

WWRP 2014 - 2

Joint Meeting of the THORPEX
International Core Steering Committee
(ICSC) and the World Weather
Research Programme (WWRP)
Joint Scientific Committee (JSC)

(Geneva, Switzerland, 17 July 2013)

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THORPEX
A World Weather Research Programme

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WORLD METEOROLOGICAL ORGANIZATION

WORLD WEATHER RESEARCH PROGRAMME

COMMISSION FOR ATMOSPHERIC SCIENCES

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MARCH 2014

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EXECUTIVE SUMMARY

A joint meeting of the CAS International Core Steering Committee (ICSC) for THORPEX and the World Weather Research Programme (WWRP) Joint Scientific Committee (JSC) was held at the World Meteorological Organization, in Geneva, Switzerland on the 17th July 2013. The joint meeting proceeded with the work assigned by the Commission for Atmospheric Sciences (CAS), the WMO Executive Council and the World Meteorological Congress. This included reviews of the progress in the development of THORPEX legacy projects, possible revisions to the structure of the WWRP post-THORPEX, international collaboration and the WWRP Open Science Conference planned for 2014.

All documents and presentations considered and discussed at the joint meeting may be downloaded from <http://www.wmo.int/thorpex>.

1. ORGANIZATION OF THE JOINT SESSION

1.1 Opening of the Session

1.1.1 The joint session of the THORPEX ICSC and the WWRP JSC was opened by Dr Alan Dickinson (Chair of the ICSC) at 09.00 am on Wednesday the 17th July 2013 at the Headquarters of the World Meteorological Organization, Geneva. He welcomed participants to this unique joint meeting and noted that since the schedule was very busy speakers should keep presentations short. He then invited Dr Deon Terblanche, Director of the Atmospheric Research Environment Branch (ARE), to address the meeting. The Director welcomed participants and expressed his gratitude on behalf of the WMO for the time they had set aside for the meeting. He especially welcomed Michel Béland the President of CAS.

He referred to the book “A crisis of global sustainability” and noted that there are a lot of stresses on the environment and on humankind. Research should come to the forefront to find the solutions to these problems and it is clear that the WMO recognizes the increasing importance of research. Indeed, the WMO 2015 strategy strongly promotes research. However, there is also a need to prioritise, be selective and have a sharp focus when choosing topics. It is good to note the increasing co-operation between the WWRP, WCRP and the GAW. With THORPEX coming to end next year there is need to focus on the future, ensure a smooth transition and enhance interaction between programmes. The restructure of the WWRP is important as is writing up the achievements of the THORPEX programme. The Director expressed gratitude to David Parsons for accepting this task.

The legacy Sub-seasonal to Seasonal Prediction Project (S2S) is well aligned to the GFCS whilst the Polar Prediction Project (PPP) will develop improved services and investigate teleconnections. The third legacy High Impact Weather Project (HIWeather) is still at the formative stage and good progress is being made. However, increased financial support for the Trust Funds for S2S and PPP is urgently needed.

The OSC in 2014 will be an important milestone for the WWRP and good progress is being made with the arrangements. This topic will be discussed further at this meeting.

1.2 Adoption of the agenda

1.2.1 The joint meeting adopted the agenda (see Annex I).

1.3 Working arrangements of the session

1.3.1 It was agreed that Dr Alan Dickinson, Chairman of the ICSC would chair the morning session and Dr Gilbert Brunet, Chairman of the WWRP JSC would chair the afternoon session.

1.4 List of participants

1.4.1 The list of participants can be seen in Annex II.

2. THORPEX LEGACY PROJECTS

2.1 SERA WG

2.1.1 Dr Brian Mills noted that a main topic for the WG is the impact of disasters on society. Disaster losses were rising with time and these were mainly due to hydrometeorological events. Total losses were now around \$150 Bn. In spite of sometimes good forecasts losses were still incurred because of poor responses by emergency managers e.g. the alarm is not sounded e.g. the recent floods in Calgary, Canada.

2.1.2 The membership of the WG has been reviewed and some new members will be needed in the near future. Some recent achievements of the WG were then outlined along with some current and planned activities. These included contributions to planning the OSC, development of a guidance document on the SERA components of RDPs and FDPs, fostering and growing the SERA elements of the new projects, looking at the economic benefits of hydro-meteorological services in Mozambique, making proposals for a study to identify the impacts and benefits of the TIGGE archives and providing user perspectives for the insurance sector. A SERA guidance document will provide detailed information on assessing benefits. The WG has also assisted the S2S and PPP projects by providing comments and text during the planning process. Similarly for the HIWeather project the WG has again been closely involved in making suggestions and recommendations.

