impact of three priority natural hazards: wind storms, surface water flooding and landslides. A recent presentation summarises the structure of the Partnership and its work:

<http://www.localdirect.gov.uk/resource/natural-hazards-partnership-carl-wilson/>

### **FACETS**

The National Weather Service in the USA is addressing issues in the scope of HIWeather through a project called FACETS: Forecasting A Continuum of Environmental Threats, which is particularly focussed on the production and communication of more effective warnings. The project has been underway for a couple of years and was presented at last year's AMS Annual Conference. Recent developments can be seen at

<http://www.nssl.noaa.gov/projects/facets/>



### **S2S**

The Extreme Weather sub-project, which has direct links to HIWeather, held a teleconference in September. While principally interested in the longer duration extreme events there was discussion of what aspects of shorter duration events, such as hurricane landfalls, might be predictable at sub-seasonal to seasonal lead times. Having looked at the cold March of 2013 as a case study, the team are currently choosing a new case study from the period since January 2015 for which the new S2S database is available. The sub-project science plan can be found at

[http://www.s2sprediction.net/resources/documents/sub-projects/Extreme\\_weather\\_Science\\_Plan.pdf](http://www.s2sprediction.net/resources/documents/sub-projects/Extreme_weather_Science_Plan.pdf)



## **Meetings**

**HIWeather workshop and steering group meeting, 25-29 April 2016 in Exeter, UK.** It is hoped that several of the WWRP working groups will be able to hold their meetings at the same time. The primary aims of the workshop will be to build linkages between the physical, social, behavioural and economic science components of HIWeather and to define the programmes of work of the task teams. Attendance will be by invitation.

**UNISDR Science & Technology conference on the Implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030** in Geneva, 27-29 January 2016. The call for abstracts has recently closed. Registration is now open. <http://www.unisdr.org/partners/academia-research/conference/2016/>

**10th International Conference on Air Quality – Science and Application, Milan, 14-18 March 2016.** The call for abstracts has closed. Registration will open in February. <http://www.airqualityconference.org/>

**International Association of Wildland 5th Fire Behaviour and Fuels Conference in Melbourne, Australia and Portland, Oregon, USA, 11-15 April 2016.** The call for papers for the conference will close shortly. Registration is open. <http://www.firebehaviorandfuelsconference.com/>. It is planned to hold a fire weather workshop alongside the conference in Melbourne.

**Royal Meteorological Society and UK National Centres for Atmospheric Science joint 2016 Conference, “High Impact Weather and Climate”, 6 – 8 July 2016, University of Manchester, UK.** The conference is organised under three themes: observation, forecasting and responding. Each theme will be introduced by three keynote presentations followed by workshops and poster sessions. Many of the workshops address themes central to HIWeather. The call for poster submissions is currently open. Registration will open shortly. <http://www.rmets.org/conference2016>

**4<sup>th</sup> International Symposium on Nowcasting and Very Short Range Forecasting** in Hong Kong, 25-29 July 2016. The call for papers is currently out. Registration will open shortly. <https://wsn16.hk/>,