World Meteorological Organization
Organisation météorologique mondiale
Secrétariat
7 bis, avenue de la Paix – Case postale 2300 – CH 1211 Genève 2 – Suisse
Tél.: +41 (0) 22 730 81 11 – Fax: +41 (0) 22 730 81 81
wmo@wmo.int – www.wmo.int

WMO OMM

Weather • Climate • Water
Temps • Climat • Eau

الرسالة رقم: RES/ARE/WWR جنيف، 29 كانون الثاني/ يناير 2015

عدد المرفقات: 1 (متوافر بالإنكليزية فقط)

الموضوع: الصناديق الاستئمانية المتعلقة بأنشطة البرنامج العالمي لبحوث الطقس (WWRP) والبرنامج العالمي للبحوث المناخية (WCRP)

تحية طيبة وبعد،

أدت تجربة البحث الخاصة بنظم الرصد وبإمكانية التنبؤ (THORPEX) دوراً هاماً باعتبارها إسهام البرنامج العالمي لبحوث الطقس (WWRP) في زيادة فهم إمكانية التنبؤ بالطقس الشديد التأثير ودعم تحسين نماذج التنبؤ بالطقس وطرائق تمثيل البيانات وأساليب المجموعات في فترة العشر سنوات حتى اختتامها في نهاية 2014.

وتتواصل الأهداف العلمية للتجربة (THORPEX) وتمتد من خلال ثلاثة مشاريع رئيسة خَلَف تعزز إعداد التنبؤ المتواصل بنظام الأرض فيما يتراوح بين دقائق وشهور، وهذه المشاريع هي: '1' مشروع التنبؤ بالطقس الشديد التأثير (HIWeather) التابع للبرنامج (WWRP)؛ '2' مشروع التنبؤات دون الموسمية إلى الموسمية (S2S)، وهو مبادرة مشتركة بين البرنامج (WWRP) والبرنامج (WCRP)؛ '3' مشروع التنبؤات القطبية (PPP)، المعد بالتعاون بين البرنامج (WWRP) والبرنامج (WCRP). وقد أعرب المجلس التنفيذي للمنظمة (WMO) في دورته السادسة والستين عن ارتياحه للتقدم المحرز مؤخراً فيما يتعلق بالمشاريع الثلاثة الخلف للتجربة (THORPEX) والمواءمة لتلبية احتياجات الأعضاء ودعم تعزيز الخدمات المناخية في سياق الإطار العالمي للخدمات المناخية (GFCS).

وتتصدى المشاريع الثلاثة للمواضيع والاحتياجات المجتمعية ذات الصلة:

(أ) يهدف المشروع (HIWeather) إلى تعزيز البحوث التعاونية الدولية لتحقيق زيادة كبيرة في القدرة على مقاومة الطقس الشديد التأثير على نطاق العالم من خلال تحسين خدمات التنبؤ على نطاقات زمنية من دقائق إلى أسبوعين، وتعزيز نشر هذه البحوث والاستفادة منها في التطبيقات الاجتماعية والاقتصادية والبيئية. والأمر الذي يحدد نطاق المشروع هو احتياجات المستخدمين إلى معلومات أفضل بشأن التنبؤات والإنذارات لتعزيز قدرة المجتمعات المحلية والبلدان على مقاومة مجموعة من المخاطر مختارة بعناية. وستركز البحوث على خمسة مجالات للمخاطر (الفيضانات في المناطق الحضرية، وحرائق البراري، والرياح المتطرفة في مناطق محددة، والطقس الشتوي المعوِّق، وموجات الحرارة وتلوث الهواء في المناطق الحضرية) تغطي مجموعة كبيرة من الآثار بحيث يكون للتقدم المحرز في بناء القدرة على مقاومة هذه المخاطر أهمية عامة؛

إلى: الممثلين الدائمين لأعضاء المنظمة (أو مديري مرافق الأرصاد الجوية أو الأرصاد الجوية الهيدرولوجية التابعة لأعضاء المنظمة) (PR-6816)

صورة إلى: المستشارين الهيدرولوجيين للممثلين الدائمين)
رؤساء الاتحادات الإقليمية) (للعلم)
رؤساء اللجان الفنية)

