

Our ref.: CLW/HWR/CHy

GENEVA, 21 July 2014

First Circular Letter (December 2012-June 2014)

Dear Colleagues,

Typically, the first circular letter from the president of the Commission for Hydrology (CHy) for a new intersessional period is transmitted shortly after the Commission session, but before the Advisory Working Group (AWG) has had time to fully engage the many activities for which it is responsible. However, it became clear soon after CHy-14 that we were entering an unusually busy period at the World Meteorological Organization (WMO), particularly within CHy. Thus, I decided to defer preparing this update until after the AWG had been able to initiate the broad array of activities within its Terms of Reference. As a result, this circular letter is longer than would usually be expected. However, as you will see, much has been accomplished in the eighteen months since CHy-14, and I hope that you will agree that the AWG has made an outstanding start to fulfilling the goals established by you at the fourteenth session.

Fourteenth session of CHy

The fourteenth session of CHy was held in Geneva from 8-14 November 2012. The abridged final report of the session is available at:

http://www.wmo.int/pages/prog/hwrrp/chy/chy14/documents/final_report/1105_en.pdf.

The programme of work adopted by the Commission for the period 2013-2016 focuses on five thematic areas: Quality Management Framework – Hydrology; Data Operations and Management; Water Resources Assessment; Hydrological Forecasting and Prediction; and Water, Climate and Risk Management. Data Operations and Management is a new theme, while the others continue and expand on activities from the previous period. The new Data Operations and Management theme was established largely to oversee the testing, evaluation, and potential adoption of WaterML 2.0 as a WMO standard for information exchange. WaterML 2.0 is designed to facilitate the exchange of hydrological data in a common format. If the recommendation is made to adopt it, and CHy concurs, then WaterML 2.0 could be registered as a joint WMO/ISO standard. In addition to the five thematic areas, Congress has tasked the Commission with contributing to several WMO priorities, including the Global Framework on Climate Services (GFCS), the WMO Integrated Global Observing System (WIGOS), Disaster Risk Reduction (DRR) and Capacity Development. The following update is organized around these themes and issues.

To: Members of the Commission for Hydrology (CHy-195)

Activities of the president of CHy (Harry Lins)

The president of CHy maintains general responsibility for guiding and coordinating the activities of the Commission and its Advisory Working Group between sessions of the Commission. He is also charged with executing specific actions prescribed by decisions of Congress and the Executive Council, as well as by the regulations of the Organization. Not surprisingly, in an Organization as complex and dynamic as WMO, this can entail numerous and varied tasks. This has certainly been the case during the past 18 months. Highlights of the president's activities follow.

Advisory Working Group (AWG)

The president chaired the first meeting of the CHy AWG in February 2013. The modes of operation of the AWG, as well as the work plans for each member of the AWG, were finalized and approved. In addition, there was a thorough review of cooperation with the regional associations related to hydrology and water resources, the World Hydrological Cycle Observing System (WHYCOS), capacity development, particularly as related to education and training, and cooperation with other international organizations. Details associated with the actions and work plans of each AWG member will appear in subsequent sections of this circular letter.

Presidents of Technical Commissions (PTC)

Two meetings of the PTC have been held since CHy-14. The first was held in January 2013. It addressed a number of inter-commission issues and cross-cutting activities, which included: responsibilities of technical commissions in the revision of Technical Regulations Volume I (how to write standards and where Volume I requires attention); progress in adjusting the operating plans of technical commissions to meet the decisions of Cg-XVI with respect to WMO polar activities; progress in developing programme-specific additions to the Practical Guide for the Implementation of a Quality Management System for National Meteorological and Hydrological Services; inter-commission consultations on data policy issues related to GFCS and contributions to the EC Task Team; the develop of common ISO/WMO standards; changes to the WMO Core Metadata Profile and the method of authorizing changes; the Severe Weather Forecasting Demonstration Project (SWFDP); progress on the implementation of WIGOS; the Flood Forecasting Initiative Advisory Group; the implementation plan for the WMO strategy for service delivery; a discussion of the limitations of climate modelling; and progress regarding WMO strategic and operational planning.

