Met Office, FitzRoy Road, Exeter EX1 3PB
Tel: +44-7767-438583
Email: brian.golding@metoffice.gov.uk

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I start by extending a warm welcome to new members of HIWeather: Xudong Liang joins the Steering Group to represent the SURF project, Deanna Hence brings expertise on convective storms and their impacts to the Processes and Predictability task team and Masahiko Haraguchi brings expertise in measuring socio-economic impacts to the Evaluation task team.

Our workshop in Beijing last November was a huge success, for which thanks must go to Qinghong Zhang and Liye Li, who made all of the local arrangements, and Julia Keller who masterminded arrangements from Geneva. Thank you also to Qinghong for putting together the workshop report for publication in Science Bulletin. The workshop also marked the formal opening of the International Coordination Office (ICO) at CMA in Beijing, so congratulations to Qinghong and Liye for that achievement. Following that, this will be the first newsletter produced by the ICO.

The essence of the workshop was the connection of everything we do to the decision maker at the end of the warning chain. It was exhilarating to be in such a mixed group of scientists, from every discipline connected to warning production, and from every part of the globe, but all concerned with how their expertise can enable warnings to be more effective – in reducing death, distress, damage and disruption from weather related hazards. In the main sessions, we heard about the progress being made by each of the task teams, while the two panel discussions opened up potential new areas of work: landslides and health impacts. However, looking forward, the key outputs will be the new areas of work defined by the break-out groups. These build on our progress to date, taking us forward in crucial areas.

I spent early January at the American Meteorological Society's annual meeting in Phoenix, where HIWeather was well represented, both in the WWRP special symposium and in the Societal Applications and International sessions. Sadly, the lack of NOAA representation impacted on parts of the meeting. While there, I had some useful discussions with Michael Morgan on progress with the US inter-agency committee on the three post-THORPEX projects. An inventory of linked projects is in preparation and we discussed potential opportunities for targeted activity. In March, I shall be taking the HIWeather value chain to a panel discussion on the value of weather services at the AMS Washington Symposium.

The last few months have been a busy period preparing for the UNISDR Global Platform 2019 (GP2019) to be held in Geneva in May, preceded by the second WMO Multi-Hazard Early Warning Systems (MHEWS) conference. Between us, David Johnston and I sit on three of the session organising committees, which were tasked with preparing concept notes, briefs and agendas for the Platform. I also submitted an unsuccessful proposal for a HIWeather side meeting. I took part in a meeting for the MHEWS conference recently, the structure of which will likely reflect the HIWeather value chain. I hope to see some of you in Geneva in May, though attendance at the MHEWS conference will be severely restricted.

Our linkage with Future Earth, IRDR and WCRP in the RISK-KAN (Knowledge Action Network) on complex and cascading risks continues to progress. I shall be involved with the Development Team for the KAN and with a bid for funding for a sub-Saharan Africa network to contribute to it. Complex risk is an area of increasing concern, particularly for urban areas, where the principal impacts of a disaster may be secondary ones arising from infrastructure failure of various kinds. A recent UK report provides a useful summary (Ciurean et al, 2018 – see publication list). This may be an area that our HIVR team might want to take an interest in once their initial survey is complete.

Finally, I am pleased to report that the Urban Disaster Risk Transitions hub, led by Edinburgh University and Kings College London, involving a large international team of scientists and practitioners, including from the focal cities of Kathmandu, Istanbul, Nairobi and Quito, and in which I am a co-I, has been funded. The five year project covers the whole range of responses to urban disaster risk from both geological and hydro-meteorological hazards, of which warnings will be a small but important component. HIWeather provided support to the bid and will be engaged in those aspects relating to warnings.

Wishing you all every success in your HIWeather activities.

1. The Project

Steering Group and Task Teams

Co-chairs: Brian Golding, UK, brian.golding@metoffice.gov.uk and David Johnston, New Zealand, David.Johnston@gns.cri.nz.

ICO: Qinghong Zhang, Liye Li, China, hiwico@cma.gov.cn.

Processes & Predictability (P&P) theme – lead: Michael Riemer, Germany, mriemer@uni-mainz.de. Members: John Knox, Peter Knippertz, Andreas Schäfler, Juan Fang, Shira Rabeh-Ruvin, Linus Magnusson.

Multi-Scale coupled Forecasting (MSF) theme – lead: Jenny Sun, USA, sunj@ucar.edu.
Members: Paul Joe, Peter Steinle, Sharan Majumdar, Jianjie Wang, Jim Dudhia, Krushna Chandra Gouda.

Human Impacts, Vulnerability & Risk (HIVR) theme – lead: Brian Mills, Canada, bmills@uwaterloo.ca.
Members: Joanne Robbins, Michael Kunz, Isabelle Ruin, Melanie Gall.

