HIWeather

29th September 2016

I'm sorry it has taken so long to get this out following the kick-off meeting in April. One reason was the extraordinary success of that meeting and the great ideas that came out of it. The other was that I spent most of July taking the HIWeather message to two big conferences.

The outputs of the kick-off meeting are summarised later in this newsletter. All those present were enthused by the inspirational talk with which Prof. Virginia Murray opened the conference. Linking HIWeather with the need for multi-hazard warning systems identified in the Sendai Framework, she highlighted the pre-eminent position of weather services in disaster reduction in many parts of the world and sounded a call to arms for the weather community to make its new capabilities available in a form to meet the needs of disaster reduction in the developing world. She also showed how health was the silent impact, so often missed from impact statistics, because it happens slowly, quietly and out of the public eye.

The Royal Meteorological Society conference in Manchester, UK, had the theme High Impact Weather & Climate and was organised around the HIWeather agenda with three days of workshops addressing Observations, Forecasting and Response respectively. I chaired a workshop entitled: "Perfecting the Warnings System" in which four eminent scientists from weather processes, weather forecasting, weather impacts, and emergency management, cast votes on where to invest in the warnings process to obtain the biggest return. Everyone, except the emergency manager, agreed that the problem was "downstream" of their discipline and the clear result was that the investment should go to the communication of risk. Details of the workshops and their organisers can be seen at https://www.rmets.org/events/conferences/rmets-ncas-conference-2016-information/workshop-agendas-downloads.

The WMO Nowcasting 2016 conference was held in Hong Kong, China during a July heatwave – we were grateful for the air conditioning! Sessions focussed on: Forecasting high impact weather in the very-short-range; New observational instruments; Advances in mesoscale NWP modelling, data assimilation & ensemble prediction; Integration of nowcast & mesoscale NWP; Urban meteorology; Transfer of science to services; Applications in public weather services, transportation, public utilities; Verification and Validation; Socio-economic impact; WMO/WWRP FDP/RDPs; the CAS/CAeM Aviation Research Demonstration Project (AvRDP). A tremendous amount of information was shared that will stimulate research & development in this area for years to come. See https://wsn16.hk/doc/wsn16-abstract-book.pdf for abstracts.

Finally, despite some early funding disappointments, the field phase of NAWDEX is now underway with an impressive array of observing platforms, and there is every prospect of gaining spectacular new datasets with which to unravel the influences of diabatic processes on North Atlantic storm development and downstream impacts. I look forward to many modelling groups working on these data in the coming years, both to elucidate process and to improve forecasting systems.

Wishing you all every success in your HIWeather activities

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The Project

Steering Group

Co chairs: Brian Golding, UK and David Johnston, New Zealand
Theme 1, Processes & Predictability – lead: George Craig, Germany; members to be confirmed
Theme 2, Multi-Scale Coupled Forecasting – lead: Jenny Sun, USA; members: Paul Joe, Peter Steinle, Sharan Majumdar, Jianjie Wang, Jim Dudhia.
Theme 3, Impacts, Vulnerability & Risk – lead: Brian Mills, Canada; members: Joanne Robbins, Jeff Lazo, Michael Kunz, Isabelle Ruin.
Theme 4, Communication – co-leads: Sally Potter & Shannon Panchuk, both currently on maternity leave - interim leads: Linda Anderson-Berry, Kiernan McGill, David Johnston & Abi Beatson; members: Greg Carbin, Melanie Harrowsmith, Nick Wiltgen, Julie Demuth, Burrell Montz, Amber Silver, Rutger Dankers, Andrea Taylor, Thomas Kox, Alasdair Hainsworth.
Theme 5, Evaluation - Beth Ebert, Australia; members: Julia Chasco, Barb Brown, Anna Scolobig, Manfred Dorninger, Pertti Nurmi, Martin Goeber, Helen Titley, Marion Mittermaier, Jing Chen.

Funding. The Trust Fund is able to provide only limited support for project meetings at present.

International Coordination Office: Discussions are in progress regarding the setting up of an ICO.

