WWRP
WORLD WEATHER RESEARCH PROGRAMME

Research's role in helping society cope with high impact weather events

Weather • Climate • Water

High Impact Weather Events

High Impact Weather is weather that can result in significant impacts on safety, property and/or socioeconomic activity”

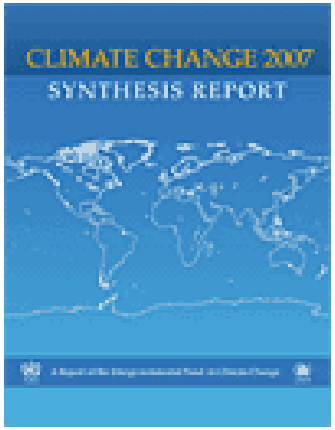
(Sills 2009)

RECENT WEATHER EXTREMES

2001	Extreme cold temperatures in Mongolia and Russian Federation
2002	Flooding of historic proportions in Central Europe
2003	Hottest summer in continental Europe since at least 1540
2004	Record number of 10 tropical cyclones made landfall in Japan
2005	The most active Atlantic hurricane season on record
2006	Worst flooding in Greater Horn of Africa in 50 years; worst wildfire seasion in USA
2007	Mexico suffered the worst flooding in 50 years
2008	Worst severe winter weather in China in 50 years; TC Nargis (Myanmar)
2009	Australia marked by exceptional heatwaves
2010	Pakistan experienced the worst floods in its history; devastating heatwave in Russia, high temperatures in China broke historical extremes, Flooding in Australia

IPCC 4th Assessment Report (AR4)

Altered frequencies and intensities of **extreme weather**, together with sea level rise, are expected to have mostly adverse effects on natural and human systems



IPCC Working Group II: Impacts, Adaptation and vulnerability

Summary for Policymakers (2007)

The size of future temperature increases and other aspects of climate change, especially at the regional scale, are still subject to uncertainty. Nevertheless, the risks associated with some of these changes are substantial. It is important that decision makers have access to climate science of the highest quality, and can take account of its findings in formulating appropriate responses.

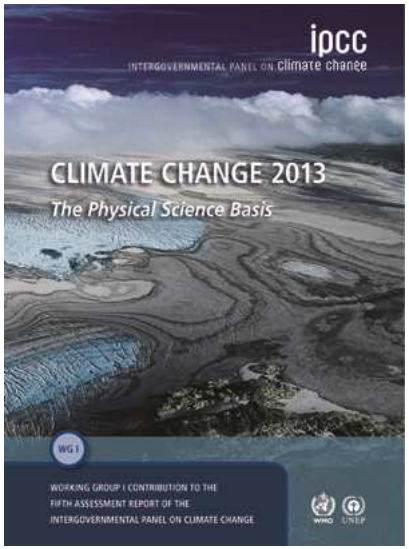
- The Royal Society, 2010

With urban expansion well underway and the ever growing likelihood in the increase in frequency and intensity of extreme weather events, **mankind will face considerable challenges to cope with risks** in the years ahead.

- People and the Planet, 2012

IPCC 5th Assessment Report (AR5)

*Changes in **many extreme weather and climate events** have been observed since about 1950. It is very likely that the number of cold days and nights has decreased and the number of warm days and nights has increased on the global scale. It is likely that the **frequency of heat waves has increased** in large parts of Europe, Asia and Australia. There are likely more land regions where the number of heavy precipitation events has increased than where it has decreased. The **frequency or intensity of heavy precipitation events has likely increased in North America and Europe.** In other continents, confidence in changes in heavy precipitation events is at most medium.*