Communication theme – co-leads: Andrea Taylor, UK, a.l.taylor@leeds.ac.uk & Shannon Panchuk, Australia s.panchuk@bom.gov.au

Members: Abi Beatson, Greg Carbin, Melanie Harrowsmith, Amber Silver, Rutger Dankers, Thomas Kox, Claudia Adamo, Jose Galvez, Kiernan McGill, Linda Anderson-Berry, Tim Brown, Vankita Brown.

Evaluation theme – lead: Beth Ebert, Australia, e.ebert@bom.gov.au

Members: Julia Chasco, Barb Brown, Anna Scolobig, Manfred Dorninger, Martin Goeber, Helen Titley, Marion Mittermaier, Jing Chen, Chiara Marsigli

NEW MEMBERS:

Xudong Liang (liangxd@cma.gov.cn) : Dr. Xudong Liang is the Director and a Senior Scientist at the State Key Laboratory of the Severe Weather of Chinese Academy of Meteorological Sciences. He developed some data assimilation techniques and Doppler weather radar data assimilation methods. Apart from that, he focused on numerical modelling and tropical cyclone dynamics. He initiated and acted as the PI in the demonstrate project "Study of Urban-Impacts on Rainfall and Fog/Haze (SURF)". Now he is the leader of the project "the East Asian Reanalysis System". His current interest is data assimilation with convective scales.

Deanna Hence (P&P) dhence@illinois.edu
Deanna Hence is an Assistant Professor at the University of Illinois Urbana-Champaign. She uses remote sensing and in situ observations to study the interactions of high impact weather phenomena with their environments and their impacts on human systems. Primarily focusing on cloud and precipitation dynamics of convective systems, her current interests are the linkages between storm dynamics and impacts on agriculture, infrastructure, and public health.
Her student Calvin Elkins research project "Structure, evolution, and impacts of hail-producing thunderstorms in Argentina: storm modes, characteristics, and emergency management response." will directly contribute to HIWeather. This research seeks to classify hail-producing thunderstorms in Argentina, examine their dynamics and kinematics, and compare the characteristics of these storms with hail-producing storms in other parts of the world. Calvin will also examine the threat evolution with respect to the response and communication efforts of local emergency managers.

Masahiko Haraguchi (Evaluation): Masahiko_Haraguchi@hks.harvard.edu
Masahiko Haraguchi has multidisciplinary education background and working experience. Currently, he is working as a Postdoctoral Fellow at John. F. Kennedy School of Government at Harvard University, and research science and technology policy, focusing on how to measure and quantify policy measures in sustainability and resilience. He finished Ph.D. programme in environmental engineering and M.A. in Climate Society at Columbia University. He also gained professional experience at the World Bank on training program designing related to climate change and disasters.

ADVISORY BOARD

John Rees, British Geological Survey and Research Councils UK, representing funding agencies
Jan Polcher, Laboratoire de Meteorologie Dynamique of Centre National de la Recherche Scientifique, France, representing Climate Science
Jennifer Sprague-Hilderbrand, National Oceanic and Atmospheric Administration, USA, representing users
Virginia Murray, Public Health England and UNISDR, representing the UN family

Michael Reeder, Monash University, Australia, representing academia

Funding. The Trust Fund can support HIWeather conference attendance by delegates from developing countries. New contributions are needed to develop and facilitate the work of the project.

International Coordination Office: The ICO in the Chinese Academy of Meteorological Sciences has been formally opened during the workshop in November 2018. The ICO is taking over organisation of Steering Group, Advisory Board and Task Team teleconferences, and the web pages for the project will be seen in February 2019.

Secretariat: Julia Keller provides valuable assistance within the WMO secretariat. Paolo Ruti provides the link to the World Weather Research Programme.

Communication: The HIWeather web site can be reached at http://bit.ly/1RKapbc. It contains the Implementation Plan, Steering Group and Task team membership and HIWeather presentations. It is available for task teams to post meetings and progress. A communications web platform for the project has been set up at Massey University, New Zealand and is currently being populated. I use Linked-In to post items of interest about HIWeather and copy my posts to Twitter using the hashtag #HIWeather.

Meetings: The Steering Group meets quarterly, usually by teleconference. The next physical meeting will be following the Beijing workshop in November. Task teams meet by teleconference at intervals to suit their work. The Advisory Board has decided to increase the frequency of its meetings to quarterly by teleconference.