2.1.3 Regarding TIGGE a proposal for looking at the benefits and impacts was outlined. There might be two objectives – firstly, TIGGE as a resource for EPS and NWP research and secondly, as a resource to develop new decision support tools and products.

It will be necessary to establish who uses TIGGE (and for what purposes) as well as carry out a bibliometric analysis. It might also be useful to investigate how well TIGGE captured the main Munich Re events followed by specific case studies in a more real time sense.

2.1.4 In discussion it was noted that the TIGGE study could require financial investment although some initial work might be possible on a voluntary basis. Close links would be needed with the Verification WG. The joint meeting welcomed these concrete plans for a SERA project related to TIGGE and hoped the work would move ahead in the near future.

2.2 THORPEX Summary Paper

2.2.1 Dr David Parsons noted that since THORPEX would close at the end of 2014 it was necessary to capture the accomplishments and lessons learnt from the programme. He then outlined the proposed contents of the comprehensive review paper and the other proposed publications that might appear in the literature.

2.2.2 Whilst he would be the lead person it would be essential for success to have the support of the wide range of people who have been involved in the programme.

2.3 Sub-seasonal to Seasonal Prediction Project

2.3.1 Dr Frederic Vitart noted that the S2S project was intended to bridge the gap between weather and climate prediction. He outlined the meetings involved in setting up the project. The Implementation Plan has been finalised and an article for the WMO bulletin has been published.

The Trust Fund has received a generous contribution from Australia and it is hoped that other countries may soon follow. The International Coordination Office (ICO) will be hosted by the Korea Meteorological Administration (KMA). The project contains a good mix of weather and climate people. The intention is that the S2S Planning Group will become the S2S Steering Group.

2.3.2 The objectives of the project were briefly outlined. These include improving the skill and understanding of forecasts on this time scale, promoting uptake by operational centres, and supporting the development of the GFCS. The timescale of interest is 15-60 days ahead. A database is being set up along the same lines as TIGGE. The project will include demonstrations and selected research topics. The main scientific issues were related to modelling matters. Five sub-projects are being created on monsoons, the MJO, Africa, extreme weather and verification. The African sub-project may be supported by donations from Norway.

2.3.3 The cold spring in Europe in 2012 was discussed. Most models represented the patterns quite well. There is a need to look at the influence of sea ice and the MJO. S2S was also looking at instances of flooding in India.

2.3.4 SNAP and SPARC are working on the interactions between the atmosphere and stratosphere and the S2S project will work closely with them. Similarly S2S will work with the PPP project on sea ice and with GLASS concerning the impact of soil moisture on initial conditions. Links with the WCRP-WGSIP are being strengthened and S2S work with WGSIP to look in detail at the first few months from the Climate Historical Forecast Project (CHFP) and also work with WGSIP to consider model errors, teleconnections and for some SERA applications.

2.3.5 The S2S database proposal was outlined. Data will be available in both GRIB2 and Net CDF. Most of the TIGGE variables will be archived along with ocean and stratosphere variables as well as soil moisture and temperature. The first two months of the CHFP will be used for comparison purposes. Eleven centres intend to participate – nine have confirmed so far. ECMWF will be the main archive centre and CMA has expressed an interest in acting as a back up. A test server is expected in ECMWF during 2014 with data entering the database in 2014/15.

2.3.6 An S2S session is planned at the AGU in December 2013 and a Workshop is scheduled for 10-13 February 2014 at NCEP. A BAMS article is also in preparation. During 2015 a two-week training course at ICTP is envisaged. It is expected that the ICO will be launched in November 2013 and a first S2S Steering Group meeting is expected in February 2014.

In discussion ICSC and JSC was requested to approve the conclusion of the activities by the Planning Group by completion of the S2S Implementation Plan and to approve to transfer the Planning Group to the Steering Group, which is responsible to implement the Project. In discussion the importance of the stratosphere was emphasized and it was again noted that S2S will work closely with WCRP groups SPARC and SNAP. However, it was stated that there is no stratosphere expert on the group. It was also suggested that SERA could be the thread to bring the three legacy projects into close co-operation.

ICSC-JSC 1: ICSC and JSC approved the conclusion of the activities of the Planning Group by completion of the S2S Implementation Plan and the transfer of the Planning Group to the Steering Group in November 2013.