Contribution of IPCC Working Group 1 to AR5

Summary for Policymakers

27 September 2013

WORLD WEATHER RESEARCH PROGRAMME

Mission: To advance society's ability to cope with high impact weather

Issues in Risk Management

1. Uncertainty in the projected impacts

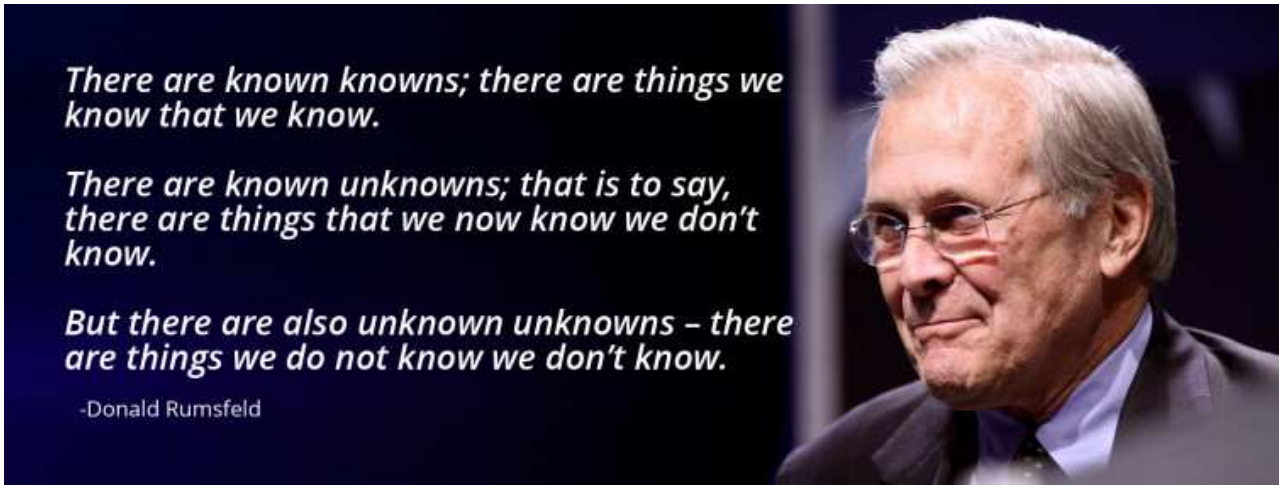
τάχ' ἄν τις εἰκὸς αὐτὸ τοῦτ' εἶναι λέγοι,
βροτοῖσι πολλὰ τυγχάνειν οὐκ εἰκότα.

It is in the very nature of probability that improbable things will happen.

Aristotle, *Rhetoric*

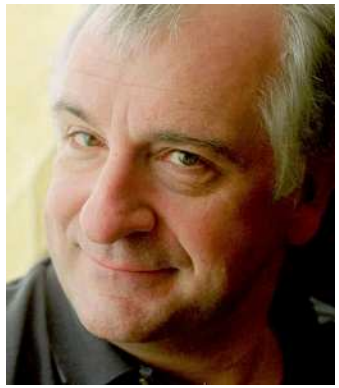
Different Types of Uncertainties

Imprecision
Problem: not knowing what the exact outcome will be
Solution: indicate probabilities
Second-order uncertainty
Problem: not knowing what the exact probabilities should be
Solution: indicate probability ranges
Intractability
Problem: not knowing how to estimate the probabilities at all
Solution: dialogue; don't pretend to imprecision; identify tractable problems



Issues in Risk Management

2. Good use of the knowledge of uncertainty



"Five to one against and falling..." she said, "four to one against and falling...three to one...two...one...probability factor of one to one...we have normality, I repeat we have normality."

She turned her microphone off — then turned it back on, with a slight smile and continued:

"Anything you still can't cope with is therefore your own problem."

Douglas Adams, *A Hitchhikers Guide to the Galaxy*

- A new NOAA analysis of extreme 2012 weather suggests climate change is already making weather disasters more severe.

  (September 2013)

- New research suggests that extreme weather events will keep people poor in many parts of the world.

  BBC News (October 2013)

Why should I care?

If I do care, what can I do about it?

Reduce the level and degree of uncertainty by improvements in:

- Accuracy & timeliness/lead time

And what else ?