2. Relevant Scientific Meetings

1) **AMS Washington Forum**, 27-29 March 2019, Washington, USA. Registration open. See https://www.ametsoc.org/index.cfm/ams/meetings-events/ams-meetings/2019-ams-washington-forum/. Includes panel discussion on the value of weather services.
2) **EGU**, 7-12 April, Vienna, Austria. Abstracts closed. Early registration until 28th February, see https://egu2019.eu/. Several sessions of interest to HIWeather including:
    - Coupled atmosphere-hydrological modelling for improved hydro-meteorological prediction
    - Coupled modelling and data assimilation of dynamics and chemistry of the atmosphere
    - Extreme meteorological and hydrological events induced by severe weather and climate change
    - Convection-permitting atmospheric modelling
    - Ensemble hydro-meteorological forecasting
    - Extreme heat events: processes, impacts and adaptation
    - High Impact Events and Climate Change
    - Understanding and modelling compound climate and weather events and their impacts
    - Natural hazards and climate change impacts in coastal areas
3) **4th WMO Monsoon Heavy Rainfall Workshop**, 16-18 April 2019, Beijing, China. Deadline for abstracts 28 Feb. (mailto:lasw@cma.gov.cn)
4) **2019 CMA-ECMWF International Workshop on Fast Radiative Transfer Model**, 22-26 April, Beijing, China.
5) **3rd European Nowcasting Conference** 24-26 April 2019, Madrid, Spain. Deadline for abstracts 15 March.
6) **IN-MHEWS 2,** 11-12 May 2019, Geneva, Switzerland. Registration open but numbers will be restricted. Sessions will cover the whole range of HIWeather.
7) **UNISDR Global Platform**, 13-17 May 2019, Geneva, Switzerland. Registration is open. See https://www.unisdr.org/conference/2019/globalplatform/home
8) **27th IUGG General Assembly**, 8-18 July, 2019, Montreal, Canada, see http://iugg2019montreal.com/. Deadline for abstracts 18 February. Several sessions of interest to HIWeather including:
    High-impact Weather and Climate Extremes
    Hydrometeorologic and coastal extremes in current and future climates
9) **WMO High Mountain Summit**, 29-31 October 2019, Geneva, Switzerland, see https://highmountainsummit.wmo.int/en
10) **AGU** Fall Meeting, 9-13 December 2019, San Francisco, USA
11) **AMS**, Annual Meeting, 12-20 January 2020, Boston, USA

3. HIWeather Research

a. Review the state of wind hazard forecasting
Link: John Knox (Processes & Predictability TT)
Identify wind metrics that relate to impacts; describe the state-of-the-art in observing and predicting them; identify processes that lead to high impacts; make recommendations for targeted work to address weaknesses in understanding, observing and prediction. The writing team is working to a target of completion in 2019.

b. Review the current state of nowcasting & forecasting high impact weather
Link: Sharan Majumdar (Multi-Scale Hazard Forecasting TT)
Objectives: Document current state of high impact weather nowcasting/forecasting with an emphasis on flood and high wind warnings; Identify gaps
The writing team has prepared a draft and it is planned to submit to BAMS in 2019.

c. Intercomparison of km-scale DA & nowcast/forecast systems
Lead: Jenny Sun (Multi-Scale Hazard Forecasting TT)
Objectives: Demonstrate state-of-the-art of km-scale DA & nowcast/NWP systems for HIW warning with an emphasis on floods & high winds
Discussions are taking place with DAOS on the possibility of carrying out such an intercomparison.

d. UK Environmental Prediction (UKEP) project
Link: Brian Golding (SG)
NERC/Met Office programme to develop a coupled km-scale atmosphere, ocean, land surface hydrology prediction system has started phase 2, having successfully demonstrated sensitivity to coupling in short range forecasts. See https://www.metoffice.gov.uk/research/collaboration/ukenvironmentalprediction

e. Formal (statistical) impact model intercomparison
Link: Martin Goeber (Evaluation TT)
Develop Masters student module to examine simple and physically-based impact models

f. Evaluating the effectiveness of impact-based, extreme weather warnings and behavioural recommendations.
Link: Anna Scolobig (Evaluation TT)
A survey of expected responses to impact-based and non-impact-based warnings amongst Swiss people was carried out. Overall, the results support the conclusion that impact information coupled with behavioural recommendations in warning messages, promote more effective decisions than standard warnings.

g. Review & classification of impact modelling
Link: Brian Mills (Human Impacts, Vulnerability & Risk TT)
The scope of the review is being prepared.

h. Global Hazard Map
Link: Helen Titley (Evaluation TT)
The Global Hazard Map (GHM) summarises the risk of high-impact weather across the globe over the coming week using forecasts from the Met Office and ECMWF global ensembles. It includes forecast layers for tropical cyclones (strike probability and tracks), 24-hour precipitation accumulation, maximum wind gust in a 24-hour period, 24-hour snowfall accumulation, as well as severe heat waves and cold waves. Performance is evaluated by comparing daily gridded precipitation forecasts against observations, and by assessing the ability of the multi-model precipitation summary layer to highlight events which cause community impacts as recorded in an impact database. The Global Hazard Map is currently being trialled with the Severe Weather Forecast Demonstration Projects (SWFDP).