Secretariat: We are delighted that Julia Keller has joined the WMO secretariat to provide support to HIWeather.

Web site: The HIWeather web site can be reached at http://bit.ly/1RKapbc. A communications web platform for the project is being set up by Abi Beatson at Massey University, New Zealand. There should be more to report on this in the next newsletter.

Meetings: Steering Group meetings are held approximately quarterly by teleconference except when there is a project workshop. The next workshop is planned for autumn 2017. The co-chairs meet with Paolo Ruti and Julia Keller monthly by teleconference in the intervening months and will report to the WWRP Scientific Steering Group in Geneva in October. The task teams meet by teleconference at intervals to suit their work and progress.

The Kick-off Workshop

The HIWeather kick-off workshop, held on 25-27 April 2016 at the Met Office headquarters in Exeter, UK, attracted 84 scientists from 21 countries around the world. It was opened by Dr. Andy Brown, Director of Science, on behalf of the UK Met Office and by Prof. Sarah Jones, Chair of the Scientific Steering Committee and Dr. Paolo Ruti Head of the World Weather Research Programme, on behalf of WMO.

Prof. Virginia Murray of Public Health England (PHE) and the UNISDR launched the meeting with an inspirational presentation on the Sendai framework for disaster reduction and the critical role that HIWeather will play in delivering the science required for delivery of the early warning systems required to reduce the toll in lives, livelihoods, health and wealth, emphasising the often long-term effects on health and well-being. She illustrated her talk with examples of research and warnings developed by PHE with the Met Office. She concluded by asking HIWeather to deliver on: Forecasting the things that matter, Defining warning language that people will respond to appropriately, Supporting the warning with relevant information for action, Using appropriate metrics to guide investment and Working in partnership to implement Sendai.

Prof. Brian Golding of the Met Office, one of the project co-chairs, introduced HIWeather, focussing on the science gaps that it will address. He described how the research would benefit policy making for future climates as well as emergency management of current hazards.

Dr. Paolo Ruti led a round table discussion of representatives funding bodies. Many funds are large and primarily focussed on delivering sustainable development. Research might form a part of a larger development project if it could be shown to be relevant.

Parallel meetings were held on Wednesday afternoon. At Exeter University, the career of Prof. Alan Thorpe was celebrated with a forward look at new challenges in numerical weather prediction. At the Met Office, David Johnston, Brian Mills and Beth Ebert introduced a programme of presentations and discussion on hazard impacts, communication of warnings & verification.

Thursday and Friday were taken up with group working sessions. The individual task teams came up with a wide variety of specific proposals for activities within or across the research themes, which were shared but not fully discussed at the final plenary. Initial working up of the proposal concepts will be by the nominated leads. Their execution within HIWeather will then depend on the commitment of participants in the relevant task teams. As a major cross-cutting activity, the first proposal will need to be considered by all task teams before its acceptance.

a. HIWeather Multi-Hazard Early Warning System Demonstration Project (FDP): Demonstrate / evaluate state-of-the-art end-to-end multi-hazard warning system based on km-scale coupled ensemble impact predictions & advanced communication methods in one or more developing countries in collaboration with existing SWFDP(s).
   Leads: Peter Steinle, co-chairs, task team leads.
   Objectives: Demonstrate benefits of advanced weather & coupled modelling; measure value chain & identify causes of biggest losses; build capacity through participation & training; transfer capability to academic, private & government institutes in the region; establish on-going capability that can be maintained locally.
   Actions: Develop concept paper (2016)
   Identify participants and funding for trial FDP - possibly Lake Victoria (2017)
   Execute and evaluate trial FDP (2018-9)
   Execute and evaluate full FDP (2022-3)

b. Review the state of wind hazard forecasting
   Lead: George Craig
   Objectives: Clarify the wind metrics that relate to impacts; describe the state-of-the-art in observing and predicting these metrics; identify processes that lead to high impacts; make recommendations for targeted work to address weaknesses in understanding, observing and prediction.
   Actions: Identify participants (2016)
   Carry out review (2016-7)
   Document and publish (2017-8)

