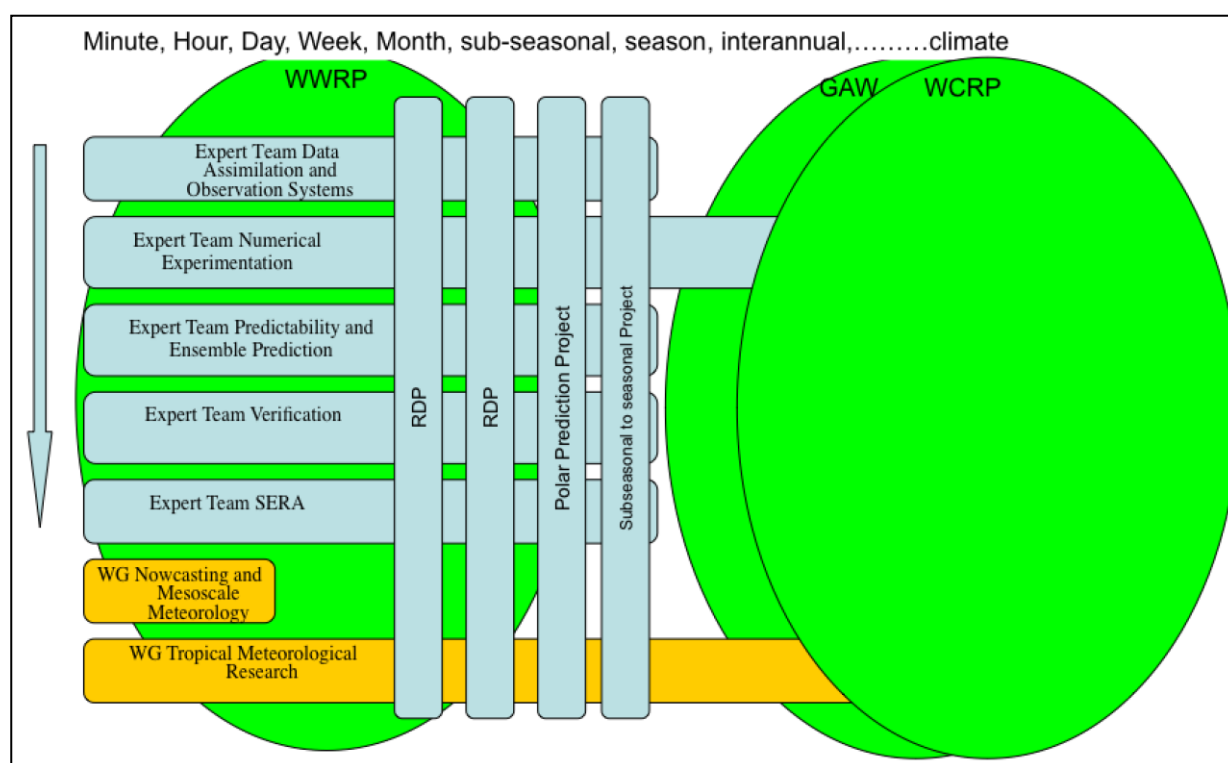


General Comments

The Commission for Atmospheric Sciences (CAS) is responsible for promoting, coordinating and facilitating activities relating to atmospheric sciences, including weather research, environmental pollution and atmospheric chemistry research, and associated training and capacity-building. It's mission includes the development and application of the best available science towards the reduction and mitigation of natural disasters and associated hydrometeorological hazards.

As of the 16th Session of CAS, the Commission is composed of a Management Group and two Scientific Steering Committees: Environmental Pollution and Atmospheric Chemistry (EPAC), and World Weather Research Programme (WWRP). This report primarily discusses the latter OPAG and its current and potential contributions to the Disaster Risk Reduction work plan activity related to the *definition and development of guidelines, manuals and standards and approaches to monitoring, detecting, maintaining databases and analytical techniques for any of the primary meteorological, hydrological and climate-related hazards of concern to WMO members.*

A revised structure for WWRP expert teams, working groups, and cross-cutting projects, discussed at CAS XVI is noted below. With respect to the current DRR initiative, hazard-specific contributions will likely be found within Research Demonstration Projects (RDPs) primarily led by the Working Groups on Nowcasting and Mesoscale Weather Forecasting Research (WG Nowcasting and Mesoscale Meteorology in figure) and Tropical Meteorological Research, and through the recently initiated Thorpex legacy cross-cutting projects on Subseasonal to Seasonal (S2S) prediction and Polar Prediction (PPP). Additional detail regarding these initiatives is provided in the survey response table, though many projects apply to multiple hazards.