i. Weather Information Value Chain
Link: Brian Golding (SG)
Workshops, in Berlin in May and Melbourne in August 2017, explored the Weather Information Value Chain as a process for understanding the end-to-end flow of information and value from weather to community benefit, including: what constitutes "value"; what an end-to-end user-driven value chain looks like; how value is added/subtracted as information flows along the chain; ways to measure value; using the value chain to guide investment. A review paper has been submitted to the Global Assessment Review of Disaster Risk Report 2019. Brian Golding will contribute to a panel on this topic in the AMS Washington Forum in March 2019.

j. Probabilistic forecasting and evaluation of Tropical Cyclones
Link: Helen Titley (Evaluation TT)

Ensemble forecasting of tropical cyclones is vital in capturing the situation-dependent uncertainty in the track and intensity forecasts for existing storms, and in providing probabilistic information about tropical cyclone genesis. We aim to enhance collaboration amongst the research and operational community to aid the development of new and innovative ways to display and verify ensemble probabilistic tropical cyclone forecasts including tracks, strike probability, genesis, intensity, and potential impacts. We will work with the operational TC forecasting community to gather their current and future user requirements and demonstrate the benefits of using ensemble forecasts, with a view to increasing the use of probabilistic information in tropical cyclone forecasting. A questionnaire has been sent to all operational TC forecasting centres asking them about their use of ensemble forecasts including: examples where probabilistic forecasts have been successfully integrated in to operations, occasions where hurdles have prevented them from being fully utilised, and where further model or product development and/or user-oriented evaluation would help encourage their wider use. Results will be used to quantify the current level of forecasting skill for TC intensity in global ensemble forecasts. Results were presented at the Beijing workshop.

k. Unconventional data sources for impact modelling, evaluation & communication
Link: Abi Beatson (Communication TT)
An unconventional data research network has been formed. Several activities are underway to investigate tools for gathering social media data from the public, and on the use of weather warnings by the public using data from social media. Activities include:

- Real-time reporting and social data intelligence: Abi Beatson (JCDR, New Zealand)
- Twitter data analysis: Hywel Williams (U. Exeter, UK)
- Use and interpretation of warnings on social media by the public: Amber Silver (U. at Albany, US), Shannon Panchuk (BoM, Australia)
- Citizen science: Lisa McLaren (JCDR, New Zealand)
- Role of social media for impact models & warnings: Sara Harrison, Sally Potter, Abi Beatson (New Zealand)

l. **Mesoscale Verification Inter-comparison over Complex Terrain (MesoVICT)**.
Link: Manfred Dorninger (Evaluation TT)
The project continues to encourage investigation of spatial verification methods in complex terrain, including for ensemble forecasts and uncertain observations. A paper entitled, "The set-up of the Mesoscale Verification Inter-Comparison over Complex Terrain (MesoVICT) Project " is available in BAMS on early release at https://journals.ametsoc.org/doi/abs/10.1175/BAMS-D-17-0164.1 and a special collection of articles related to MesoVICT is planned for *Monthly Weather Review* and *Weather & Forecasting*.

m. **User-oriented metrics challenge**.
Link: Beth Ebert (Evaluation TT)
A competition for evaluation metrics relevant to end users run by the Joint Working Group on Forecast Verification Research (see http://www.wmo.int/pages/prog/arep/wwrp/new/Forecast_Verification.html) was a great success with 17 entries from 11 countries. See overview paper at https://www.schweizerbart.de/papers/metz/detail/prepub/89677/The_WMO_Challenge_to_Develop_and_Demonstrate_the_B?af=crossref. The JWGFVR plans to run another challenge in 2020.

n. Review of approaches to communicating high impact weather.
Link: Andrea Taylor, (Communication TT).
A special issue of the International Journal of Disaster Risk Reduction under the title, “Communicating High Impact Weather: Improving warnings and decision making processes” is available at https://www.sciencedirect.com/journal/international-journal-of-disaster-risk-reduction/vol/30/part/PA.

o. Training Materials
Link: Shannon Panchuk (Communication TT)
Current plans are to link into the work of the WMO Expert Team on Impact-Based Forecasting & Warning and to NOAA in the USA.

p. Review of the role of trust, salience and beliefs on people’s responses to weather warnings.
Link: Sally Potter (Communication TT)
Reviewing the role of influences on response to weather warnings, such as risk perceptions, trust, salience and beliefs. We aim to Review previous literature, Understand the variables on achieving an optimal behavioural response, Produce guidelines on how to best communicate weather information. Recent work in the Bushfire CRC is being picked up.

q. Communicating uncertainty
Link: Sally Potter (Communication TT)

Review and publish the implications of uncertainty in weather forecasts and warnings across the whole spectrum of HIWeather. Literature review underway. Once completed, materials and research will be summarised and guidelines developed for weather forecasters to communicate uncertainty better.