2.4 Polar Prediction Project

2.4.1 Prof. Thomas Jung outlined the progress made with this project. He noted that the scope of the project reaches to the seasonal timescale. The Science and Implementation Plans have been published. An offer by Germany to host the ICO has been accepted. It will be situated at the Alfred Wegener Institute (AWI) and administrative support and a scientific officer will be provided. A draft website is available and includes a link to the WCRP PCPI initiative.

2.4.2 A Polar Prediction Workshop was hosted by ECMWF from 24 to 27 June 2013. A number of early career scientists were present and a set of working groups formulated recommendations for future work. Mio Matsueda has extended his toolbox to include polar regions. Some statistics are now being examined. Some results from the ECMWF meeting were then outlined including the subject of teleconnections which is seen as a topic of considerable importance at present. Some of the other recommendations from the Workshop included the importance of coupled prediction systems, the need for an integrated approach to boundary layer parameterisations, the importance of starting to use all the available polar observations now, quantifying the predictive limits for sea ice, the need to hold further workshops and summer schools and the importance of engaging with the private sector active in polar regions e.g. the shipping industry.

2.4.3 The ECMWF Workshop was followed by a planning meeting for the Year of Polar Prediction (YOPP). The workshop resulted in 51 action items amongst which is the need to align the YOPP with MOSAIC, adjust the YOPP period to mid- 2017 to mid -2019, carry out a pre-YOPP with SHEBA data, provide a YOTC type data set for the YOPP, engage scientific and commercial communities, establish a YOPP data centre, organize verification activities, and consider teleconnections as a possible PPP “flagship” topic.

2.4.4 The WCRP Polar Climate Predictability Initiative (PCPI) was then described. There would be three topic areas considered jointly with the PPP these are re-analysis, polar prediction and model error.

2.4.5 The next steps for the PPP project include preparing a YOPP brochure, interacting with the funding agencies, preparing a detailed YOPP planning document (by October 2013), organising a special issue of the Quarterly Journal of the Royal Meteorological Society on polar prediction, organizing a second YOPP planning meeting and setting up a 2015 summer school.

2.4.6 Some of the issues with the project concerned the delay in setting up the ICO, the lack of contributions to the Trust Fund and funding PPP activities long term.

2.5 High Impact Weather

2.5.1 Prof. Sarah Jones introduced recent work directed at establishing a HIWeather project. The Workshop in Karlsruhe received a large attendance as did the Town Hall at the AMS meeting. This suggested that there was indeed strong interest in a new project. A Task Team of 21 scientists has been formed and based on their guidance Brian Golding (a WMO appointed consultant) has prepared a first draft of the project plan. It is expected that the plan will be revised for submission to CAS in November 2013 and if all goes well presented to the WMO EC for approval in June 2014. A main thrust of the HIWeather project is to promote co-operative research to achieve a dramatic increase in resilience to HIW events worldwide. The approach to the definition of the research topics is therefore impacts led i.e. social, economic and environmental. The programme will be specifically designed to respond to the needs to users.

2.5.2 It is intended that the project will be essentially application driven. This will lead to the specific research topics to be followed. The research programme will have a number of themes relevant to the applications. These will include RG1 - Predictability and Processes (atmosphere, ocean, land surface), RG2 - Multiscale Prediction of variables needed to forecast weather impacts (coupled EPS systems on timescales from minutes to days and from local to global, sand and dust, volcanic ash etc.), RG3 - Producing more relevant forecasts and warnings (assessing the impacts of hazards on individuals, communities and businesses, the impact of disasters on health and well being etc.), RG4 – Identifying deficits and growing trust in forecasts (rigorous evaluation of forecasts and warnings, how to measure the benefits of research, evaluation of how people respond to forecasts etc.), RG5 – achieving more effective responses (improving the formulation and communication of forecasts).

2.5.3 In order to link these research themes seven crosscutting applications are envisaged. These are applications in the forecasting process, design of observing strategies, defining uncertainty, carrying out field campaigns and research demonstrations (such as the Lake Victoria project, T-NAWDEX etc.), knowledge transfer, verification and impacts forecasting.

2.5.4 It was noted that a mandate is needed to engage with the relevant national and international bodies to establish user needs and priority applications. It was also noted that considering extreme events with low probability will require large data sets. The project is intended to build on THORPEX and will be essentially defined by the needs of specific weather related applications. It is essential to communicate closely with stakeholders, exploit high resolution (HR) models, include coupled systems and address vulnerability and risk evaluations well as focus on improving communication of the forecast. The interface with the S2S project is at around two weeks whilst for the PPP project the delineation is primarily geographical.