At the second PTC meeting, in January 2014, the presidents reviewed the efficiency and effectiveness of inter-commission task teams and working groups; evaluated the recurring problem of a lack of quorum in voting by correspondence for the election of technical commission (TC) vice-presidents (this is an issue that affected CHy during the last intersessional period) and with reaching a quorum even during TC sessions; follow-up actions related to implementation of the WMO Strategy for Service Delivery; progress made in the establishment of the Disaster Risk Reduction Focal Points within technical commissions and technical programmes; impact-based forecasting and risk-based warnings; the WMO emergency response to typhoon Haiyan; the International Cloud Atlas; a new proposed approach to the approval process for WIGOS Regulatory Material (WRM); the WMO Strategic Plan 2016-2019; and the major decisions of the First Session of the Intergovernmental Board on Climate Services (IBCS).

WHYCOS

The president chaired the tenth meeting of the WHYCOS International Advisory Group (WIAG-10) in October 2013. The meeting was informed that the WMO Secretariat is taking action on the recommendations of the WHYCOS independent evaluation conducted at the request of

Congress in 2011, and is studying the best operational arrangements in the Secretariat to provide maximum support to the implementation of the programme and its components. Some of the recommendations are also being addressed in the ongoing review of the WHYCOS Guidelines. There was also recognition at the meeting that HYCOS projects cannot continue to stand alone and must be mainstreamed into NHSs networks and activities, linked to other activities of river basin organizations, directed to meet data, information and service needs of society and contribute to value-adding initiatives like GFCS, disaster risk reduction and flood forecasting systems. Meeting participants also underlined the need to develop and pursue a strategy to communicate, publicize and market the benefits of WHYCOS to governments, donors, the private sector, international programmes, private foundations and society at large in order to attract funding.

Flood Forecasting Initiative Advisory Group (FFI-AG)

The president chaired the first meeting of the FFI-AG in October 2013, which had been established in 2011 by Sixteenth Congress (Resolution 15 (Cg-XVI)) to provide guidance and advice on the hydrological forecasting elements of a number of flood-related initiatives and programmes ongoing within WMO, and to provide broad-based support to improve collaboration between the meteorological and hydrological communities for more effective flood forecasting related practices. The primary outcome of the meeting was the development of a workplan for the Advisory Group, which consists of nine activities: (1) advise on the concept, objectives, expected benefits/costs, strategy and action plan, and future development of the WMO FFI; (2) review and assess the FFI status and propose strategies for remedial action as necessary; (3) review and assess the progress of FFI projects upon request; (4) advise on standards for the implementation of the FFI; (5) review the relationship of the FFI with other relevant international programmes; (6) identify and evaluate constraints on and risks to the future implementation of the FFI; (7) consider and propose plans for effective advocacy of the FFI; (8) promote awareness about raising the social and economic benefits and value of flood forecasting systems; and finally, (9) review and advise on the FFI's terms of reference and composition. One area in which particular progress has resulted is in closer collaboration between the SWFDP and the Flash Flood Guidance System (FFGS) with Global Coverage.

Associated Programme on Flood Management (APFM)

The president represented CHy at the June 2013 meeting of the APFM Advisory Committee (AC). The AC reviewed programme activities during 2012-13, and discussed issues related to publications, APFM tools, HelpDesk operations, field demonstration projects, capacity building, outreach, and cooperation with support base partners and the Global Water Partnership (GWP). The AC made several recommendations of particular note, including: (1) that there was a need to develop success and performance indicators, using a results-based monitoring framework, and making use of the experience from the GWP; (2) that a concerted effort should be made to connect APFM and Integrated Drought Management Programme (IDMP) activities with GFCS; and (3) that the GWP should offer financial support to APFM activities under GWP's Water and Climate Programme.

Integrated Drought Management Programme (IDMP)

A joint GWP and WMO preparatory meeting for the IDMP was held in June 2013, immediately following the APFM meeting. The president represented the Commission at this meeting as well. The GWP underscored its commitment to IDMP and stressed the obvious links between IDMP and the APFM. A series of actions/decisions were forthcoming from the meeting, although two were of particular importance. First, highlight IDMP's association with GFCS with promotional material including website links, and second, establish an intermediate, including a "Help Yourself" section that would contain tools and concept papers.