r. Post-event case studies
Link: Shannon Panchuk (Communication TT)
An index of previous WMO surveys of weather service severe weather warnings has been prepared by Juyeon Bae and will be used by this and other activities as a starting point.

s. Communication platform
Link: Emily Campbell (Communication TT).
Outputs from HIWeather communication activities will be freely available on the HIWeather Communication Platform, including best practice guidelines and reviews. The Platform is expected to be launched shortly.

t. NAWDEX (North Atlantic Waveguide and Downstream Impacts Experiment):
Link: Michael Riemer (Processes & Predictability TT).
A description of the field experiment and its results is available in the BAMS review paper by Schäfler et al (2018) at https://doi.org/10.1175/BAMS-D-17-0003.1

u. **HIGHWAY** (**Lake Victoria Basin Nowcasting project)**
HIWeather link: Andrea Taylor (Communication TT)
The "HIGH impact Weather lAke sYstem" project falls UKAid WISER programme and runs from October 2017 to March 2020. The expected outcome of HIGHWAY is increased access to and use of co-designed and sustainable early warning systems to inform regional, national, sub-national and community level planning and decision-making in the East African region and to improve resilience and reduce the loss of life and damage to property supporting sustainable economic development in the East African region. Meetings have been held in February and May with stakeholders, including local fishing communities. During January 2019, the HYVIC flying campaign by the NCAS/Met Office FAAM aircraft was conducted over Lake Victoria in support of HIGHWAY and SWIFT. See https://www.metoffice.gov.uk/about-us/what/international/projects/wiser/highway.

v. GCRF African Science for Weather Information and Forecasting Techniques (GCRF African SWIFT)
Link: Andrea Taylor (Communication TT)
A 4-year UKAid project to improve African hourly to seasonal forecasting capabilities, funding 80 scientists in 5 UK and 10 African institutions, with WMO as an advisory member. Work is organised in 3 Strands:

- **User engagement/forecast evaluation**: links user engagement with forecast accuracy evidence.
- **Physical science research**: disciplinary research to deliver quality-controlled weather predictions.
- **Knowledge exchange, training and documentation**: provide a legacy to project outcomes.

WMO/WWRP supported project planning, and there is strong collaboration with the ***Highway*** project. GCRF African SWIFT aims to engage with and contribute to ***HIWeather's*** programme of work. In January SWIFT worked with the Kenya Met Department on a forecasting testbed for East Africa (see https://www.ncas.ac.uk/en/currentnews/18-news/2958-improving-forecasts-of-high-impact-weather-in-africa). See https://www.ncas.ac.uk/en/swift-project or contact NCASSwift@leeds.ac.uk

w. RELAMPAGO-CACTI (Remote sensing of Electrification, Lightning, And Meso-scale/micro-scale Processes with Adaptive Ground Observations - Cloud Aerosols and Complex Terrain Interactions)
Link: Julia Chasco (Evaluation TT)
RELAMPAGO is funded by the US National Science Foundation to observe convective storms that produce high impact weather in the lee of the Andes in Argentina. It also involves contributions from NASA, NOAA, Argentina (MINyCT), Brazil (CNPq and FAPESP), Chile (CONICYT), universities across the region, Argentina's national meteorological service (SMN) and Brazil's space agency (INPE). Observations during the main observing period, Nov-Dec 2018, successfully captured many storms. See press report at: https://www.abc.net.au/news/2019-01-23/weather-scientists-find-one-of-worlds-largest-hail-stones/10735666

x. SURF (Study of Urban Rainfall and fog/haze)
Link: Xudong Liang (SG)
Linked to HIWeather through GURME and the MSF task team
The Institute of Urban Meteorology is carrying out the SURF field experiment to study urban pollution and extreme precipitation in Beijing. 2017 was the third season of field data collection. Case study results were presented in the Conference on Predictability & Multi-Scale Prediction of High Impact Weather in October 2017.

y. ICE-POP2018 (RDP/FDP alongside the Pyeongchang Winter Olympic Games in South Korea)

Link: Jenny Sun (Multi-Scale Hazard Forecasting TT).
See http://www.wmo.int/pages/prog/arep/wwrp/new/RDP-FDP.html for details.

z. SCMREX (Southern China Monsoon Rainfall EXperiment)
Link: Xudong Liang (SG)
During the presummer rainy season (April–June), southern China often experiences frequent occurrences of extreme rainfall, leading to severe flooding. The China Meteorological Administration (CMA) initiated a nationally coordinated research project, SCMREX, endorsed by WMO, as a WWRP RDP, consisting of four major components: field campaign, database management, studies on physical mechanisms of heavy rainfall events, and convection-permitting numerical experiments including impact of data assimilation, evaluation/improvement of model physics, and ensemble prediction. Pilot field campaigns were carried out in 2013–15. See https://journals.ametsoc.org/doi/abs/10.1175/BAMS-D-15-00235.1, which describes i) the scientific objectives, pilot field campaigns, & data sharing of SCMREX; ii) provides an overview of heavy rainfall events during SCMREX-2014; and iii) presents examples of preliminary research results and explains future research opportunities.