2.5.5 The joint meeting welcomed the new project and supported the submission to CAS. Also, the HIWeather project appears to be very broad and it will be necessary to be selective. The meeting also strongly supported the approach of concentrating on selected applications and using these to define the research required. It is also essential to involve stakeholders from the start of the project. The presence of observations topics and recognition of the importance of urbanisation were also welcomed. The first steps in implementing the project are seen as defining the priority applications, engaging the key stakeholders and setting the metrics for success.

ICSC-JSC 2: The HIWeather TF is asked to define and communicate the next steps (and timelines) in developing the HIWeather project proposal for submission to CAS in November 2013.

2.6 WCRP Perspective

2.6.1 Dr Michel Rixen outlined the role of the WCRP in the GFCS and noted the recent restructuring that has taken place to provide a Modelling Council and Data Advisory Council. There is then a series of WGs and other groups including CLIC, CLIVAR, GEWEX and SPARC. All groups will seek to address the WCRP key challenges during the next 5 years.

2.6.2 He then outlined some of the main WCRP projects including a coupled model intercomparison (CMIP5). The links between the WCRP WGSIP and the S2S project were noted. WGSIP addresses seasonal to interannual prediction and has set up the CHFP archive which S2S will utilise for the first few months ahead. There are three sub-projects on the land surface, the stratosphere and on sea ice. All these activities will be relevant to the S2S project.

2.6.3 It is still felt that climate models are missing some key processes involving interplay between the oceans, atmosphere, cryosphere, clouds, etc., Thus some key uncertainties remain and these need to be tackled. There are also issues related to coupling clouds to the general circulation. In some senses clouds are the biggest challenge in weather and climate modelling. An additional difficulty arises because model developers are becoming fewer in number. To help address this WCRP is organising summer schools devoted to this topic and establishing a WCRP/WMO prize in this area. The WCRP is also active in promoting workshops on dynamics, systematic errors (through transpose AMIP) and coordinating efforts on surface fluxes.

2.6.4 WCRP strongly promotes the seamless prediction approach and is very active in YOTC, S2S, PPP, the MJO TF, the Grey Zone, transpose AMIP and other areas related to metrics and verification. Ten years ago the collaboration with WWRP was very low now it is regarded as excellent.

2.7 Severe Weather Forecast Demonstration Project (SWFDP)

2.7.1 Effort is being devoted to improving services, lead times, disaster risk reduction and the interaction of NMHSs with end users. Capacity building and moving towards climate change adaption were important elements. There are now initiatives in Southern Africa, the South Pacific Islands, E. Africa and two others in Asia involving a total of more than 40 countries. The projects organize a data flow from the global to regional and then to the NMC level. The NMCs remain responsible for the issue of forecasts and warnings within national boundaries. Regional Centres provide a key role in offering guidance and additional products to NMCs. Project Management groups decide what new products will be introduced employing formal change management methods.

2.7.2 It is recognized that GIFS-TIGGE research could add important new ensemble products. Probabilistic HIW forecasts in near real time could be of real value to the SWFDPs. However, whilst the regional centres can provide some monitoring and evaluation of these projects the available effort and expertise is limited and so the products should be reasonably advanced and mature before exposure to the forecasters. There was also the pressing need to deal with the short range using e.g. improving satellite imagery tools. The SWFDP focus is very much on high impact weather out to 3-5 days ahead e.g. flash floods, heavy rain and strong winds. Also required were training programmes for forecasters and managers. There are identified gaps in expertise and skill in relation to tropical convection, the rapid on-set of severe weather and a general lack of appropriate forecasting tools. There is little data to help with the first 12 hours (very few observations and usually no radar data) so a major reliance is placed on satellite data.

2.7.3 In discussion it was noted the proposed HIWeather project would like to develop close links with the SWFDPs and better understand their requirements on the shorter time scales. Regarding the Lake Victoria project it was said that the main issue is rapidly developing convective storms generating gust fronts which result in the deaths of many local fishermen. A high resolution wave model would probably be of significant value. The UK Met Office 4km atmospheric model performs surprisingly well but there is a need to evaluate its accuracy in predicting convergence lines and the diurnal cycle. Additional observational data would be very valuable.