Other activities within WWRP and CAS are not as easily aligned to the specific hazards noted in the survey. A third Thorpex legacy project on High Impact Weather (HIWeather) is in the early process of being developed. While contributions from the HIWeather project cannot be assessed fully at this stage, it will likely be focused on a few common hydrometeorological hazards, such as flooding, that have tremendous consequences for society, and the urban environment. It will also likely include an emphasis on impact forecasting and thus will contribute and make use of hazard impact and loss information and databases.

The proposed expert teams on Societal and Economic Research and Applications (SERA) and Verification (presently Joint Working Group on Forecast Verification Research) participate in the WWRP RDPs and projects but also have expertise that may generally benefit the DRR initiative. For example, it may be possible to apply knowledge, techniques, and best practices developed and refined for NWP forecast verification to assess the quality of hazard/impact data and impact forecasts. As well, several SERA scientists make extensive use of social and economic loss and impact data, including the global loss databases maintained by MunichRe and CRED, but also national, regional, and specialized datasets (i.e., original research and data collection), to develop impact models and evaluations of the benefits of hydrometeorological information. Some of this expertise is summarized for illustration in the table below.

SERA MEMBER (not all are listed)	HAZARD-RELEVANT EXPERTISE/APPLICATION AREA
Kwabena Anaman (<i>University of Ghana</i>) Jeff Lazo (<i>NCAR</i>)	Sensitivity of economy to weather, economic impact of weather-related events and hazards; social and economic value of weather information
Linda Anderson-Berry (<i>Australian Bureau of Meteorology</i>)	Community-level impacts and responses to hazards and disaster events
David Johnston (<i>Massey University and GNS Science</i>)	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 (<i>Environment Canada</i>)	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 (<i>UK Met Office</i>)	Development and integration of risk and impact prediction models into weather forecasting
Angelika Wirtz (<i>Munich Re, former member</i>)	International disaster loss and impact databases and trend analysis
Paul Kovacs (<i>Institute for Catastrophic Loss Reduction</i>)	Estimation of insured and total losses associated with disaster and hazard events; use of insurance and financial instruments to reduce or mitigate risk

Please list the contact information for individuals who contributed to this questionnaire:

COMMISSION FOR ATMOSPHERIC SCIENCE (CAS)

Name of Technical Commission Focal Point:				
Title	First name	Last name	Phone number	e-mail address
Mr.	Paul	Kovacs	(011) 416-364 8677	pkovacs@pacicc.ca

Please provide the following information on who has been consulted to complete your response				
Title	First name	Last name	Role within Technical Commission	e-mail address
Mr.	Brian	Mills	Chair, WWRP SERA WG	bmills@uwaterloo.ca;brian.mills@ec.gc.ca
Mr.	Deon	Terblanche	Director, AREP	dterblanche@wmo.int
Dr.	Tetsuo	Nakazawa	Chief, WWR	tnakazawa@wmo.int
Mr.	Dan	Sandink	Manager, Resilient Communities & Research, Institute for Catastrophic Loss Reduction	dsandink@iclr.org

Table 1: Hazard priorities, definitions and hazard data archiving

Please complete the following table regarding your Technical Commission's activities related to standards for hazard monitoring, databases, metadata and analysis techniques to support risk assessment.

If your Commission has activities related to the specific hazard, please specify the following:

HAZARD	Activities		Hazard Monitoring & Detecting	Data / Metadata		Statistical, Analysis and Forecasting Techniques
	Please indicate if your commission has activities related to the specified hazard (Yes/No)	Please: (i) identify each activity, (ii) identify the entity that is responsible (e.g. OPAG, Working Group, Expert Team), and (iii) provide a short description of the activity.	Please indicate whether the identified activities are related to <u>observation, detection and monitoring of meteorological / hydrological and climate hazards</u> and provide a short description of why the activity is related.	Please indicate whether the identified activities are related to <u>archival</u> of standardized meteorological / hydrological data & information (e.g. spatial, temporal) to characterize the hazard and provide a short description of the activity.	Please indicate whether the identified activities related to <u>standardization of archived parameters</u> for the specified hazard and provide a short description of the activity.	Please indicate whether the identified activities are related to <u>standardization of when observational data and information is to be archived for the specified hazard</u> occurrence (e.g. threshold values such as number of deaths, meteorological and hydrological parameters, etc) and provide a short description of the activity.
Drought	Yes	<ol style="list-style-type: none"> Subseasonal to Seasonal (S2S) Prediction project (Joint WWRP-WCRP S2S Planning Group) The Thorpex Interactive Grand Global Ensemble (TIGGE) database (WWRP-Thorpex) 	<ol style="list-style-type: none"> S2S project will involve the creation of a global subseasonal forecast and multi-year reforecast database. This will permit characterization (frequency/severity) of hazardous meteorological phenomena (e.g., drought) at 			<ol style="list-style-type: none"> S2S is a new prediction/forecasting initiative from which drought-related products may eventually be derived and analyzed.. TIGGE is a database of forecasts from which drought-related products may be derived, analyzed, and archived. For example, see applications at the

		GIFS-TIGEE Working Group transitioning to WWRP WG on Predictability, Dynamics and Ensemble Forecasting)	the spatial and temporal resolution of the database. 2. TIGGE Ensemble forecasts from about 10 contributing centres are collected in near-real time using a common format at three data archive and distribution centres: China Meteorological Administration (CMA), European Centre for Medium-range Weather Forecasts (ECMWF) and US National Center for Atmospheric Research (NCAR).			http://tparc.mri-jma.go.jp/TIGGE/
Flash and river floods	Yes	<p>Forecast/Research Demonstration Projects (FDP/RDP) and other activities of the WWRP Nowcasting Research WG and Mesoscale Weather Forecasting Research WG (proposed to be combined into a new WWRP WG on Nowcasting and Mesoscale Weather Forecasting Research)</p> <p>Relevant RDP/FDPs:</p> <p>FDP INCA-CE (INtegrating nowCAsting with Crisis management and risk prEvention in a transnational framework)</p> <p>RDP La Plata Basin Project is a project that will demonstrate the feasibility of dynamical prediction of local extreme weather using dense observation data and numerical models over shared catchments in South America (Argentina, Brazil, Uruguay, Bolivia, and Paraguay)</p> <p>Tokyo Metropolitan Area Convection Study for extreme weather resilient cities (TOMACS) is an international initiative focused on urban meteorology studies, including air quality. The project is targeting local high impact weather events in the Tokyo metropolitan area and will act as a test-bed for deep convection.</p> <p>Convective and Orographically-induced Precipitation Study (COPS)</p> <p>HyMeX (HYdrological cycle in the Mediterranean EXperiment) 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</p>	FDP/RDPs typically involve the testing and evaluation of new short-term, high-resolution modeling and statistical forecasting techniques for flash flooding and other quick onset weather-related hazards. Although limited in geographic focus, they normally involve the installation of extensive monitoring systems and archiving of observed and forecasted conditions to facilitate verification and evaluation of different technologies.			RDPs and FDPs are focused on developing new modeling and statistical forecasting techniques and transferring these to operational centres/applications.

		context of global change.					
Strong winds	Yes	<p>Forecast/Research Demonstration Projects (FDP/RDP) and other activities of the WWRP Nowcasting Research WG and Mesoscale Weather Forecasting Research WG (proposed to be combined into a new WWRP WG on Nowcasting and Mesoscale Weather Forecasting Research)</p> <p>Relevant RDP/FDPs:</p> <p>FDP INCA-CE (INtegrating nowCAsting with Crisis management and risk prEvention in a transnational framework)</p> <p>RDP La Plata Basin Project is a project demonstrating the feasibility of dynamical prediction of local extreme weather using dense observation data and numerical models over shared catchments in South America (Argentina, Brazil, Uruguay, Bolivia, and Paraguay)</p> <p>Tokyo Metropolitan Area Convection Study for extreme weather resilient cities (TOMACS) is an international initiative focused on urban meteorology studies, including air quality. The project is targeting local high impact weather events in the Tokyo metropolitan area and will act as a test-bed for deep convection.</p>	FDP/RDPs typically involve the testing and evaluation of new short-term, high-resolution modeling and statistical forecasting techniques for downbursts/ straightline/tornadic winds and other quick onset weather-related hazards. Although limited in geographic focus, they normally involve the installation of extensive monitoring systems and archiving of observed and forecasted conditions to facilitate verification and evaluation of different technologies.				RDPs and FDPs are focused on developing new modeling and statistical forecasting techniques and transferring these to operational centres/applications.
Tornado (rotational high winds)	See Thunderstorm or lightning						
Hailstorm	See Thunderstorm or lightning						
Thunderstorm or lightning	Yes (includes tornadic activity and hail)	<p>Forecast/Research Demonstration Projects (FDP/RDP) and other activities of the WWRP Nowcasting Research WG and Mesoscale Weather Forecasting Research WG (proposed to be combined into a new WWRP WG on Nowcasting and Mesoscale Weather Forecasting Research)</p> <p>Relevant RDP/FDPs:</p> <p>FDP INCA-CE (INtegrating nowCAsting with Crisis management and risk prEvention in a transnational framework)</p>	FDP/RDPs typically involve the testing and evaluation of new short-term, high-resolution modeling and statistical forecasting techniques for thunderstorms and associated convective and meso-scale weather-related hazards. Although limited in geographic focus, they normally involve the installation of extensive monitoring systems and archiving of observed and forecasted conditions to facilitate verification and evaluation of different technologies.				RDPs and FDPs are focused on developing new modeling and statistical forecasting techniques and transferring these to operational centres/applications.