WMO Integrated Global Observing System (WIGOS)

WIGOS is an integrated, comprehensive, and coordinated system comprised of the existing WMO global observing systems, particularly the in-situ and space-based components of the Global Observing System (GOS), the Global Atmosphere Watch (GAW), the WMO Hydrological Observing Systems (WHOS, including WHYCOS) and the observing component of the Global Cryosphere Watch (GCW), including their surface-based and space-based components. The president is a member of the Inter-Commission Group WIGOS (ICG-WIGOS), the body charged by EC, in accordance with Congress, to establish Inter-Commission Task Teams as and when required with representatives of international partner organizations to address WIGOS standardization process, WMO regulatory material issues, and improvement of WIGOS observing components. Since CHy-14, there have been two meetings of the ICG-WIGOS wherein WIGOS key activity areas have been reviewed. These include: (a) management of WIGOS Implementation; (b) collaboration with the WMO co-sponsored observing systems and international partner organizations and programmes; (c) design, planning and optimized evolution of WIGOS and its regional, sub-regional and national component observing systems; (d) observing system operation and maintenance; (e) quality management; (f) standardization, system interoperability and data compatibility; (g) The WIGOS Operational Information Resource, (h) Data Discovery, Delivery and Archival, (i) capacity development; and (j) communications and outreach. The Inter-Commission Group further agreed on an updated version of the WIGOS Framework Implementation Plan (WIP) to be submitted to EC-66 in June 2014.

WHOS

One of the first issues that the president of CHy confronted in working with the ICG-WIGOS was a broad misperception of what WHYCOS actually is and does. Throughout WMO there was a pervasive impression that WHYCOS was the hydrological counterpart of the Global Climate Observing System (GCOS), the Global Terrestrial Observing System (GTOS), and the Global Ocean Observing System (GOOS). Although when WHYCOS was established in the early 1990s there was a proposal to build an observing network of roughly 1,000 existing stations worldwide, that proposal never materialized. Soon after its creation, WHYCOS became a capacity-building activity that was implemented through the establishment of regional HYCOSs, aimed at assisting developing countries in building an observing capability. As a result, the focus of WHYCOS has always been on facilitating the development of an observing network rather than on providing data from a worldwide network of hydrologic stations. Given the advent of WIGOS, and the emphasis on the data from “integrated global observing systems,” it was clear that CHy had to address the need for an easily accessible database of high-quality, continuous, and near real-time hydrological observations from around the world. To meet this need, the president of CHy has proposed the establishment of WHOS. WHOS is conceived as a portal to facilitate access to already available on-line real-time and historical data, drawing from the water information systems of countries around the world that make their data freely and openly available, including HYCOS projects. Currently, the president and members of the Advisory Working Group are working with a CHy expert to establish a prototype WHOS portal for review by the Commission during 2014.

Re-establishment of the Regional Working Group on Hydrology in RA IV

The president of CHy, working with Hydrological Advisers and experts across RA IV, developed a proposal for the re-establishment of the RA IV Working Group on Hydrology (WGH), which had been disbanded in 2009 as part of a reorganization of management structures within the Region. The proposal included new and specific terms of reference, as well as the establishment of a regional hydrology forum to provide a platform where all the issues and challenges related to the operation of hydrological networks and services can be discussed among interested professionals and other stakeholders. The proposal was debated and approved at the sixteenth session of RA IV in 2013 in Curaçao, and the WGH was subsequently re-established. The Regional Hydrology

Forum was developed as an online communications platform in early 2014 to support the RA IV WGH, and is now operating at http://www.whycos.org/chy/WGH_RAIV/.

Activities of the vice-president of CHy (Zhiyu Liu)

The vice-president of CHy is responsible for a diverse suite of Commission activities. One of the more important tasks involves coordinating the review and production of CHy publications. In this regard, the *Note on Stationarity and Non-stationarity* was reviewed and approved, and has now been published on the CHy website. (See http://www.wmo.int/pages/prog/hwrp/publications/statements/Stationarity_CHy_Statement.pdf.) In addition, *The Guidelines on Hydrological Data Rescue* was reviewed by five specialists, and is being revised by the author. Publication is planned for later this year.

The vice-president is also charged with monitoring and updating the Hydrological Information Referral Service (INFOHYDRO). In support of this activity, a call to hydrological advisers to update the information for their countries contained in INFOHYDRO was issued. The INFOHYDRO website was subsequently updated by the WMO Secretariat in response to the replies received.

Identifying and leading actions associated with the education and training requirements of Commission activities are critical tasks for the vice-president, and several items within this work element have been accomplished to date.

The training material on the WMO Manual on Stream gauging has been translated into Spanish and is being translated into French and a Training of Trainers for Spanish-speaking Instructors on Stream Gauging was held in Mexico from 11 to 15 November 2013. The community of practice of instructors in stream gauging is being developed and is intended to be activated by July 2014.