aa. MOUNTAOM (RDP alongside the 2022 Winter Olympic Games in Beijing)
China will be hosting the 2022 Winter Olympic Games in the mountains to the northwest of Beijing. A research activity is underway in the Chinese Meteorological Administration to develop capability in forecasting the relevant weather parameters in this area. The project has six research themes. It is planned to mount an annual field programme, the first of which was held in winter 2017. LES modelling experiments are being conducted with nested grids from 1km down to 37m. The project has an International Advisory Committee, the chair of which is Prof Joe Fernando.

bb. Multi-scale, multi-leadtime predictability of high-impact weather
Leads: Shannon Panchuck and Linus Magnusson
High Impact Weather case studies of the forecast value chain

cc. HIW case studies of the forecast value chain
Leads: Shira Raveh-Rubin, Linus Magnusson, Michael Riemer
Objectives: Assess the predictability of different ingredients to HIW events as a function of lead time and identify the physical processes that limit predictability. In collaboration with the Multiscale Forecasting theme, assess the role of assimilating high-resolution data to capture the mesoscale dynamics and improve short-term prediction. Starting with high-impact weather related to dry intrusions, develop general recommendations how to assess this insight for other types of high-impact weather.

4. National Programmes

US Contributions
A joint committee is formulating a US response to the three post-THORPEX projects and will shortly complete an inventory of existing relevant work. Prof. Michael Morgan leads this activity for HIWeather. The US has a wide range of relevant work underway including the Hydrometeorology Testbed (HMT), focusing on rainfall and flood forecasting, and the Hazardous Weather Testbed, focusing on tornado, wind and hail forecasting. CAPS is running 3-km CONUS-domain cycled EnKF data assimilation, including radar data, for selected periods and discussing coupling with hydrology/river stream models for HMT. The National Weather Service FACETS project (http://www.nssl.noaa.gov/projects/facets/) is closely aligned with several aspects of HIWeather. The related Weather Ready Nations initiative is particularly relevant and Dr Jennifer Sprague-Hilderbrand is a member of the HIWeather Advisory Group.

UK Contributions
Relevant areas of work include unconventional data sources, km-scale data assimilation and ensemble prediction, km-scale coupled modelling, hazard impact modelling and risk communication. Impacts work is largely carried out in the Natural Hazard Partnership (http://www.naturalhazardspartnership.org.uk/). The recently completed Natural Environment Research Council (NERC)/Met Office Flooding from Intense Rainfall project delivered new radar capability, advances in km-scale data assimilation & coupling with inundation models (see http://www.met.reading.ac.uk/flooding/). UKRI funds two networks in its "Decision Making Under Uncertainty" theme. NERC/UKAid fund four research projects through the Science for Humanitarian Emergencies And Resilience programme focusing on co-production of knowledge using a multi-disciplinary and problem-centred approach in sub-Saharan Africa and south Asia (http://www.nerc.ac.uk/research/funded/programmes/shear/). ForPAc (towards Forecast-based Preparedness Action: Probabilistic forecast information for defensible preparedness decision-making and action) focuses on flooding and drought in East Africa (primarily Kenya) promoting the use of risk information for preparedness action (http://gtr.rcuk.ac.uk/projects?ref=NE%2FP000568%2F1). LANDSLIP (Landslide

Multi-Hazard Risk Assessment, Preparedness and Early Warning in South Asia: Integrating Meteorology, Landscape and Society), focuses on early warning of landslides in India (http://www.landslip.org/). FATHUM (Forecasts for AnTicipatory HUManitarian action) focuses on flooding in Africa (https://www.insis.ox.ac.uk/forecasts-anticipatory-humanitarian-action-fathum) and "Citizen science for landslide risk reduction and disaster resilience building in mountain regions", focuses on landslides in Nepal (http://gtr.rcuk.ac.uk/projects?ref=NE%2FP000207%2F1). See also SWIFT and HIGHWAY, above. The UKRI Global Challenges Research Fund has just announced funding for research hubs, including the Urban Disaster Risk Hub, which was endorsed by HIWeather, and focuses on natural hazards in Kathmandu, Nairobi, Istanbul and Quito.

German Contributions

W2W (Waves to Weather) is a Collaborative Research Center 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. 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) is an 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.

Australian Contributions

An Australian HIWeather community was established at the annual Australian Meteorological and Oceanographic Society (AMOS) meeting in February in Canberra. The goal is to foster collaboration within Australia of physical and social scientists, forecasters, and users of forecasts of high impact weather. Anyone who is interested can contact HIWeather@bom.gov.au to join this community.