2.8 THORPEX Restructure – input from ICSC 11

2.8.1 Dr Alan Dickinson briefly outlined the discussions that had taken place at ICSC 11 in the previous few days concerning post- THORPEX arrangements. The ICSC meeting considered the formation of new WGs, the future of the Regional Committees (RCs). ICSC 11 supported the merger of the PDP and GIFS-TIGGE WGs and the move of the DAOS WG both new to become new WGs of the WWRP. It is planned that the IPO and ICSC will cease at the end of 2014 and the Trust Fund be wound up.

2.8.2 The ICSC also agreed that the RCs could continue to function under the WWRP provided that they are self-funding and self-organising.

2.9 Proposal for a new WWRP Expert Team on Predictability, Dynamics and Ensemble Forecasting

2.9.1 Dr Richard Swinbank noted that GIFS-TIGGE WG has shifted emphasis to research on ensembles. The WG was now looking at calibration of EPS forecasts, combination of ensembles and R&D on probabilistic products. The interests now extended to representation of uncertainty in initial conditions, stochastic physics and generally how to improve EPSs. On the other hand the PDP WG worked on the theoretical basis for ensemble forecasting. They also considered the relationship between dynamical processes and the accuracy of weather forecasts and contained a good mix of academic and operational people. So bringing the two WGs together makes sense. The ET transition of TC Malakas was shown as a good example of the interplay between the dynamics of a TC, ensemble forecasting and uncertainty in evolution of the storm.

2.9.2 The projects S2S, PPP and HIWeather are focused on key research “hot spots” while the WWRP working groups should cover the entire spatial, geographical and temporal domains. The new WG would act to support these and other projects through fostering research on dynamics, predictability and ensembles and bridging the gap between the academic and operational communities. The group could also steer development of the TIGGE and TIGGE-LAM archives and promote further use of these databases. One of the specific scientific issues the WG would look at is the origin and growth/evolution of errors. It is felt that WGNE does not have the time to fully explore this topic.

2.9.3 Concerning transition arrangements it is hoped that the PDP and GIFS-TIGGE WGs will meet early in 2014 and define in detail the scope and responsibilities of the new merged group. The merger would then take effect at the end of 2014. A number of new members for the joint group will be needed.

ICSC-JSC 3: The meeting endorsed the proposed merger of the THORPEX PDP and GIFS-TIGGE WGs to form a new WG of the WWRP and the move of the THORPEX DAOS WG to become a WG of the WWRP noting that the specific roles and responsibilities of the groups in the WWRP structure will need to be considered and agreed by the WWRP JSC (in consultation with WGNE as necessary).

2.10 Impacts to the WWRP Structure

2.10.1 Dr Tetsuo Nakazawa considered some of the implications for the WWRP as the THORPEX programme comes to an end. There is a need to accommodate the two proposed new WGs and consider rationalisation of the current WWRP structure. He illustrated the proposed changes

diagrammatically noting the links to the WCRP, WGNE etc., and said that it would be challenge to make the new “matrix” structure work. In addition it will be necessary to make some WMO budget arrangements to support the new WGs from 2015 onwards. Further discussions were necessary to finalise the proposals and to identify the specific roles of all the groups in the new structure.

3. INTERNATIONAL COLLABORATION

3.1 GEO

3.1.1 Dr Jim Caughey introduced the document. The development of the new GEO Work Plan for 2012-2015 was noted. The Plan adopts a more target driven approach and has a three part structure devoted to infrastructure, institutions/ development and information on societal benefits. The number of GEO Tasks has been reduced compared to the previous Plan. In addition an improved Work Plan management structure has been introduced.

3.1.2 The GEO 2015 strategic target for Weather was described. This will be achieved through the programmes of the WMO. The THORPEX activities contribute to the achievement of this target in areas such data assimilation, modelling systems and verification and assessment.

3.1.3 There are several THORPEX projects that appear within the Plan. These are WE-01 C1 - Global Multi- Model Prediction system for High Impact Weather (the GIFS-TIGGE activities) and WE-01 C2 - Use of high Impact Weather Information (which involves supporting the implementation of the THORPEX Africa case studies)

3.1.4 It was through EC funding for GEO implementation that a successful bid for GIFS-TIGGE development was made possible. The GEOWOW project involves further development of the TIGGE archive at ECMWF and testing and trialing of prototype products. It is already providing a significant impetus to GIFS-TIGGE WG plans and objectives.