(ب) يهدف المشروع (S2S) إلى تحسين مهارات التنبؤ والفهم على النطاقات الزمنية دون الموسمية إلى الموسمية، من خلال إنشاء قاعدة بيانات لنظم المجموعات المتعددة النماذج وتقييم مهاراتها في دراسات الحالة شديدة التأثير، وتعزيز استيعابها في المراكز العاملة واستخدامها في دوائر التطبيقات. ويمثل النطاق الزمني دون الموسمي إلى الموسمي، من منظور المستخدم النهائي، أمراً بالغ الأهمية عند اتخاذ كثير من القرارات الخاصة بالإدارة في مسائل الزراعة والأمن الغذائي، والماء، وإدارة مخاطر الكوارث، والصحة. وتحسين التنبؤات، بدءاً بالتنبؤات الخاصة بالطقس ووصولاً إلى التنبؤات المناخية، يبشر بأن تكون له قيمة اجتماعية واقتصادية كبيرة؛

(ج) يهدف المشروع (PPP) إلى "تعزيز البحوث التعاونية الدولية التي تمكّن من تحسين خدمات التنبؤ بالطقس والبيئة في المناطق القطبية على نطاقات زمنية من ساعة واحدة إلى موسمية". ويشكل هذا المشروع العنصر البحثي للنطاقات الزمنية من ساعة واحدة إلى الموسمية في النظام العالمي المتكامل للتنبؤات القطبية (GIPPS) التابع للمنظمة (WMO). ويجري التشديد على أن الفوائد المتوقع جنيها ستتجاوز النطاقات الزمنية (من ساعة واحدة إلى موسمية) والمنطقتين (المنطقة القطبية الشمالية والمنطقة القطبية الجنوبية). ومن المنتظر أن تعمل التحسينات المتوقعة في تمثيل العمليات القطبية الرئيسية في النماذج (المتقارنة)، من قبيل الطبقات المتاخمة المستقرة وديناميات الجليد البحري، على تقليل الأخطاء المنهجية في النماذج المناخية، وأن تساعد من ثم على تقليص أوجه عدم اليقين في التوقعات المناخية الإقليمية. وستكمّل سنة التنبؤات القطبية الجهد الرصدي للنظام (GIPPS) عن طريق شن حملة ميدانية مع تحديد فترات خاصة للرصد بين عامي 2017 و2019.

وللحصول على مزيد من المعلومات، يرجى الاطلاع على الملخص التنفيذي للمشروع (HIWeather) المرفق (انظر المرفق). وتتوافر مسودة خطة التنفيذ على الموقع الشبكي للبرنامج (WWRP) التابع للمنظمة (WMO) (http://www.wmo.int/wwrp). كما يمكن الحصول على معلومات تفصيلية عن المشروعين (PPP) و(S2S) على الموقع الشبكي لكل منهما: /http://polarprediction.net و /http://s2sprediction.net.

ويسر كل من الدكتور Paolo Ruti، رئيس البرنامج العالمي لبحوث الطقس (البريد الإلكتروني: PRuti@wmo.int)، والسيد Michel Rixen، البرنامج العالمي للبحوث المناخية (البريد الإلكتروني: MRixen@wmo.int) تقديم مزيد من المعلومات.

وقد أقر المجلس التنفيذي للمنظمة (WMO) في دورته السادسة والستين، بموجب القرار 12 (EC-66)، إنشاء مشروع الطقس الشديد التأثير (HIWeather) التابع للبرنامج (WWRP)، على أن يُدعم من التبرعات، وطلب من الأمين العام أن يقر إنشاء صندوق استئماني مرتبط به. وقد أنشئ فيما سبق الصندوقان الاستئمانيان للمشروعين (S2S) و(PPP) من خلال اعتماد القرارين 16 و17 (EC-64).

وأود أن أقدم الشكر لإدارة الأرصاد الجوية الكورية، جمهورية كوريا، على استضافة مكتب التنسيق الدولي للمشروع (S2S)، ومعهد ألفريد فيجينر للبحوث القطبية والبحرية بألمانيا، على استضافة مكتب التنسيق الدولي للمشروع (PPP). وعلاوة على ذلك أود أن أعرب عن تقديري لكافة الأعضاء الذين أسهموا بالفعل في الصندوقين الاستئمانيين في السنوات السابقة.