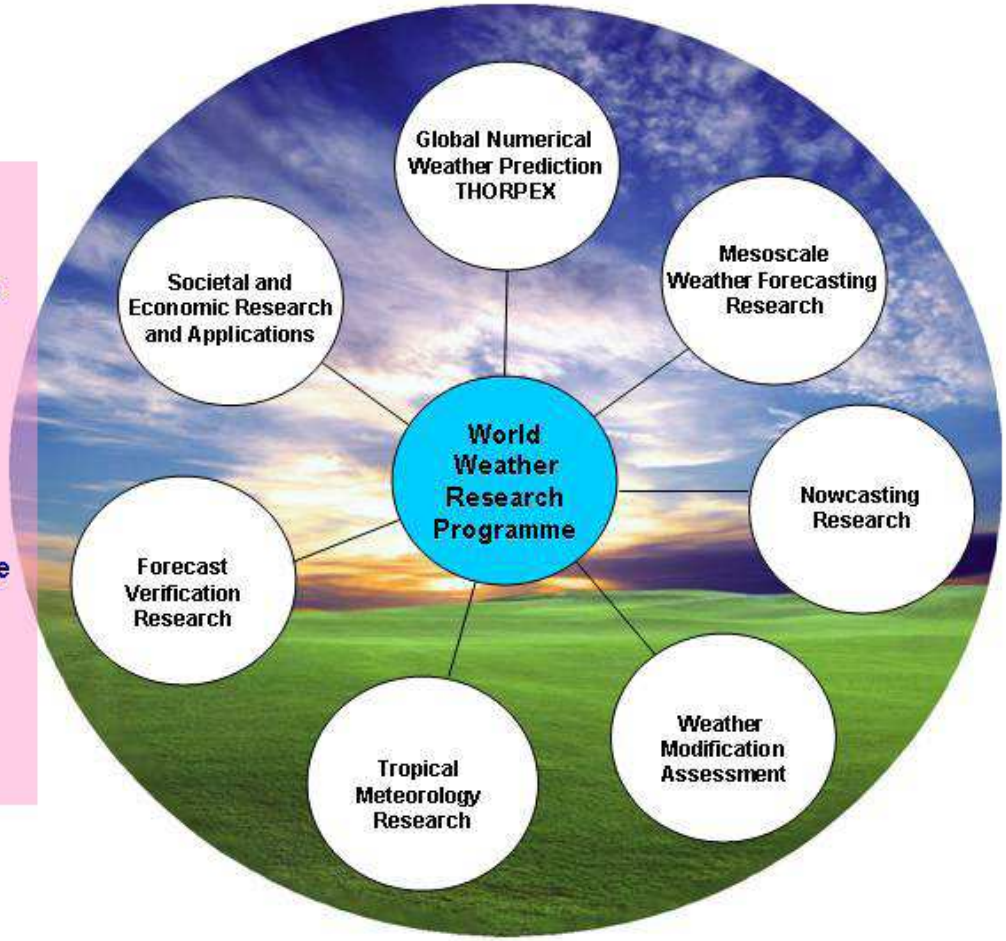
Identify how the uncertain information can be used to inform decision-making.

WORLD WEATHER RESEARCH PROGRAMME

Mission: To advance society's ability to cope with high impact weather **through research focused on improving the accuracy, lead time and utilization of weather prediction.**

Major Partners

- Joint Working Group on Numerical Experimentation (WGNE)
- World Climate Research Programme (WCRP)
- WMO Weather and Disaster Risk Reduction Services
- Global Atmosphere Watch (GAW)
- WMO Integrated Global Observing System (WIGOS) and Information System (WIS)
- The International Council for Science (ICSU): Integrated Research on Disaster Risk (IRDR)
- Hydrological Research Community
- Ocean Observations and Modelling Research Community



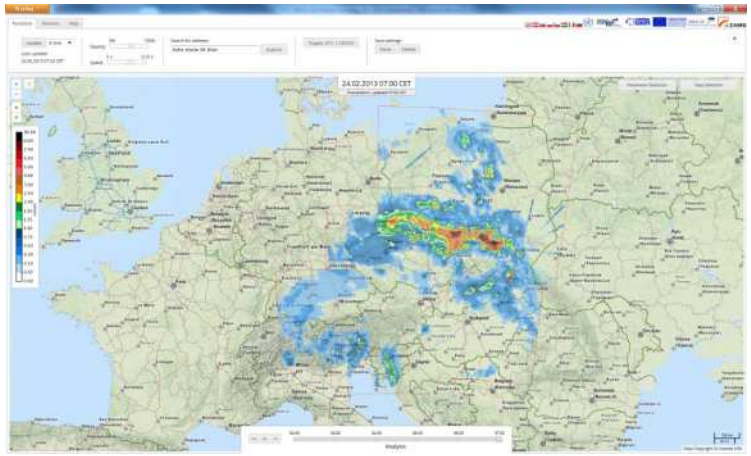
WWRP WORLD WEATHER RESEARCH PROGRAMME

WG SERA

Societal and Economic Research Applications

To advance the **science of the social and economic application of weather related information and services and review and assist in the development and promotion of societal and economic related demonstration projects.**

INCA-CE



ACHIEVEMENTS

✓ Multidisciplinary and transnational links in nowcasting and applications established and strengthened