3.2 WGNE

3.2.1 WGNE is jointly sponsored by CAS and WCRP and considers the development of numerical models for all timescales. Close links are maintained with many groups including WWRP and the THORPEX PDP WG, GEWEX, SPARC, and other WCRP programmes such as GCSS, GABLS and GLASS. Recent activities included the Transpose AMIP experiments, cloudy radiances, the “grey –zone”, the importance of aerosols, quality of monsoon predictions, the MJO, comparison of model momentum budgets etc.. Verification is an important topic and the performance of NWP models is continuously assessed. The performance of models in polar regions and the development of climate model metrics are also being addressed.

3.2.2 WGNE has organized regular workshops for example concerning systematic errors in weather and climate models (providing recommendations on the way ahead) and on ocean coupled models. In the future WGNE will look at short range weather prediction including clouds, rain, surface temperature etc., So the emphasis was switching to HR models and the “grey zone”. Earth system prediction (coupling to the ocean and ice etc.,) and aerosols were also important. However, some of the more traditional areas such as stochastic physics remain important. There is a need to continue to look across all timescales and to keep pushing model development. Some of the issues of concern relate to the frequency of meetings (now held every 18 months) and the need to maintain an active portfolio of projects.

During discussions it was noted that the link between WGNE and the new WG formed from the merger of the PDP and GIFS-TIGGE WGs needs to be carefully defined. Concern was also expressed that WGNE does not meet often enough. A strong recommendation was made that it should revert to annual meetings.

ICSC-JSC 4: The PDP and GIFS –TIGGE WGs are invited to work with WGNE to produce a short paper broadly defining the roles and responsibilities of the new merged group in time for the CAS meeting in Nov.

ICSC-JSC 5: The meeting strongly recommends that the WGNE meetings are held on an annual basis. The WGNE Co-Chairs are invited to arrange for letters of support for this objective from the representatives of the global NWP centres on WGNE.

3.3 YOTC

3.3.1 Dr Duane Waliser introduced YOTC. In 2007 the YOTC Science Plan was completed followed by a comprehensive Implementation Plan. A YOTC Project Office is in place under the auspices of the US THORPEX Executive Committee and NSF. A website provides access to all YOTC documents, meetings and future plans. The programme has been widely publicized at international conferences and at many AGU meetings and the AMS. A highly successful First Science Symposium was organized in Beijing in May 2010.

3.3.2 YOTC data includes global NWP fields from ECMWF, NASA and NOAA at high resolution. The data are available at NCAR. The NASA GIOVANNI satellite system has been extended to support YOTC. The Cloud-Sat and A-Train data sets are now available to the community through GIOVANNI.

3.3.3 The YOTC “year” runs from May 2008 until April 2010 and includes El Nino, La Nina and Arctic Oscillation conditions giving unique information on climate variability. There is a wide range of on-going collaborative work. This includes multi-model transpose-AMIP experiments, global cloud-system resolving experiments, tropical intra-seasonal multi-model 20 year hindcast experiments with additional output and analysis focused on the YOTC period, extension of the GEWEX Cloud System Study (GCSS) for the June - August 2008 period and tropical-extra-tropical interaction studies.

3.3.4 YOTC has set up a Task Force to study the MJO (MJO TF which now reports to WGNE). Four sub-projects were being implemented. These were related to diabatic processes, boreal summer forecasting metrics, process oriented MJO diagnostics and metrics to aid model development. The close links of YOTC research to the S2S project were noted.

3.3.5 Several important papers concerning YOTC have appeared recently in BAMS. These are; “Progress and Directions in Tropical Convection Research” by *Moncrieff et. al.*, “Multiscale Convective Organisation and the YOTC Virtual Global Field Campaign” by *Moncrieff et. al.*, and “The “Year” of Tropical Convection” (May 2008-April 2010) by *Waliser et. al.* More than 70 peer reviewed science articles refer to YOTC.

3.3.6 In conclusion it was noted that YOTC will end in late 2014. Consideration was being given to the 2nd International Science Symposium although it was recognised that the OSC in 2014 could also provide an appropriate venue along with a YOTC session at a GEWEX conference, also in 2014.

3.4 HYMEX (including MEDEX)

3.4.1 Dr Veronique Ducrocq said that in HYMEX the emphasis is on hydro-meteorological hazards and modelling the atmosphere-land-ocean coupled system on the event to seasonal and inter-annual timescales. The project runs from 2010-2020. Also included is the assessment of social and economic vulnerability to hydro-meteorological hazards. HYMEX is organized into a series of WGs which will focus on the water budget of the Mediterranean basin, the hydrological continental cycle, heavy precipitation and flash flooding and vulnerability factors and capacity building. The multi disciplinary research and data bases within HYMEX are expected to improve observational and modelling systems (especially coupled systems), prediction of extreme events and the accurate simulation of the longterm water cycle and definition of adaptation measures.