ونظراً إلى ما تقدم، سأكون ممتناً لو قام مرفقكم ببحث إمكانية تقديم دعم مالي للصناديق الاستئمانية للمشاريع الخلف الثلاثة لضمان تنفيذ تلك المشاريع بفعالية.

وإنني لأتطلع لتلقي ردكم في أقرب وقت ممكن.

وتفضلوا بقبول فائق الاحترام،

(ج. لنغواسا)
عن الأمين العام

World Meteorological Organization

WWRP WORLD WEATHER RESEARCH PROGRAMME

HIWeather

EXECUTIVE SUMMARY

Despite substantial advances in both forecasting capability and emergency preparedness, recent years have seen a large number of natural disasters that have cost many lives, displaced large numbers of people, and caused widespread damage to property and infrastructure. Many of these disasters result from severe weather interacting with society. At the same time, less severe weather events place a continuing strain on society through more frequent impacts of smaller magnitude. This is especially evident in less developed countries with more fragile economies and infrastructure. In addition, weather forecasts are becoming increasingly important for economic applications (e.g. forecasting energy supply and demand) and for protecting the environment. In all these areas users of weather information expect more sophisticated guidance than was the case ten years ago.

The THORPEX programme delivered major advances in the science of weather forecasting thus providing the knowledge basis for improving early warnings for many High Impact Weather events for one day to two weeks ahead. At the same time, new capabilities in short-range forecasting arising from the use of new observations and convective-scale Numerical Prediction Models and Ensemble Prediction Systems have made it possible to provide warnings of weather-related hazards, directly, up to one or two days ahead. Together with advances in coupling prediction models and better understanding by social scientists of the challenges to achieving effective use of forecasts and warnings, these advances offer the basis for a dramatic increase in the resilience of communities and countries to the threat of hazardous weather and its impacts. The time is ripe to capitalise on these advances. We propose a ten year programme within the World Weather Research Programme to:

"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".

The scope of the project is defined by the needs of users for better forecast and warning information to enhance the resilience of communities and countries in responding to a carefully selected set of hazards. While not comprehensive, they cover a wide range of impacts so that advances in building resilience to them may be expected to have more general relevance. The selection has been guided by their importance as a cause of disasters, by relevance to developing countries, by vulnerability of those living in megacities, and to span the complete range of climate regimes.

Urban floods, including flooding from the sea, rivers and directly from rainfall that exceeds drainage capacity, and including rain-induced landslides, with particular emphasis on flood impacts in the growing megacities of the developing world, especially those situated in the tropics and subtropics. Flooding is the most common cause of disasters in the world today. Since most of the world's major cities lie either on the coast or on a major river, the problem is set to increase as cities grow, sea level rises, and the hydrological cycle becomes more intense in a warming atmosphere. Management of floods varies according to their source and scale and source. For large river floods with large forecast lead times, river controls can be used to either make space for the water or to retain it upstream of vulnerable populations. For coastal floods with large lead times, evacuation may be most appropriate. For flash floods and surface water flooding, local protection and movement of people requires more precise forecasts at much shorter lead times.

Wildfires, emphasizing requirements associated with fire fighting and fire management as well as prediction of fire risk. Increasing use of wilderness areas for recreation and the spread of human settlement into forested areas are both increasing the risk from this hazard. Fire is associated with drought and high temperatures, so there will be opportunities for linking with the Subseasonal to Seasonal Prediction Project in extended range prediction of these conditions. However, management of live fires also requires a detailed knowledge of both the vegetation state and wind, which can only be predicted for very short periods ahead.

Localized Extreme Winds, including localized wind maxima within tropical and extratropical cyclones (e.g. sting jets), downslope windstorms, and tornadoes. Great advances have been made in the prediction of both tropical and extratropical cyclones over the past decade, but wind damage and disruption mostly occur in small areas, e.g. within embedded mesoscale and convective scale weather systems. Decisions on appropriate protective action depend on knowing the location, timing and intensity of these localized wind maxima.

Disruptive winter weather, including snow, ice, fog and avalanche, and focussing on transport, energy and communications impacts. While not usually the cause of disasters, this collection of hazards, with related meteorological causes and overlapping impacts, is a major source of social and economic disruption in mid- and high-latitude regions. There will be opportunities to work with the Polar Prediction Project on this hazard.