✓Increased safety for society and protection of environment

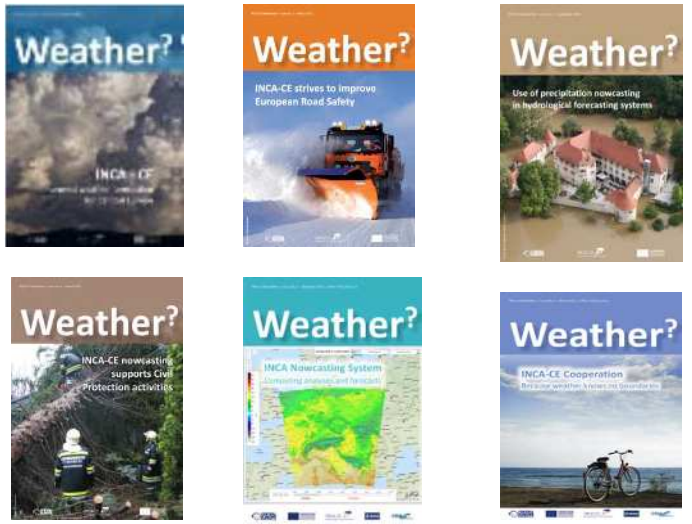
✓Further cooperation is planned to build upon achieved results

Hydrology: Increased preparedness for (flash) flood events

Civil Protection: Optimized action taking in all severe weather situations

Road safety: Improved road conditions especially in the winter season; also e.g. less salt consumption and therefore better protection of the environment

INCA-CE Newsletters

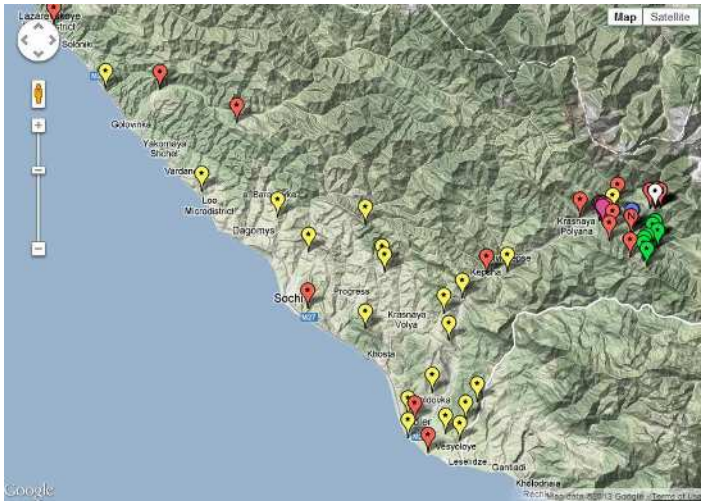


More information is available online at:

http://www.inca-ce.eu/

http://www.inca-ce.eu/CE-Portal/

FROST 2014



Observational set-up for Sochi Olympics

Location on sports venues and observing stations

Partners

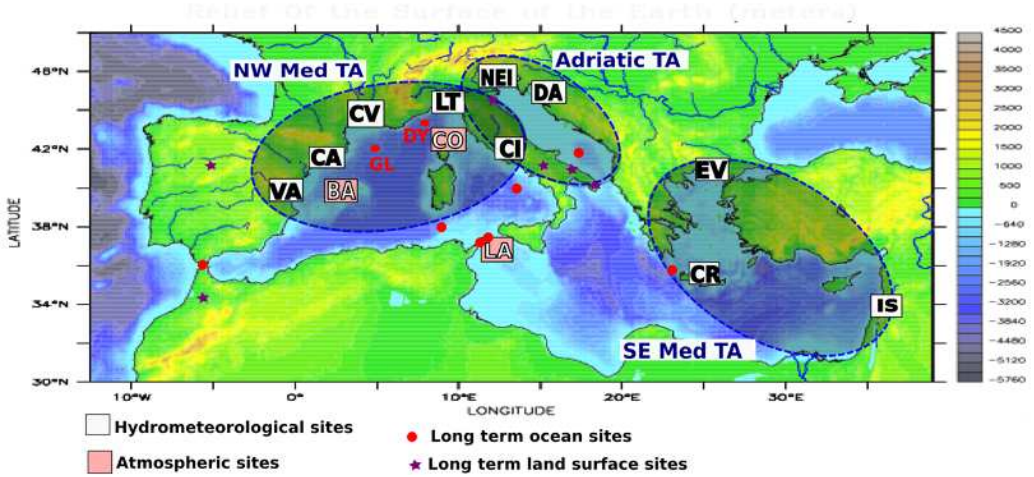
COSMO	KMA
EC	NOAA
FMI	ZAMG
HIRLAM	

Forecaster Training

HYMEX

HYdrological cycle in Mediterranean EXperiment

HyMeX (**HY**drological cycle in the **M**editerranean **EX**periment) aims at a better understanding and quantification of the hydrological cycle and related processes in the Mediterranean, **with emphasis on high-impact weather events**, inter-annual to decadal variability of the Mediterranean coupled system, and associated trends in the context of global change.