		<p>RDP La Plata Basin Project is a project demonstrating the feasibility of dynamical prediction of local extreme weather using dense observation data and numerical models over shared catchments in South America (Argentina, Brazil, Uruguay, Bolivia, and Paraguay)</p> <p>Tokyo Metropolitan Area Convection Study for extreme weather resilient cities (TOMACS) is an international initiative focused on urban meteorology studies, including air quality. The project is targeting local high impact weather events in the Tokyo metropolitan area and will act as a test-bed for deep convection.</p>					
Heavy snow	Yes	<p>1. RDP/FDP FROST 2014, for the Winter Olympic Games in Sochi, currently in the phase of testing the real-time forecasting and nowcasting facilities to be implemented during the Games, is aimed to demonstrate usefulness of high-resolution deterministic mesoscale forecasts, regional ensemble prediction systems and nowcast systems for winter weather phenomena (snow levels, wind, visibility, precipitation type and intensity) in a complex terrain. Organizations from eight countries (Austria, Canada, Finland, Germany, Republic of Korea, Switzerland, the Russia Federation, and USA) are participating in this project (WWRP WG on Nowcasting Research and WG on Mesoscale Weather Forecasting Research)</p> <p>2. The WWRP Polar Prediction Project (WWRP-PPP) aims to promote cooperative international research enabling development of improved weather and environmental prediction services for the polar regions, on time scales from hourly to seasonal. Sea ice, polar lows and related winter weather hazards (e.g., heavy or blowing snow, high winds, cold air outbreaks) will be important components of the research. (WWRP PPP Steering Committee; coordinated with WCRP activity on polar climate predictability)</p>	<p>1. FDP/RDPs typically involve the testing and evaluation of new short-term, high-resolution modeling and statistical forecasting techniques for heavy snowfall and other weather-related hazards. Although limited in geographic focus, they normally involve the installation of extensive monitoring systems and archiving of observed and forecasted conditions to facilitate verification and evaluation of different technologies.</p> <p>2. A Year of Polar Prediction (YOPP) is planned for the latter part of the decade and will involve a substantive observation component. A key priority of PPP is to provide guidance on optimizing polar observing systems, and coordinate additional observations to support modelling and verification. A key priority of PPP is to provide guidance on optimizing polar observing systems, and coordinate additional observations to support modelling and verification</p>			<p>1. RDPs and FDPs are focused on developing new modeling and statistical forecasting techniques and transferring these to operational centres/applications.</p> <p>2. PPP is a new prediction/forecasting initiative from which sea ice-related products may eventually be derived and analyzed.</p>	