Distance Learning Courses in Basic Hydrology Sciences were held in 2013 for Asia and Africa, with a second edition for Asia held in March and April 2014. These courses are jointly organized by WMO, COMET, the National Oceanic and Atmospheric Administration (NOAA) and a local WMO Regional Training Centre (RTC), India National Water Academy in the case of Asia and the Institute for Meteorological Training and Research (IMTR) of Kenya for Africa.

One other training-related element of the vice-president's workplan involves the provision of guidance, advice and training on the spatial estimation of rainfall and other hydrological parameters, including the use of remote sensing (e.g. radars and satellites). To assist him in this duty, WMO supported his attendance at the Weather Radar and Hydrology (WRaH) International Symposium, which was sponsored by the American Society of Civil Engineers in Washington, DC in April 2014.

Quality Management Framework(QMF) – Hydrology (Paul Pilon)

An important element of the QMF-Hydrology theme is the continued implementation of the project to assess the performance of flow measurement instruments and techniques (Project X). In the period since CHy-14, five teleconferences and one face-to-face meeting have been held. A workplan has been developed and has been finalized and is ready for consideration by the Advisory Working Group. The workplan, which is a living document, is available at: http://www.wmo.int/pages/prog/hwrp/Flow/flow_tech/workplan.php. A community of practice has been launched for the project management committee to facilitate sharing of documents and communications among participants.

A second element within this theme involves the preparation of background material for NHSs explaining why they should use standard methods in their data collection. A WMO QMF website has been launched (<http://www.wmo.int/pages/prog/hwrrp/qmf-h/index.php>) and contains a number of relevant documents.

A third QMF-Hydrology element aims to facilitate the development of policies, frameworks and information sources for promoting standardization/guidance of the most suitable equipment and technologies in order to achieve high levels of reliability, user knowledge training effectiveness and other economies of scale. The Project X management committee reviewed a proposal for a Hydrometric Technology Verification Program (HTVP). The management committee concluded that such an activity would be advantageous and would add value to currently on-going verification efforts undertaken by NHSs. The management committee has included in its workplan additional consideration of the HTVP, which will likely be referred to as an Independent Verification Proposal. If approved, it will be presented to the CHy Advisory Working Group for its consideration.

A critical quality management element involves coordinating a review of ISO and other standards, and to specify what joint ISO/WMO standards will be and how they will be established. There have been three meetings involving ISO staff, WMO staff, and the AWG member to discuss the process and how NHSs might be able to access ISO publications and use them in the development of Standard Operating Procedures (SOPs) of various NHSs and avoiding potential lawsuits for use of copyrighted material. In a recent meeting, a potential approach to joint standards was proposed whereby WMO, as a liaison to an ISO Technical Committee, could submit a document for consideration under the various categories of ISO publications (i.e., technical document, technical specification, standard). The review process was also discussed. It became apparent that very few documents produced by the WMO Hydrology and Water Resources Programme (HWRP) would likely be submitted through the joint WMO/ISO standard process, while more might be considered through the liaison role. There were two possible advantages that were evident from discussions for having HWRP documents available on the ISO website. One was that having WMO HWRP documents within the ISO system would increase awareness and possible availability, although acquisition through the ISO is at a cost to the requester. The second is that within the ISO process, AFNOR (France's national standards organization) may decide to translate the document into French, with the translation being made available to WMO, which could then make it available to NHSs.

Discussions were also held on how WMO and NHSs might be able to access on-line ISO standards. The AWG member is preparing a preliminary list of ISO documents that would be of most interest to NHSs (e.g., mentioned in Technical Regulations Volume III – Hydrology and in our manuals). ISO is assisting in this activity as are the Project X experts and management committee. Currently, we are guardedly optimistic that progress is being made toward an agreement whereby at least some ISO documents will be made available to NHSs worldwide.

An ongoing aspect of QMF-Hydrology is the review of material for the Technical Regulations (Volume III – Hydrology). A thorough review and revision of the material represents a daunting undertaking, both in terms of magnitude and structure of effort. The existing workplan calls for the formation of an editorial board to oversee and drive the review, but this has not yet happened. The responsible AWG member has suggested the need for appointing an expert who can be tasked with undertaking this review. That suggestion is currently under discussion between the president of CHy and Secretariat staff.