The Bureau of Meteorology and Geoscience Australia is running a small project on **impact prediction**, currently looking at impacts of rain and wind on infrastructure. Partners include forecasters and State Emergency Services. High resolution ensemble NWP is coupled to wind & rain damage functions to derive probabilistic spatial maps of damage severity, using East Coast Lows as demonstration events.

New Zealand Contributions

Colleagues of David Johnston and Sally Potter at Massey University and GNS Science are developing a portfolio of HIWeather related projects in the Communications theme. These include a project to provide best practice recommendations on the optimal length, order and content of short warning messages for agencies that warn the public about a variety of hazards, including severe weather and flooding. The next HIWeather New Zealand workshop is planned for the NZ Hydrological Society & NZ Meteorological Society Joint Conference in December 2018, in Christchurch.

Argentine Contributions

The Alert.AR project finished in May 2018, having delivered a new warning system. A Health & Heatwave Early Warning System (https://www.smn.gob.ar/smn_alertas/olas_de_calor) was inaugurated this summer as a result of a joint research between the National Ministry of Health and the National Meteorological Service of Argentina. The warning system is based on mortality data and climatological information from the last 40 years for 57 cities of Argentina. A WMO regional workshop on Impact-Based Forecasting & Warning is being hosted in September.

Chinese Contributions

Recently, 4 projects lead by researchers from Chinese Academy of Meteorological Sciences (CAMS) have been approved as *National Key Technology Research and Development Plan*:
1) "*Development of High Resolution Data Assimilation Techniques and East Asia Atmospheric Reanalysis Datasets*" (Xudong LIANG). The aim is for a 3km grid, decade long reanalysis for East Asia.

2) "*Research on Thunderstorm Electrification-discharge Processes and Lightning Effects*" (Weitao LYU). This project will include basic observational and theoretical approaches to understanding lighting and will use AI approaches to develop a lightning forecasting and warning platform.

3) "*Aerosol-Convective Cloud Interaction Mechanism and Its Model Application Demonstration over Beijing-Tianjin-Hebei Region*" (Jianping GUO https://www.researchgate.net/profile/Jianping_Guo6). This projects aims to improve 24-hour precipitation scores in the Beijing-Tianjing-Hebei region by developing improved mixed-phase parametrization scheme that incorporate aerosol effects. The parametrizations will be developed on the basis of field campaigns.

4) "*Development of Seamless Weather-Climate Model Dynamic Core on Unstructured Grid*" (Jian LI). The aim is to develop a core that gives more accurate solutions and is suitable for future supercomputing architectures.

A five-year Project, named as "*Key Dynamic and Thermodynamic Processes and Prediction for the Evolution of Typhoon Intensity and Structure*" of the Ministry of Science and Technology is led by Prof. Zhemin Tan from Nanjing University and aims to deliver forecast products of track, intensity and structure of typhoon 3-7 days in advance, see: http://meso.nju.edu.cn/web/typhoon/

5. Related Activities

GHHIN (Global Heat Health Information Network). A professional network of academics, government representative at all levels, professional organisations, international organisations, donor organisations, private sector and non-governmental organisations eager to share and engage in issues around heat and health. See http://www.ghhin.org/

VORTEX-SE (Verification of the Origins of Rotation in Tornadoes Experiment – SouthEast)
A research program to understand how environmental factors characteristic of the southeastern United States affect the formation, intensity, structure, and path of tornadoes. It will also determine the best methods for communicating forecast uncertainty related to these events to the public, and evaluate public response. See http://www.nssl.noaa.gov/projects/vortexse/

PECAN (Plains Elevated Convection At Night)
A large field project that focused on night-time convection in the Central USA. It was conducted across northern Oklahoma, central Kansas and south-central Nebraska from 1 June to 15 July 2015. A description of the field programme and preliminary results was published in the April 2017 issue of BAMS.

I-REACT
EU Horizon2020 project on Improving Resilience to Emergencies through Advanced Cyber Technologies (I-REACT), involving 20 partners, will integrate existing systems to facilitate early planning of weather-related disaster risk reduction activities. I-REACT will co-operate with the European Flood Awareness System (EFAS), European Forest Fire Information System (EFFIS), European Global Navigation Satellite System (E-GNSS), Copernicus, etc. See http://www.i-react.eu/

ANYWHERE
An EU Innovation action designed to bridge the gap between R&D in forecasting and warning high impact weather and climate so as to enhance response by emergency managers and first responders across Europe http://www.anywhere-h2020.eu/. Work packages include translating weather forecasts into impact forecasts, developing a platform for communicating information to emergency managers. The project is working on 5 pilot sites: Ligurian Sea, Catalonia, Finland/Norway, Swiss Alps. It is a partnership of operational authorities, R&D institutes and private sector businesses. The project catalogue contains a large collection of forecasting algorithms, many developed in previous EU actions. Mostly they concern prediction of the hazard, but a few also deal with the impact. See http://anywhere-h2020.eu/catalogue/