Freezing rain	Yes	RDP/FDP FROST 2014, for the Winter Olympic Games in Sochi, currently in the phase of testing the real-time forecasting and nowcasting facilities to be implemented during the Games, is aimed to demonstrate usefulness of high-resolution deterministic mesoscale forecasts, regional ensemble prediction systems and nowcast systems for winter weather phenomena (snow levels, wind, visibility, precipitation type and intensity) in a complex terrain. Organizations from eight countries (Austria, Canada, Finland, Germany, Republic of Korea, Switzerland, the Russia Federation, and USA) are participating in this project (WWRP WG on Nowcasting Research and WG on Mesoscale Weather Forecasting Research)	FDP/RDPs typically involve the testing and evaluation of new short-term, high-resolution modeling and statistical forecasting techniques for flash flooding and other quick onset weather-related hazards. Although limited in geographic focus, they normally involve the installation of extensive monitoring systems and archiving of observed and forecasted conditions to facilitate verification and evaluation of different technologies.				RDPs and FDPs are focused on developing new modeling and statistical forecasting techniques and transferring these to operational centres/applications.
Dense fog	Yes	RDP/FDP FROST 2014, for the Winter Olympic Games in Sochi, currently in the phase of testing the real-time forecasting and nowcasting facilities to be implemented during the Games, is aimed to demonstrate usefulness of high-resolution deterministic mesoscale forecasts, regional ensemble prediction systems and nowcast systems for winter weather phenomena (snow levels, wind, visibility, precipitation type and intensity) in a complex terrain. Organizations from eight countries (Austria, Canada, Finland, Germany, Republic of Korea, Switzerland, the Russia Federation, and USA) are participating in this project (WWRP WG on Nowcasting Research and WG on Mesoscale Weather Forecasting Research)	FDP/RDPs typically involve the testing and evaluation of new short-term, high-resolution modeling and statistical forecasting techniques for visibility and other weather-related hazards. Although limited in geographic focus, they normally involve the installation of extensive monitoring systems and archiving of observed and forecasted conditions to facilitate verification and evaluation of different technologies.				RDPs and FDPs are focused on developing new modeling and statistical forecasting techniques and transferring these to operational centres/applications.
Tropical cyclone	Yes	1. The Thorpex Interactive Grand Global Ensemble (TIGGE) database (WWRP-Thorpex GIFS-TIGEE Working Group transitioning to WWRP WG on Predictability, Dynamics and Ensemble Forecasting) 2. Various activities of the WWRP WG on Tropical Meteorology Research including: Typhoon Landfall Forecast Demonstration Project (TLFDP), the South China Monsoon Rainfall Experiment (SCMREX), and the North Western Pacific Tropical Cyclones Ensemble	1. TIGGE Ensemble forecasts from about 10 contributing centres are collected in near-real time using a common format at three data archive and distribution centres: China Meteorological Administration (CMA), European Centre for Medium-range Weather Forecasts (ECMWF) and US National Center for Atmospheric Research (NCAR). 2. FDP/RDPs for TCs typically involve the testing and evaluation of new modeling and statistical forecasting techniques for track, intensity, and heavy rainfall. Although limited in				1. TIGGE is a database of forecasts from which TC-related products are derived, analyzed, and archived. For example, see applications at the http://tparc.mri-jma.go.jp/TIGGE/ 2. RDPs and FDPs are focused on developing new modeling and statistical forecasting techniques and transferring these to operational centres/applications.