3.4.2 The Data Targeting System (DTS) is being used to add additional radiosondes in sensitive areas. There have been two SOPs – SOP1 (September 2012 - November 2012) which investigated heavy precipitation and flash flooding and SOP 2 (February 2013 - March 2013) which addressed intense air sea interactions. A wide range of over 200 instruments and platforms was employed including gliders, data buoys, argo floats, aircraft and ships. In SOP1 there were several instances of heavy rainfall, mostly in Italy. The HYMEX Operational Centre is in Montpellier. The field campaign was successful with examples of squall lines, MCSs, tornadic storms, etc., In SOP2 the domain was the Gulf of Lyon. Real time ocean models were employed. Two successful field campaigns were completed in SOP2.

3.4.3 All data is placed in the HYMEX database. A first re-analysis for SOP1 has been produced. The next HYMEX workshop will be in October 2013. HYMEX is also carrying out regional climate activities and work on societal and economic issues. A BAMS paper describing the entire HYMEX project is planned.

3.4.5 Concerning MEDEX it was noted that this programme has now finished. The final conference was held in October 2012.

In discussion it was confirmed that the HYMEX database is available for research purposes, although users must register. It was also stated that the HYMEX datasets should be part of the WMO WIS.

ICSC-JSC 6: The WGs and projects are encouraged to access and make use of the new HYMEX data sets and report to the next WWRP JSC on their proposed applications.

3.5 T-NAWDEX

3.5.1 Prof. Heini Wernli introduced the T-NAWDEX plans. Work started in 2006 but has been somewhat delayed. However, a recent planning meeting was held in Karlsruhe in March 2013. The objective is to study disturbances in the mid-latitude wave guide. The essential T-NAWDEX hypothesis is that there are still systematic errors in model representations and that these are attributable to diabatic processes. The errors are manifest in the PV distribution. The project will look especially at the factors modifying wave guide disturbances.

3.5.2 This is planned to be a major international collaborative effort involving France, the UK, Switzerland, Germany and the USA. Hopefully the US Hiaper and Halo aircraft will take part. The experiment will be unique and consider forecast errors on the Atlantic scale out to 10 days ahead and how physical processes affect the dynamics. The two G5 aircraft roles will be coordinated and

there are strong synergies with planned satellite missions. The planning team would be happy to see other groups join the project.

3.5.3 During discussions it was suggested that the NOAA G4 aircraft could play a useful role since they could deploy dropsondes and were fitted with Doppler radar. There is a strong link between T-NAWDEX and the WCRP grand challenge related to clouds. Microphysical measurements will be available from the French Falcon, the UK and Canadian aircraft. A link to the HYMEX project is encouraged.

4. WWRP OPEN SCIENCE CONFERENCE

4.1 Report on the International Organizing Committee

4.1.1 Michel Béland gave a short update on the status of the OSC. The idea came from the successful WCRP OSC held a few years ago. The title was “The Weather, What’s the Outlook?” and the conference will be held in Montreal from 16 to 21 August 2014. It would try to look at the next 10-20 years and come up with 4 or 5 white papers defining the major challenges. There would be two streams, one looking at the science and the other at users and societal issues. The main idea is to stimulate a dialogue. The International Organizing Committee is supported by several sub-committees focusing on the science programme, users and societal matters, local issues, communications and sponsorship and exhibits. The estimated attendance is 1500. At the moment 150K\$ is available but it is thought that another 200K\$ will be needed. There is an intention to form an Association of Weather Early Career Scientists as a legacy.

4.2 Report from the Science Programme Committee

4.2.1 This committee is considering areas such as nowcasting and seasonal forecasting, DA and observations, predictability and dynamics, interaction between sub-systems, prediction of the Earth system and the impacts of weather and climate events. There would be a number of crosscutting themes related to atmospheric composition, the influence of the surface, ecosystems etc., Future activity would involve choosing conveners of the sessions, deciding priorities and setting up poster sessions.

4.2.2 In discussion the hope was raised that the conference would be strongly supported and therefore successful. Getting the users to actively and fully participate may be a difficult challenge.

4.3 Report from the User Programme Committee

4.3.1 Dr Brian Mills described the user, applications and social science programme. A Programme Committee has been formed. Strong involvement of business and the commercial private sectors is being sought. Some of the issues covered will include the behavioural response to forecasts, the impacts and costs of forecasts and best practice. The main themes will be Goods and Services, Disaster Risk Reduction, Communication etc.,

4.4 Summer School

4.4.1 It has been decided not to proceed with a summer school in 2014.

ICSC-JSC 7: The meeting decided that sessions at the OSC should be devoted to YOTC, S2S and PPP and possibly the HIWeather project.