Urban heat waves and air pollution. While extreme heat and poor air quality may occur separately, both are associated with long-lived weather patterns, both give rise to similar health responses, and major heat-related disasters tend to involve both ingredients. There will be opportunities to work with the Subseasonal to Seasonal Prediction Project on the extended range predictability of blocking events, but the main focus will be on the spatial and temporal variability of the hazard and the influence of the urban fabric through emissions and heat fluxes from the built environment.

The research required to deliver enhanced resilience to these hazards will be carried out in five themes that cover areas traditionally separated into the physical and social sciences. Achieving the outcomes of the High Impact Weather (HIWeather) project depends on these two scientific communities working together. Research objectives have been identified within each theme that, together, will enable specific advances in the management of impacts from the five hazards.

Predictability and Processes. Research will be focused on the meteorological processes that influence the predictability of High Impact Weather: control of convective-scale predictability by large scale processes in tropical and extratropical latitudes; differences in predictability of hazardous weather relative to "normal" weather; association with forecasts that are very sensitive to initial state; mechanisms that produce quasi-stationary hazardous weather systems; role of diabatic heating; role of boundary layer and land surface; pre-conditioning of the land surface for hazards. These research challenges will be addressed through the use of datasets from recent and planned field experiments, especially the planned North Atlantic waveguide experiment, T-NAWDEX, Lake Victoria experiment, LVB-HyNEWS, and La Plata basin experiment, RELAMPAGO, through coordinated case studies and model intercomparisons, and in review papers and targeted workshops.

Multi-scale Forecasting of Weather-Related Hazards. Research covers the observations, nowcasting, data assimilation, modeling and post-processing required to forecast High Impact Weather using coupled numerical weather, land surface, ocean and chemistry models, including modelling of floods, landslides, bushfires, air pollution etc. Research will focus on advances in the whole prediction chain needed to forecast the hazards, on prediction at convective-scale (<3km), on coupled modeling and on the use of ensembles to quantify probability and uncertainty. Specific activities will be carried out reviewing the use of existing and new observation sources; comparing new approaches to multi-scale coupled modelling and data assimilation systems, drawing on parallel activities in the Subseasonal to Seasonal Prediction Project; developing ensemble perturbations for small scales and hazards; and meeting the product specifications identified by the communications theme. The research will make use of a catalogue of hazardous weather case studies developed with the predictability and processes theme, together with datasets from recent and planned field experiments, re-analyses and re-forecasts, and will demonstrate and evaluate new techniques in Forecast Demonstration Projects.

Human impacts, Vulnerability and Risk. Research will enable modelling of hazard impacts to extend to exposure and vulnerability of individuals, businesses and communities in support of risk assessments. It is intended that social scientists should take leadership of this activity. Workshops are planned to draw the physical and social science communities together through agreed definitions of key words and concepts, which will be documented in a white paper. Research will initially focus on building a community of interested scientists and on reviewing recent experience and current capabilities. Subsequent work will include development of new models within an end-to-end framework; use of social media to construct and validate models; and representation of the dynamic nature of vulnerability from socioeconomic datasets. In each case, initial activities will be to survey and share current approaches, including with private sector meteorologists, then to facilitate progress through joint meetings and to evaluate new capability in Forecast Demonstration Projects.

User-oriented Evaluation. Research will focus on the profile of accuracy and value through the forecasting, warning and communication chain with an emphasis on the information required by decision-makers to build their trust in the information they receive. An intercomparison project will assess whether recent advances in meteorological verification can usefully be extended to more variables, including the hazards themselves where allowing for observation quality will be important. A white paper will be published and new techniques will be evaluated in Forecast Demonstration Projects. Together with the communication theme, a catalogue of post-event reviews of the effectiveness of forecasts and warnings will be compiled. Targeted workshops and conference sessions will be held to involve users and social scientists in exploring metrics of the value of forecasts and warnings in user decision-making. Evaluation requires observations so this theme will work with the human impacts, vulnerability and risk theme to investigate how to use new sources of data in verification. Research on economic benefit of forecasts and warnings, will also be carried out through workshops involving economists and private sector meteorologists, leading to the publication of a white paper.