c. Review current state of nowcasting & forecasting high impact weather
   Leads: Sharan Majumdar and Jenny Sun
   Objectives: Document current state of high impact weather nowcasting/forecasting with an emphasis on flood and high wind warnings; Identify gaps
   Actions: Workshop leading to review article (2017)

d. Intercomparison of km-scale DA & nowcast/forecast systems
Leads: Sharan Majumdar and Jenny Sun
Objectives: Demonstrate state-of-the-art of km-scale DA & nowcast/NWP systems for HIW warning with an emphasis on floods & high winds; Document status of NWP capability for nowcasting severe weather
Actions: Develop concept paper (2017);
Identify interested participants, datasets & funds (2017)

e. Using multi-scale prediction and uncertainty in decision making
Lead: tbd
Objective: User-oriented post-processing tools for decision making with an emphasis on impacts, uncertainty & risk
Actions: Workshop leading to a review article (2019)

d. Intercomparison of impact models for a particular hazard against a common impact dataset; optimal combination of impact data
Leads : Martin Goeber, Joanne Robbins, Isabelle Ruin
Action: Develop concept paper (2016)

e. Review & classification of impact modelling
Leads: Brian Mills & HIVR task team
Action: Develop paper (end 2017)

f. Research Demonstration Project (RDP) focused on the Value Chain
Leads: Jeff Lazo, Barb Brown, Brian Mills, Manfred Dorninger, Anna Scolobig, Mark Bevan
Actions: Concept paper (2016)
Scoping workshop (2017)

g. Factors that affect warning-related decision-making including legal & institutional frameworks.
Leads: Anna Scolobig, Julia Chasco
Action: Concept paper (2016);
Framework intercomparison: PhD student (2019)

h. Communication along the value chain in different cultures/contexts
Lead: Isabelle Ruin, Julia Chasco, Tom Kox
Action: Concept paper

i. Probabilistic forecasting and evaluation of Tropical Cyclones
Leads: Helen Titley, Sharan Majumdar, Munehiko Yamaguchi, David Richardson, Barbara Brown, Linda Anderson-Berry
Objectives: Increase use of *probabilistic* ensemble forecast information in operational tropical cyclone forecasting; link to multi-scale modelling through, e.g., storm wind structure, precipitation (incl. orographic effects), storm surge and impact forecasting.
Actions: Review best practice in producing, evaluating & using probabilistic TC forecasts
Targeted HIWeather session at WMO/WWRP International Workshop on Tropical Cyclones. (2018)

j. Unconventional data sources for impact modelling, evaluation & communication
Leads: David Johnston, Abi Beatson
Action: Literature review and synthesis: Abi Beatson, PhD student. (2019)

HIWeather Research

NAWDEX (North Atlantic Waveguide and Downstream Impacts Experiment): The field phase is now in progress and will continue until 16 October 2016. Further information can be found at http://www.nawdex.org/ and an updated version of the science plan was released in January at http://www.nawdex.ethz.ch/documents/NAWDEX_science_plan.pdf. Fortuitously, the UK FAAM aircraft became available at a late stage and has been integrated into the plan, focusing on the downstream structure between the UK and Iceland.

LVB-HyNEWS (Lake Victoria Basin-Hydro-climate to Nowcasting Early Warning Systems)
A prospective source of funding for a pilot study has been identified and a proposal is being prepared. If the pilot is successful, funding for a larger study may become available.

RELAMPAGO (Remote sensing of Electrification, Lightning, And Meso-scale/micro-scale Processes with Adaptive Ground Observations)
See last year's newsletter for an outline of the main components. The main field campaign is planned for 2018.

SURF (Study of Urban Rainfall and Fog/Haze)
The Institute of Urban Meteorology is carrying out the SURF field experiment to study urban pollution and extreme precipitation in Beijing. A RDP proposal is being prepared for submission to WWRP.

PC-2018 (The Pyeongchang Winter Olympic Games in Korea, http://www.pc2018.com/ **)** is the venue for a WWRP RDP in 2018. The objectives of the RDP/FDP are similar to SNOW-V10 and FROST-2014, but with stronger emphasis on high-resolution data assimilation and modelling. The RDP/FDP is currently being referred to as ICE-POP2018.