		Forecast Project (NWP-TCEFP)	geographic focus, they normally involve the installation of extensive monitoring systems (i.e., specialized 1-2 year field campaigns such as the Year of Tropical Convection, PARC) and archiving of observed and forecasted conditions to facilitate verification and evaluation of different technologies.				
Storm surge	No						
Coastal flooding	No						
Heat wave: period of abnormally high temperatures	Yes	<ol style="list-style-type: none"> 1. Subseasonal to Seasonal (S2S) Prediction project (Joint WWRP-WCRP S2S Planning Group) 2. The Thorpex Integrative Grand Global Ensemble (TIGGE) database (WWRP-Thorpex GIFS-TIGEE Working Group transitioning to WWRP WG on Predictability, Dynamics and Ensemble Forecasting) 	<ol style="list-style-type: none"> 1. S2S project will involve the creation of a global subseasonal forecast and multi-year reforecast database. This will permit characterization (frequency/severity) of hazardous meteorological phenomena (e.g., excessive heat) at the spatial and temporal resolution of the database. 2. TIGGE Ensemble forecasts from about 10 contributing centres are collected in near-real time using a common format at three data archive and distribution centres: China Meteorological Administration (CMA), European Centre for Medium-range Weather Forecasts (ECMWF) and US National Center for Atmospheric Research (NCAR). 				<ol style="list-style-type: none"> 1. S2S is a new prediction/forecasting initiative from which heat-related products may eventually be derived and analyzed.. 2. TIGGE is a database of forecasts from which heat-related products may be derived, analyzed, and archived. For example, see applications at the http://tparc.mri-jma.go.jp/TIGGE/
Cold wave: period of abnormally low temperatures	Yes	<ol style="list-style-type: none"> 1. Subseasonal to Seasonal (S2S) Prediction project (Joint WWRP-WCRP S2S Planning Group) 2. The Thorpex Integrative Grand Global Ensemble (TIGGE) database (WWRP-Thorpex GIFS-TIGEE Working Group transitioning to WWRP WG on Predictability, Dynamics and Ensemble Forecasting) 3. The WWRP Polar Prediction Project (WWRP-PPP) aims to promote cooperative international research enabling development of improved weather and environmental prediction services for the polar regions, on time scales from hourly to seasonal. Sea ice, polar lows and related 	<ol style="list-style-type: none"> 1. S2S project will involve the creation of a global subseasonal forecast and multi-year reforecast database. This will permit characterization (frequency/severity) of hazardous meteorological phenomena (e.g., excessive cold) at the spatial and temporal resolution of the database. 2. TIGGE Ensemble forecasts from about 10 contributing centres are collected in near-real time using a common format at three data archive and distribution centres: China Meteorological Administration (CMA), European Centre for Medium-range Weather Forecasts (ECMWF) and US National Center for Atmospheric Research (NCAR). 				<ol style="list-style-type: none"> 1. S2S is a new prediction/forecasting initiative from which cold-related products may eventually be derived and analyzed. 2. TIGGE is a database of forecasts from which cold-related products may be derived, analyzed, and archived. For example, see applications at the http://tparc.mri-jma.go.jp/TIGGE/ 3. PPP is a new prediction/forecasting initiative from which sea ice-related products may eventually be derived and analyzed.

		winter weather hazards (e.g., heavy or blowing snow, high winds, cold air outbreaks) will be important components of the research. (WWRP PPP Steering Committee; coordinated with WCRP activity on polar climate predictability)	3. A Year of Polar Prediction (YOPP) is planned for the latter part of the decade and will involve a substantive observation component. A key priority of PPP is to provide guidance on optimizing polar observing systems, and coordinate additional observations to support modelling and verification. A key priority of PPP is to provide guidance on optimizing polar observing systems, and coordinate additional observations to support modelling and verification.				
River flooding	Yes	<p>Forecast/Research Demonstration Projects (FDP/RDP) and other activities of the WWRP Nowcasting Research WG and Mesoscale Weather Forecasting Research WG (proposed to be combined into a new WWRP WG on Nowcasting and Mesoscale Weather Forecasting Research)</p> <p>Relevant RDP/FDPs:</p> <p>FDP INCA-CE (INtegrating nowCAsting with Crisis management and risk prEvention in a transnational framework)</p> <p>RDP La Plata Basin Project is a project demonstrating the feasibility of dynamical prediction of local extreme weather using dense observation data and numerical models over shared catchments in South America (Argentina, Brazil, Uruguay, Bolivia, and Paraguay)</p> <p>HyMeX (HYdrological cycle in the Mediterranean EXperiment) 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.</p>	FDP/RDPs typically involve the testing and evaluation of new short-term, high-resolution modeling and statistical forecasting techniques for flash flooding and other quick onset weather-related hazards. Although limited in geographic focus, they normally involve the installation of extensive monitoring systems and archiving of observed and forecasted conditions to facilitate verification and evaluation of different technologies.				
Marine hazards (storm, sea ice, icebergs, etc.)	Yes	The WWRP Polar Prediction Project (WWRP-PPP) aims to promote cooperative international research enabling development of improved weather and environmental prediction services for the polar regions, on time scales from hourly to seasonal. Sea ice, polar lows and related winter weather hazards (e.g., heavy or blowing snow, high winds, cold air outbreaks) will be important components of the	A Year of Polar Prediction (YOPP) is planned for the latter part of the decade and will involve a substantive observation component. A key priority of PPP is to provide guidance on optimizing polar observing systems, and coordinate additional observations to support modelling and verification.				PPP is a new prediction/forecasting initiative from which sea ice-related products may eventually be derived and analyzed.