FIELD CAMPAIGNS

SOP1 (field campaign in 2012)

- dedicated to heavy precipitation & floods

SOP2 (field campaign in 2013)

- Dedicated to severe regional winds (Mistral)

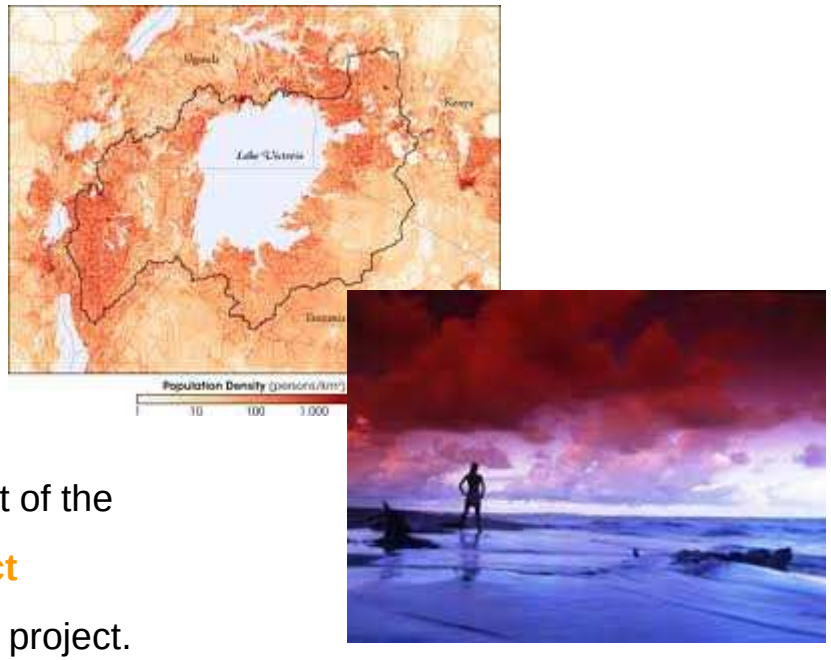
Lake Victoria Project

EC-LXII (2010) directive: WWRP to consider a project for the Lake Victoria Watershed

➢ **WWRP/WGNR Lake Victoria Project (LVP) Proposal**

Objectives:

- Develop a **scientific field project** to understand the dynamics of the lake and **severe thunderstorms**
- **Capacity building** - establish a research and operational legacy,
- Develop a prototype **sustainable nowcasting system** for East Africa, particularly over the Lake
- Implementation of the nowcasting system within the context of the existing **Severe Weather Forecast Demonstration Project**
- **Verification and validation** of the nowcasts using the field project.



WWRP WORLD WEATHER RESEARCH PROGRAMME

WCRP World Climate Research Programme

OBJECTIVES

- To improve forecast skill and understanding on the sub-seasonal to seasonal timescale with special emphasis on high-impact weather events
- To promote the initiative's uptake by operational centres and exploitation by the applications community
- To capitalize on the expertise of the weather and climate research communities to address issues of importance to the Global Framework for Climate Services

D-RES_12781

High-Impact Weather Prediction Project

Overall Objective

“Promote cooperative international research to achieve a dramatic increase in resilience to high impact weather, worldwide, through improving forecasts for timescales of minutes to two weeks and enhancing their communication and utility in social, economic and environmental applications”