Communication. Research will focus on the choices of information content, language, format and media channels used, spatial and temporal precision, timeliness, context and trust that together determine whether forecasts and warnings will be received, understood and acted on. A catalogue of post-event reviews will be developed, together with regular surveys and workshops involving weather services, private sector meteorologists and key user groups. This will be used to assess high impact weather communication methods and their transferability, leading to a published review paper. The role of social media will be investigated, with the aim of identifying and documenting and sharing best practice. Results will be evaluated in Forecast Demonstration Projects and success stories shared. Workshops and special sessions at conferences will be convened and a journal special issue is planned to attract social scientists to contribute in this field.

Eight cross-cutting activities have been identified across the themes to draw them together: applications in the forecasting process, design of observing strategies, uncertainty, field campaigns and demonstrations, knowledge transfer, use of verification, impact forecasting and data management/archiving. Some of these serve to ensure that key common areas of expertise are applied throughout the project, while others will enable the pooling of skills and resources so as to take forward and demonstrate the results of multiple research themes.

Many of the research and cross-cutting activities will converge on field campaigns, Research Development Projects and Forecast Demonstration Projects (RDP/FDPs), which will be focussed on particular hazard forecasting problems in specific climates so as to establish an evidence base of best practice that may be applied globally. One such activity is the planned North Atlantic Waveguide and Downstream Development Experiment (T-NAWDEX), which will link activities across a variety of spatial and temporal scales, drawing on both the academic and operational communities. Another is the Lake Victoria Experiment (LVB-HyNEWS), whose aims include developing hazard warnings for those working on the Lake. Further RDP/FDPs will be promoted, probably in conjunction with field experiments aimed at broader objectives, in the areas of urban flooding (including the RELAMPAGO project in South America), winter weather (including the CHAMP project in North America), fire weather (possibly with a planned experiment in Australia) and extreme local winds (including the PECAN project in the USA). It is also planned to use available forecasting testbeds, including the Hazardous Weather Testbed in the USA, to evaluate advances in use of observations, modelling and product generation.

The proposed research will revolutionize the information available to be used in support of weather-related hazard management, providing better accuracy and more relevance, from systems designed with proactive risk reduction and effective emergency response as their aim. At the same time, the research benefits will cascade to "normal" weather, enabling National Hydrometeorological Services to make more effective contributions to their national economies, especially in less developed countries. These outcomes will contribute significantly to delivering the aims of the follow-on to the Hyogo Framework for Action, which will be agreed at Sendai in 2015.

The research will build on advances made in THORPEX and dovetail closely with the other two projects arising from THORPEX: the Polar Prediction Project and the Subseasonal to Seasonal Prediction Project. The WWRP and THORPEX working groups, particularly PDP, DAOS, TIGGE, WGNR, MWFR, JWGFVR and SERA, have played key roles in defining the project and their successors will continue to be important contributors to the research. Links with the climate impacts community in WCRP will be developed to enable research results gained in HIWeather to be applied to assist communities and countries in their adaptation to a changing climate. The cooperation between the academic and operational communities developed in THORPEX will be maintained and strengthened. The programme will work closely with other international and national programmes in disaster reduction and hazard forecasting, and will establish links with major business-led programmes that address weather sensitivities. A primary goal will be to build capacity in less developed countries, particularly through the RDP/FDPs, engaging widely with the academic and emergency response communities in the host countries.

The project will be governed by a Steering Group consisting of two co-chairpersons representing the physical and social sciences, together with chairpersons of task teams for each of the research themes. These task teams will consist of the PIs of activities being carried out in the theme. The Steering Group will report to WMO through the WWRP and will be advised by a Strategic Advisory Group consisting of senior representatives of key user communities, including Disaster Reduction, Weather Services, Economic Development, Health as well as the relevant WMO Technical Commissions, CBS, CHy and CIMO.

The project will be working in an area that has traditionally been very fragmented, both in discipline and regionally. Success will depend on attracting people to meet and work together in workshops, conference sessions and summer schools. To achieve this, the project will require administrative support in the form of an International Coordination Office and financial support from a trust fund amounting to at least CHF 200,000 per year to cover travel to management meetings, costs of workshops, publications and travel to scientific meetings for participants from developing countries.