A separate review effort is also underway that is looking at the potential need to revise relevant HWRP documents from a QMF perspective. Recommendations have been made to review and update the *Guidelines on the Role, Operation and Management of National Hydrological Services*, and the *Manual on Low-flow Estimation and Prediction* so that these documents can be given a QMF-H designation, indicating that their contents are consistent with

desired QMF practices. To date, an expert has been selected to update the “*Guidelines*” document with a timetable for completing the update by the end of 2015.

The AWG member responsible for QMF-H has been representing CHy on the WIGOS Task Team on WIGOS Regulatory Material (TT-WRM). Drafts of the WIGOS Manual and the WIGOS Technical Regulations have been prepared and are ready for review. Our AWG member has been an active participant in this process to ensure that the many differences between CHy procedures and those of the rest of WMO are fully understood and accommodated. This has been a very laborious and difficult task, and our representative has served our interests exceedingly well.

Data Operations and Management (Tony Boston)

As requested by CHy-14, a community of practice on database management systems has been established, based on the open source MCH (Meteorology, Climatology and Hydrology) system. MCH, originally developed in Spanish and installed in several Latin-American countries, has been translated into English and French and installed in Ghana, Belize, Curacao, Albania, Bosnia Herzegovina, with several other countries to be added in the next few months. In all cases, NHS staff has been trained in the operation and management of the system.

A significant amount of progress has been made in the development and application of WaterML 2.0. Much of this effort involves close coordination between CHy and the WMO/Open Geospatial Consortium (OGC) Hydrology Domain Working Group (HDWG), on which our AWG member is a co-chairperson. In particular, current HDWG activities include the development of a candidate standard WaterML 2.0, Part 2, on Ratings, Gaugings and Sections. This candidate standard will be tested in the coming months through an interoperability experiment in Australia, the USA, and the UK. There has also been a release of a Sensor Observation Service (SOS) profile for hydrology that defines how WaterML 2.0 should be made available using the OGC web service.

Another aspect of this theme area involves monitoring and reporting on new developments dealing with data management issues, such as observations, data exchange and protocols, data transfer formats, data information, as well as the WMO Information System (WIS) and WIGOS. An awareness-raising article has been prepared and submitted to the WMO Bulletin entitled *Global Initiatives in Hydrological Data Sharing*. An update to the Global Runoff Data Center's (GRDC) Hydrological Metadata profile of ISO 19115 has also been released. Our AWG member responsible for this theme is currently investigating the possibility of publishing a list of commercial and open source water data management systems on the WMO website that support OGC services for hydrological data exchange, along with guidelines on their implementation and use. He is also investigating the use of the WMO Information System (WIS) for registering hydrological data services.

With respect to reviewing progress on the exchange of hydrological data and products, as well as protocols for providing information on data use, a survey was released in September 2013 on the exchange of hydrological data. Initial results were presented to the WMO/OGC HDWG at that time. A list of commercial and open source software systems supporting OGC services for hydrological data exchange have also been identified. It was noted in the results that better engagement with developing countries through WMO Regional Associations is essential to broaden understanding of the value of, and to encourage the use of, WaterML 2.0.

Finally, in terms of testing and applying WaterML 2.0 in pilot projects aimed at demonstrating the value and utility of WaterML 2.0 and providing a basis for it to become a WMO information exchange standard, a project has been implemented by the Italian National Hydrology Survey (ISPRA). ISPRA has built a national hydrologic information system for Italy's federated

hydrologic data services from observation sites managed separately in 21 geographic regions across the country. There is a HydroCatalog in Rome that compiles the data from HydroServers in each of the 21 regions. Italy has also developed documentation that supports the exchange of hydrological data using WaterML 2.0. The plan is to host this software (open source) on the WMO website. This website could potentially list Hydrological Information Systems that support OGC web services and WaterML 2.0, and other resources of relevance to National Hydrological Services. The site will also include updates of progress in this area, focusing on the current state of standards along with examples of software that supports the standard, with an invitation for other compliant software to be listed on request.

Water Resources Assessment (Antonio Cardoso-Neto and Sung Kim)

There had been plans to hold both a regional and a global Workshop on Water Resources Assessment in late 2013, but due to an already busy schedule and other delays, these meetings did not proceed. Planning is now underway to hold these meetings later this year and early in 2015. In the interim, some discussions have been held with experts to determine what type of manual could be prepared and if so what process would be most suitable for its preparation, given the difficulties that we have faced in the past.