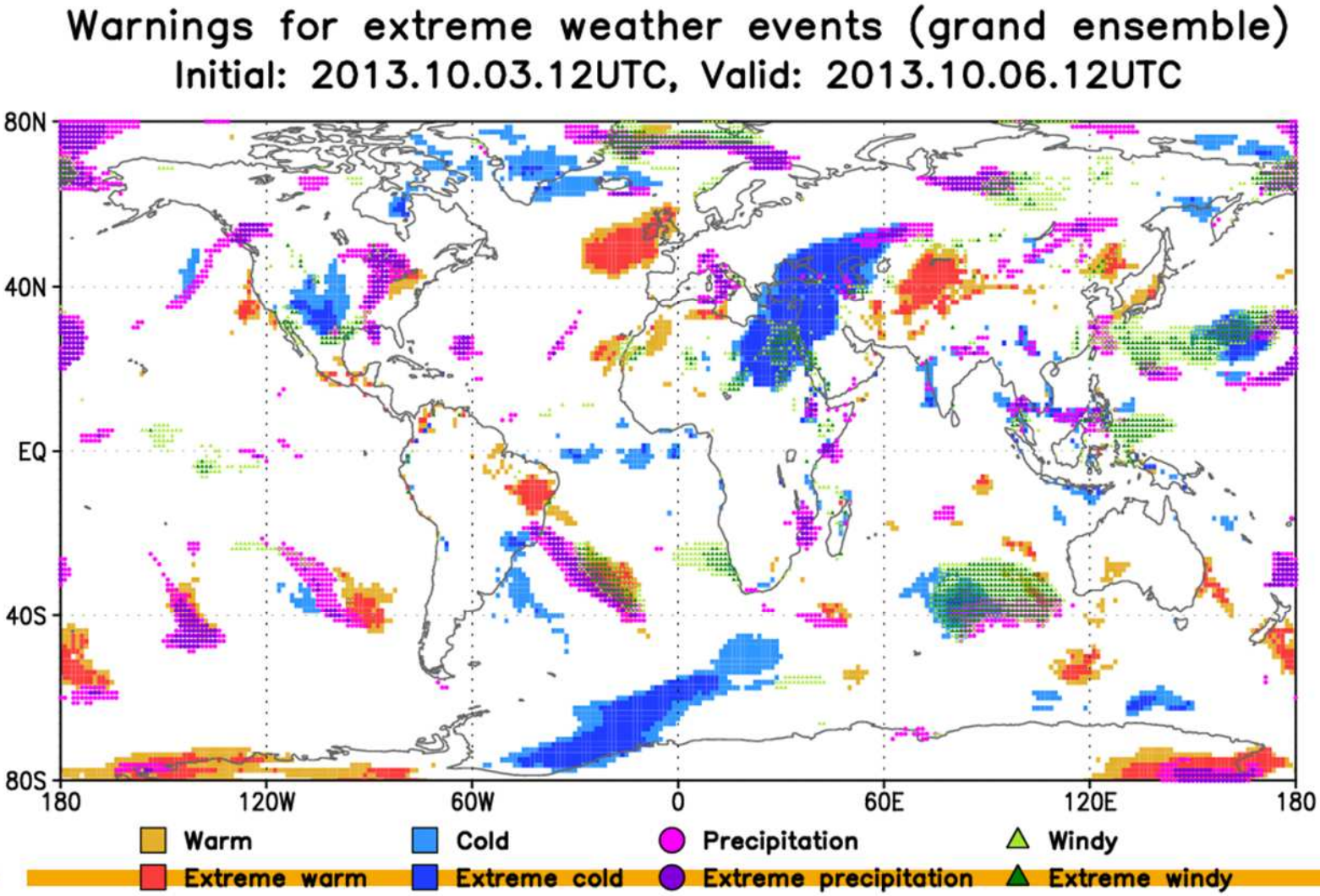
STRATEGIES TO ACHIEVE GOALS

- Engage researchers from operational and academic centres; encourage development of research proposals
- Develop linkages with other initiatives
    - International bodies and activities, WWRP Working groups, national initiatives, Post-Hyogo activities on disaster risk reduction
- Engage communication of scientists with different backgrounds through workshops, conferences etc.
- Establish and exploit special research datasets
- Support research and demonstration projects
- Link to S2S and PPP

TIGGE

- Thorpex Interactive Grand Global Ensemble (TIGGE) Database *(R. Swinbank, M. Kyouda—WG co-chairs)*
  - Collection of ensemble predictions from 10 of the leading global forecast centres (2006-present)
  - TIGGE data are made available after a 48-hour delay, to support research on probabilistic forecasting methods, predictability and dynamical processes
  - Products derived from TIGGE data **can inform hazard event occurrence, frequency, severity**
  - Provides a picture of what forecast information (and uncertainty) was available during particular events

TIGGE example product



Weather · Climate · Water

working together in support of building hazard resilient communities

Working arrangement to, among other things, jointly support the activities of the Working Group on Societal and Economic Research and Applications.

WG SERA

research priorities include:

- Estimation of the societal (including economic) value of weather and disaster risk reduction information;
- Understanding and improving the use of weather-related hazard information in decision making;
- Understanding and improving the communication of weather-related hazard information and forecast uncertainty;
- Development of user-relevant verification methods; and
- Development of decision support systems and tools.”