		research. (WWRP PPP Steering Committee; coordinated with WCRP activity on polar climate predictability)					
Sand and dust storms	Yes	WMO Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) (transitioning from WWRP to CBS) (Regional SDS-WAS Steering Groups in two existing nodes: Northern Africa-Middle East-Europe (NA-ME-E) Node, Asia Node) For more information, see : http://www.wmo.int/pages/prog/arep/wwrp/new/Sand_and_Dust_Storm.html	The SDS-WAS mission is to achieve comprehensive, coordinated and sustained observations and modeling capabilities of sand and dust storms in order to improve the monitoring of sand and dust storms to increase the understanding of the dust processes and to enhance dust prediction capabilities.				
Landslide or mudslide	Yes	Expertise exists within the membership of the WWRP Societal and Economic Research and Applications WG, however, no WWRP projects are presently being used to examine this hazard.					
Airborne hazardous substances (i.e., nuclear, biological, chemical, etc.)	No						
Waterborne hazards (i.e., nuclear, biological, chemical, oil spills, etc.)	No						
Desert locust swarm	No						
Hydrometeorological hazards to aviation (i.e., turbulence, icing)	Yes	Expertise exists within the membership of the WWRP Nowcasting WG, however, no WWRP projects are presently being used to examine this hazard.					
Avalanche	No						
Forest or wild land fire	Yes	Expertise exists within the membership of the WWRP Societal and Economic Research and Applications WG, however, no WWRP projects are presently being used to examine this hazard.					
Smoke, Dust or Haze	No						
Tsunami	No						

Rapid melting of glaciers	No						

Table 2: Hazard priorities, definitions and hazard data archiving

Please list existing published materials (e.g., Standards, technical guidelines, technical notes, training and educational curricula, public information material) that your Technical Commission has produced that are related to standards for hazard monitoring, databases, metadata and analysis techniques to support risk assessment.

Publication number	Title of Publication	Please provide: i) A brief description of the scope of this publication and how it relates to the topic of this technical workshop, ii) Through which OPAG, Working Group, Expert Team it was produced, iii) if this publication is available electronically please provide download link.
WWRP/WGNE Joint Working Group on Forecast Verification Research (2013)	Verification methods for tropical cyclone forecasts	Reviews quantitative verification methods which can be used to measure the quality of TC forecasts compiled over many storms Prepared by WWRP/WGNE Joint Working Group on Forecast Verification Research http://www.wmo.int/pages/prog/arep/wwrp/new/documents/TC_verification_Final_11Nov13.pdf
S2S Project Planning Group (2013)	Subseasonal to Seasonal Prediction Project Implementation Plan	Provides and overview of the S2S project and its planned implementation (expands on table entries above) Prepared by WWRP/Thorpex/WCRP S2S Planning Group http://www.wmo.int/pages/prog/arep/wwrp/new/documents/Implementation_plan_V6_4_nolinenos_nowm.pdf
WWRP/PPP No.1 (2013)	WWRP Polar Prediction Project Science Plan	Provides and overview of the scientific (and hazard) context for the PPP project (expands on table entries above) Prepared by WWRP PPP Steering Committee http://www.wmo.int/pages/prog/arep/wwrp/new/documents/Final_WWRP_PPPScience_Plan.pdf
WMO Secretariat (2012)	WMO Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) Science and Implementation Plan 2011-2015	Identifies scientific objectives of the SDS-WAS and defines phases of actions that will be performed in the period 2011-2015 in order to implement the activities that lead to more accurate warnings and assessments of sand and dust storms. Prepared by WMO Research Department http://www.wmo.int/pages/prog/arep/wwrp/new/documents/SDS_WAS_implementation_plan_01052012.pdf
WWRP 2009 - 2	Strategic Plan for the Implementation of WMO's World Weather Research Programme (WWRP): 2009-2017	Provides and overview of planned WWRP activities Prepared by WWRP http://www.wmo.int/pages/prog/arep/wwrp/new/documents/final_WWRP_SP_6_Oct.pdf
WWRP 2009 - 1	Recommendations for the Verification and Intercomparison of QPFs and PQPFs from Operational NWP Models	Recommends a standard methodology for verification and intercomparison of QPFs and PQPFs from NWP models. These recommendations apply to the verification of direct model output precipitation forecasts as well as forecasts which have been subjected to post-processing. Prepared by WWRP/WGNE Joint Working Group on Forecast Verification Research http://www.wmo.int/pages/prog/arep/wwrp/new/documents/WWRP2009-1_web_CD.pdf