US Contribution
Part of the special session on International Partnership opportunities at AMS2017 will be dedicated to the post-THORPEX projects, including HIWeather, with the aim of identifying the basis for a US post-THORPEX project proposal.

UK Contribution
A summary of Met Office contributions to HIWeather has been prepared, which it is planned to extend to include NCAS, and potentially other UK partners. Key areas of work include work on unconventional data sources, km-scale data assimilation and ensemble prediction, km-scale coupled modelling for the UK, hazard impact modelling and risk communication.

W2W (Waves to Weather). German Collaborative Research Center aims to deliver 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. See http://w2w.meteo.physik.uni-muenchen.de/. The research programme is listed under the headings of Upscale Error Growth, Cloud-Scale Uncertainties and Predictability of local Weather.

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

FfIR (Flooding from Intense Rainfall): UK research programme involving five universities, the Met Office and the Environment Agency. Includes HIWeather-related activities in using multi-parameter radar, assimilation of correlated data, representation of hydrology in land surface schemes, flood inundation modelling including sediment transport, and accessing non-conventional observation sources. The first two work packages are drawing to a close and the third, which seeks to integrate the other two, is about to start. See http://www.met.reading.ac.uk/flooding/

MesoVICT - The Mesoscale Verification Inter-comparison over Complex Terrain (MesoVICT) project met as a session at the 2015 EMS conference in Sofia, Bulgaria. The project is comparing spatial verification methods to give users information about which methods are appropriate for which types of data, forecasts and desired forecast utility. More information is at http://www.ral.ucar.edu/projects/icp/.

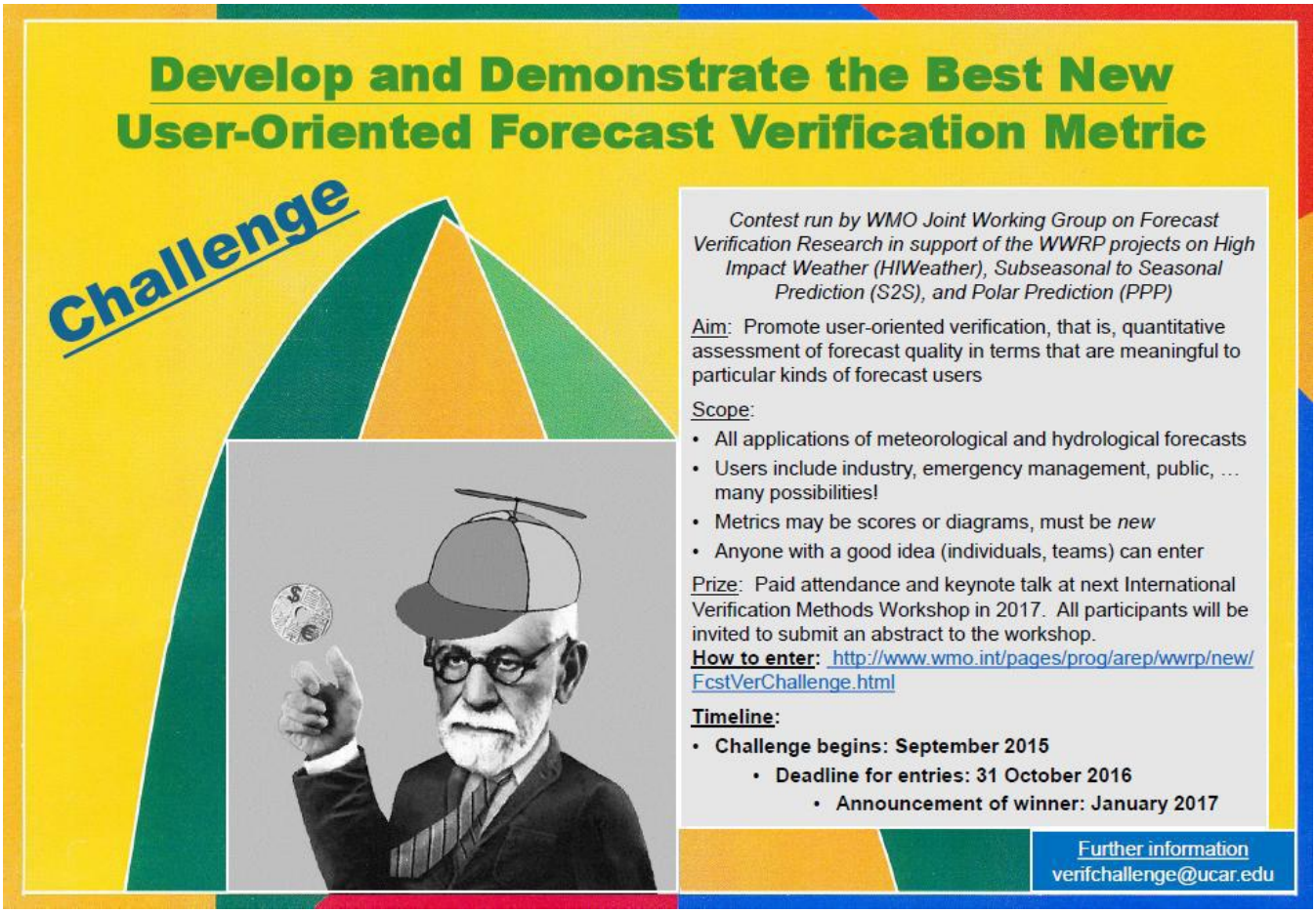
Fire weather and risk workshop – A 2-day workshop on fire weather and risk was held 11-12 April 2016 in conjunction with the 5th International Fire Behaviour and Fuels Conference (http://www.firebehaviorandfuelsconference.com/).