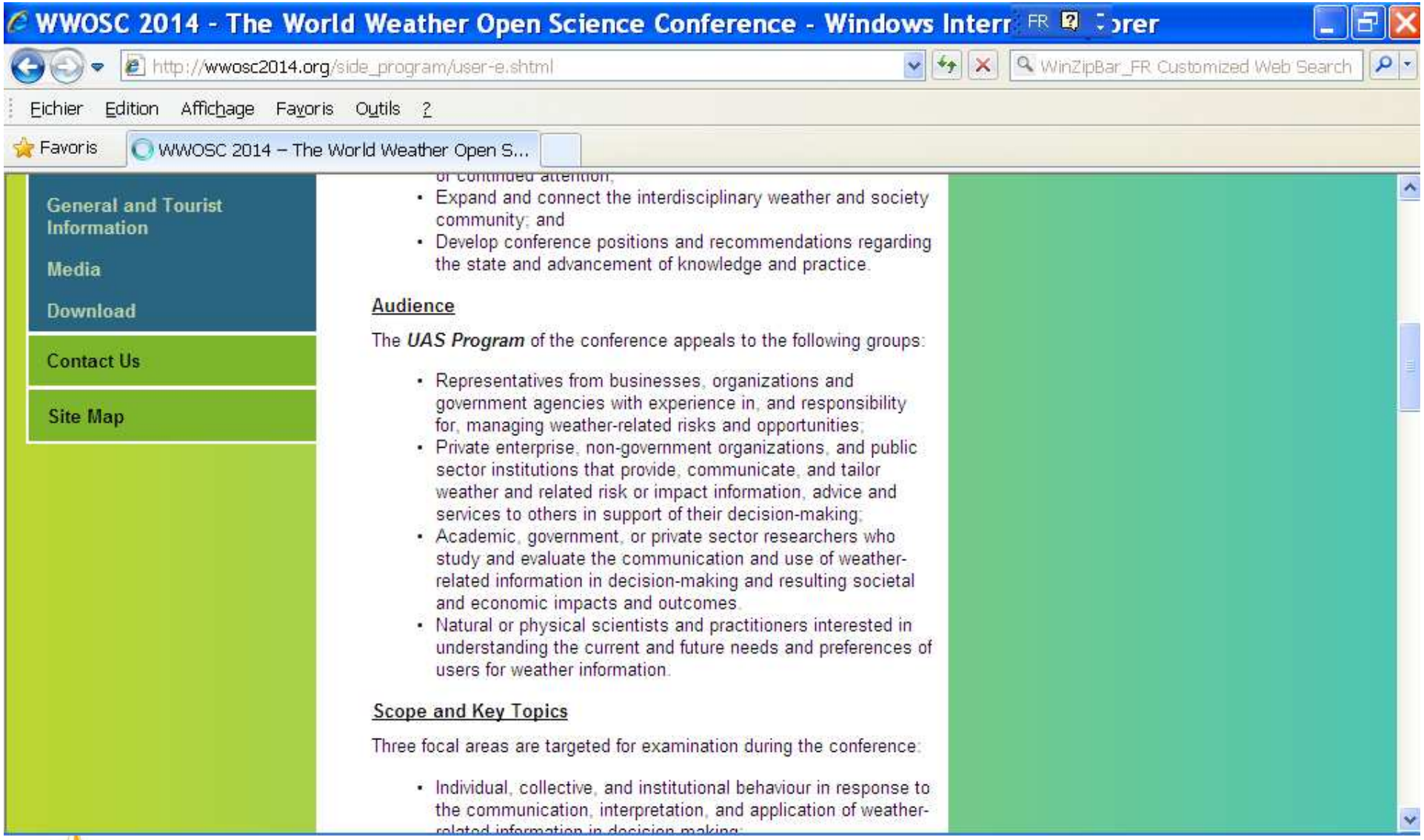
WG SERA

MEMBERS	HAZARD-RELEVANT EXPERTISE/APPLICATION AREA
Kwabena Anaman *(University of Ghana)* Jeff Lazo *(NCAR)*	Sensitivity of economy to weather, economic impact of weather-related events and hazards; social and economic value of weather information
Linda Anderson-Berry *(Australian Bureau of Meteorology)*	Community-level impacts and responses to hazards and disaster events
David Johnston *(Massey University and GNS Science)*	Human responses to volcano, tsunami and weather warnings; crisis decision-making; and role of public education/participation in building community resilience and recovery
Brian Mills *(Environment Canada)*	National and regional lightning and weather-related transportation collision risk analysis; evaluation of the impact of weather-related information on decision-making and behaviour
Joanne Robbins *(UK Met Office)* *Eugene Poolman*	Development and integration of risk and impact prediction models into weather forecasting
Jan Eichner ((*Munich Re)*	International disaster loss and impact databases and trend analysis
Paul Kovacs *(Institute for Catastrophic Loss Reduction)*	Estimation of insured and total losses associated with disaster and hazard events; use of insurance and financial instruments to reduce or mitigate risk

WWRP WORLD WEATHER RESEARCH PROGRAMME


WWOSC 2014 - The World Weather Open Science Conference - Windows Interr
http://wwosc2014.org/side_program/user-e.shtml
WinZipBar_FR Customized Web Search
Fichier Edition Affichage Favoris Outils ?
Favoris
WWOSC 2014 – The World Weather Open S...
WWOSC 2014
MONTRÉAL, CANADA
THE WORLD WEATHER
OPEN SCIENCE CONFERENCE
The weather: what's the outlook?
16 to 21 August 2014
Welcome
Important Dates
Week-at-a-Glance
Registration
Sponsorship & Exhibition
Accommodations
Français
Welcome
Expression of Interest
Venue & Important Dates
Organization
Registration
User, Application & Social Science (UAS) Program
Program Overview
The overall theme of the OSC is Seamless Prediction of the Earth System: from minutes to months. With improved and seamless prediction capability as the scientific program backdrop, the User,


WWOSC 2014 - The World Weather Open Science Conference - Windows Interr
http://wwosc2014.org/side_program/user-e.shtml
WinZipBar_FR Customized Web Search
Fichier Edition Affichage Favoris Outils ?
Favoris
WWOSC 2014 – The World Weather Open S...
Welcome
Important Dates
Week-at-a-Glance
Registration
Sponsorship & Exhibition
Accommodations
Français
Welcome
Expression of Interest
Venue & Important Dates
Organization
Registration
Program
Plenary Speakers
Call for Abstracts
Travel Support
Sponsorship & Exhibition
Accommodations
General and Tourist Information
Media
User, Application & Social Science (UAS) Program