Hydrological forecasting and prediction (Yuri Simonov and Johnson Maina)

The members for hydrological forecasting and prediction have had a very busy year, being involved as the focal points from CHy for Disaster Risk Reduction and also representing CHy on the Flood Forecasting Initiative Advisory Group. For the Disaster Risk Reduction (DRR) meeting, a mapping of the CHy activities in support of DRR was undertaken and reported on to the meeting. The CHy representatives were able to demonstrate the importance of end-to-end systems for the delivery of effective flood forecasting and warning systems.

Work has continued in the Secretariat in terms of improvements to the Zambezi River Basin Flood Forecasting and Early Warning System Strategy, supported by the United States Agency for International Development (USAID). Also supported by USAID, work has continued on the development of regional applications of the Flash Flood Guidance System developed by the Hydrological Research Centre in the USA. APFM, in partnership with GWP, continues to compile and produce guidance documents and tools in support of Integrated Flood Management (IFM). Four new tools have been published in 2013, and seven more are being developed. The most recent tools are on Floodplain Mapping, flood forecasting and early warning, transboundary aspects of flood management and coastal flood management. Training activities in support of countries wishing to adopt Integrated Flood Management Strategies are continuing, with three workshops organized in 2013 (for Mexico, Vietnam, the Balkans and Turkey) and five regional workshops being planned for 2014. Moreover, the HelpDesk on IFM has reached a peak in terms of requests received during the same period, either for rapid guidance or for the development and support of pilot projects. APFM is also supporting the EC-funded project PEARL (Preparing for extreme and rare events in coastal regions) in the Seventh Framework Programme (FP-7), as well as the Instrument for Pre-Accession Assistance (IPA) "Building resilience to disasters in Western Balkans and Turkey". The Integrated Drought Management Programme (IDMP), also in partnership with GWP, is now operational with a Technical Support Unit in the WMO Secretariat, to which contributes also GWP through a seconded expert working in WMO. A number of country and regional workshops have been held over the last few months, also in close linkage with GWP initiatives.

You will recall that at CHy-14, Italy offered to make the DEWETRA platform freely available to members of CHy. The DEWETRA platform is a real-time integrated system for hydrometeorological and wildfire risk forecasting, monitoring and prevention. It has the capability to ingest data from different sources and produce several types of integrated maps, useful for risk-

management decision-makers. As a follow-up to the offer above, WMO organized a workshop in Rome in October 2013, where representatives of 15 countries, from all RAs, were introduced to the system, and the procedures to be followed in case they were interested in requesting it for their country were explained. A Cooperation Agreement between WMO and the Italian Department of Civil Protection (the “owner” of the software) was signed and the first installation mission was undertaken in May 2014 in the Philippines, with the next scheduled for August 2014 in Ecuador.

Water, Climate and Risk Management (Jan Danhelka)

The member responsible for water, climate and risk management has made progress on a number of elements in his workplan, including extended hydrological prediction and downscaling. He attended the AGU Chapman Conference on Seasonal to Inter-annual Hydrological Prediction in Portland, Oregon in July 2013. He presented the CHy activities in the field of extended hydrological prediction (EHP), including the template for case studies and the proposal for the EHP definition. Jan assisted in the development of the Water exemplar for GFCS and represented CHy at the IBCS-1 (July 2013) as a delegate of the president of the CHy. He also represented CHy at the 2nd meeting of Joint Commission for Climatology/Commission for Agriculture Meteorology/CHy Expert Group on Climate, Food and Water and the 5th International Symposium on Climate, Food and Water on Jeju Island in November 2013. The proposed meeting on downscaling will take place in mid-2014.

Chair of the Intergovernmental Council of the International Hydrological Programme of UNESCO (Johannes Cullman, ex-officio member)

Johannes Cullman has continued to provide excellent coordination between CHy and the IHP of UNESCO and contributed significantly to activities associated with hydrological forecasting and prediction. In particular, he has finalized a report on the intercomparison of flood forecasting models and is in the process of preparing for a meeting on extended hydrological prediction in association with Jan Danhelka.

In late 2013, WMO (Secretary-General) and UNESCO (Director-General) signed a new set of working arrangements between the two agencies.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Jan Danhelka', written in a cursive style.

Commission for Hydrology