I-REACT – EU Horizon2020 3-year project on Improving Resilience to Emergencies through Advanced Cyber Technologies (I-REACT) involving a consortium of 20 partners will integrate multiple existing systems and European assets to facilitate early planning of disaster risk reduction activities. The focus will be on natural disasters triggered by extreme weather. I-REACT will cooperate with the European Flood Awareness System (EFAS), European Forest Fire Information System (EFFIS), European Global Navigation Satellite System (E-GNSS), Copernicus, etc. Within this project FMI will develop methodology and provide information on forecast occurrence risk of relevant high-impact weather variables, covering time scales from hours to couple weeks, utilizing probabilistic approaches and ensemble prediction systems.

ANYWHERE – EU Horizon2020 project aimed at producing a Europe-wide early warning system for weather-related hazards.

Fire spread model evaluation – Australian Bureau of Meteorology project to evaluate and inter-compare different fire spread simulators that are driven by weather input. Results from this project will assist in developing routine predictive services for wildfire behaviour.

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



Related Activities

NHP
The Natural Hazards Partnership draws together a wide range of UK institutes involved in understanding and predicting natural hazards to provide co-ordinated advice to government and to develop consistent approaches to risk and early warning. Currnetly, work is focussed 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/. This project is closely related to the Weather Ready Nation initiative, which focussed on improving community response to warnings. This initiative is now being extended to have an international dimension.

S2S (Sub-seasonal-to-Seasonal Prediction):
The Extreme Weather sub-project, which has direct links to HIWeather, held a teleconference in January. See http://www.s2sprediction.net/static/news for news, including the latest S2S newsletter for download.

PPP (Polar Prediction Project):
Latest news is available at http://www.polarprediction.net/news.html.

European Disaster Risk Management Knowledge Centre – The new centre will work at the science-policy interface to help EU Member States respond to emergencies, prevent and reduce the impact of disasters. See http://drmkc.jrc.ec.europa.eu/, https://ec.europa.eu/jrc/en/news/new-knowledge-centre-help-eu-minimise-risk-disasters

Related Meetings

AMS Annual Meeting, Seattle, January 2017
UNISDR Global Platform, Cancun, May 2017
IAMAS-IAPSO-IAHS Assembly, Cape Town, August 2017