Aristotle
Aristotle will deliver multi-hazard capability to the EU Emergency Response Coordination Centre (ERCC), which is responsible for the coordination of human aid upon request of the government of a country affected by natural (and other) hazards. It offers a scalable scientific network including new hazard related services and a pool of experts in the field of Hydro-Meteorology and Geophysics that can support ERCC in crisis situations worldwide. See http://aristotle.ingv.it/

European Disaster Risk Management Knowledge Centre
This 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

S2S (Sub-seasonal-to-Seasonal Prediction)
Latest news is available at http://www.s2sprediction.net/static/news

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

TIGGE (THORPEX Interactive Grand Global Ensemble) and TIGGE-LAM (-Limited Area Model)
The TIGGE dataset (https://www.ecmwf.int/en/research/projects/tigge) is one of the major achievements of THORPEX. It now contains over 10 years of global data. On a smaller scale, the TIGGE-LAM dataset provides 5 years of multi-model ensemble data at mesoscale resolution for limited areas. These datasets have been used to investigate a variety of atmospheric processes and there is scope for more use in the context of HIWeather. Opportunities may be driven by analysis of weather phenomena or weather variable thresholds associated with high impact. Within the S2S project, activities related to specific weather phenomena are brought together at

http://s2sprediction.net/ under topic wiki pages. There may be opportunities to do something similar for phenomena relevant to HIWeather. If you are interested, please contact John Methven at Reading University.

CODATA: the Committee on Data of ICSU

CODATA exists to promote global collaboration to improve the availability and usability of data for all areas of research. CODATA supports the principle that data produced by research and susceptible to be used for research should be as open as possible and as closed as necessary. CODATA works also to advance the interoperability and the usability of such data: research data should be intelligently open or FAIR. The group is working with relevant domain experts to develop proposals for major cross-disciplinary data integration projects to advance solutions for three important global challenges in **infectious disease**, **sustainable cities**, and **disaster risk reduction**. See www.codata.org/task-groups/linked-open-data-for-global-disaster-risk-research

The Young Earth System Scientists (YESS) Community

The YESS Community is an international multidisciplinary Early Career Researcher (ECR) network with more than 1000 members from over 80 countries. The network aims on bringing together early career scientists, both from natural and social sciences, who are working in a field of Earth system science. YESS is a bottom-up initiative and fully relies on the engagement and activities of its active members. YESS works closely with WWRP, GAW and WCRP to get ECRs involved and to provide them with a collective voice. YESS invites interested HIWeather master students, Ph.D. students and postdocs (within 5 years after their last degree) to join and engage in the community. See www.yess-community.org and follow YESS on Facebook: www.facebook.com/yesscommunity, Twitter: twitter.com/YESSCommunity or LinkedIn: www.linkedin.com/company/yess-community.

Journal of International Crisis and Risk Communication Research: open access journal dedicated to human and mediated communication issues associated with crises, risks, and emergencies around the world. It is supported by an international editorial board comprised of top risk and crisis communication scholars. The Journal invites manuscripts of a philosophical, theoretical, methodological, critical, applied, pedagogical or empirical nature. Its scope includes community or regionally based events and risks, such as hurricanes, floods, wild fires, infectious disease outbreaks or similar threats. See www.jicrcr.com

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- **Dorninger, Manfred, Eric Gilleland, Barbara Casati, Marion P. Mittermaier, Elizabeth E. Ebert, Barbara G. Brown,** and **Laurence J. Wilson, 2018**: The set-up of the Mesoscale Verification Inter-Comparison over Complex Terrain (MesoVICT) Project. *Bulletin of the American Meteorological Society*, doi: 10.1175/BAMS-D-17-0164.1
- **Ebert** Elizabeth**, Barbara** Brown**, Martin** Göber, **Thomas** Haiden**, Marion** Mittermaier, **Pertti** Nurmi, **Laurie** Wilson, **Sarah** Jackson, **Peter** Johnston, and **Dieter** Schuster, **2018**: The WMO Challenge to Develop and Demonstrate the Best New User-Oriented Forecast Verification Metric. *Meteorologische Zeitschrift,* Vol. 27, No. 6, 435–440.
- **Griffiths, D.** et al, **2018**, Flip-Flop Index: Quantifying revision stability for fixed-event forecasts, Met Apps, 26, 30-35
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- **Rothfusz,** L.P. et al, **2018**, FACETs A Proposed Next-Generation Paradigm for High-Impact Weather Forecasting, *BAMS*, DOI:10.1175/BAMS-D-16-0100.1
- **Schröter, K., D. Molinari, M. Kunz, and H. Kreibich, 2018**. Preface: Natural hazard event analysis for risk reduction and adaptation, *Natural Hazards and Earth System Sciences*, 18:963-968.
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