Program Overview
The overall theme of the OSC is Seamless Prediction of the Earth System: from minutes to months. With improved and seamless prediction capability as the scientific program backdrop, the User, Application & Social Science (UAS) Program provides an open forum where the experiences and perspectives of a variety of information providers and users will be combined with the latest applications and methodological advances in social science to:
• Demonstrate and document recent progress, highlighting and sharing lessons from both successful and 'less successful' projects and applications;
• Identify and deliberate areas of practice, social science research methods, and training and education requiring new or continued attention;
• Expand and connect the interdisciplinary weather and society community; and
• Develop conference positions and recommendations regarding the state and advancement of knowledge and practice.


WWOSC 2014 - The World Weather Open Science Conference - Windows Interr
FR
orer
http://wwosc2014.org/side_program/user-e.shtml
WinZipBar_FR Customized Web Search
Fichier Edition Affichage Favoris Outils ?
Favoris
WWOSC 2014 – The World Weather Open S...
General and Tourist Information
Media
Download
Contact Us
Site Map
of continued attention;
• Expand and connect the interdisciplinary weather and society community; and
• Develop conference positions and recommendations regarding the state and advancement of knowledge and practice.
Audience
The UAS Program of the conference appeals to the following groups:
• Representatives from businesses, organizations and government agencies with experience in, and responsibility for, managing weather-related risks and opportunities;
• Private enterprise, non-government organizations, and public sector institutions that provide, communicate, and tailor weather and related risk or impact information, advice and services to others in support of their decision-making;
• Academic, government, or private sector researchers who study and evaluate the communication and use of weather-related information in decision-making and resulting societal and economic impacts and outcomes.
• Natural or physical scientists and practitioners interested in understanding the current and future needs and preferences of users for weather information.
Scope and Key Topics
Three focal areas are targeted for examination during the conference:
• Individual, collective, and institutional behaviour in response to the communication, interpretation, and application of weather-

THE ROLE OF RESEARCH IN DRR

1. Reduce the level and degree of uncertainty by improvements in:

accuracy

lead time

2. Identify how the uncertain information can be used to inform decision-making.

THANK YOU