5. REVIEW OF DECISIONS AND ACTIONS

5.1 The decision and actions arising from the meeting were reviewed and agreed and are summarized at Annex III.

6. OTHER BUSINESS

6.1 There was no other business.

7. CLOSURE OF THE MEETING

7.1 The Chairman for the afternoon session, Dr Gilbert Brunet, thanked the participants for making the meeting so productive.

JOINT SESSION OF THE THORPEX ICSC AND THE WWRP JSC

(Geneva, Switzerland, 17 July 2013)

Agenda

1. ORGANIZATION OF THE JOINT SESSION

- 1.1 Opening of the Joint Session (**9 AM, 17 July 2013**)
- 1.2 Adoption of the agenda
- 1.3 Working arrangements of the Session
- 1.4 Provisional list of participants attending both meetings

2. THORPEX LEGACY PROJECTS

- 2.1 SERA WG
- 2.2 THORPEX Summary Paper
- 2.3 Sub-seasonal to Seasonal Prediction Project
- 2.4 Polar Prediction Project
- 2.5 High-Impact Weather Project
- 2.6 WCRP Perspective
- 2.7 SWFDP
- 2.8 THORPEX Restructure – input from ICSC11
- 2.9 Proposal for a new WWRP Expert Team on Predictability, Dynamics and Ensemble Forecasting
- 2.10 Impacts to the WWRP Structure

3. INTERNATIONAL COLLABORATION

- 3.1 GEO
- 3.2 WGNE
- 3.3 YOTC
- 3.4 HYMEX (including MEDEX)
- 3.5 T-NAWDEX

4. WWRP OPEN SCIENCE CONFERENCE

- 4.1 Report on the International Organizing Committee meetings
- 4.2 Report from the Science Program Committee
- 4.3 Report from the User Program Committee
- 4.4 Summer School

5. REVIEW OF DECISIONS AND ACTIONS

6. OTHER BUSINESS

7. CLOSURE OF THE JOINT SESSION – 5 PM on 17 July 2013

JOINT SESSION OF THE THORPEX ICSC AND THE WWRP JSC

(Geneva, Switzerland, 17 July 2013)

List of Participants

Family Name	First Name	Email	Working Group / Project
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Chair of Working Groups and Expert Team			
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**ACTIONS AND DECISIONS ARISING FROM THE JOINT SESSION OF THE THORPEX ICSC
AND THE WWRP JSC**

(Geneva, Switzerland, 17 July 2013)

ICSC - JSC ACTION/DECISION	RESPONSIBILITY	STATUS
ICSC-JSC 1: ICSC and JSC approved the conclusion of the activities of the Planning Group by completion of the S2S Implementation Plan and the transfer of the Planning Group to the Steering Group in November 2013.		
ICSC-JSC 2: The HIWeather TF is asked to define and communicate the next steps (and timelines) in developing the HIWeather project proposal for submission to CAS in November 2013.	HIWeather TF	ASAP
ICSC-JSC 3: The meeting endorsed the proposed merger of the THORPEX PDP and GIFS-TIGGE WGs to form a new WG of the WWRP and the move of the THORPEX DAOS WG to become a WG of the WWRP noting that the specific roles and responsibilities of the groups in a the WWRP structure will need to be considered and agreed by the WWRP JSC (in consultation with WGNE as necessary).	WWRP JSC	Dec. 2014
ICSC-JSC 4: The PDP and GIFS – TIGGE WGs are invited to work with WGNE to produce a short paper broadly defining the roles and responsibilities of the new merged group in time for the CAS meeting in Nov.	PDP and GIFS-TIGGE WGs and WGNE	ASAP

<p>ICSC-JSC 5: The meeting strongly recommends that the WGNE meetings are held on an annual basis. The WGNE Co-Chairs are invited to arrange for letters of support for this objective from the representatives of the global NWP centres on WGNE.</p>	<p>WGNE Co-Chairs</p>	<p>ASAP</p>
<p>ICSC-JSC 6: The WGs and projects are encouraged to access and make use of the new HYMEX data sets and report to the next WWRP JSC on their proposed applications.</p>	<p>WWRP WGs</p>	<p>By next WWRP JSC meeting</p>
<p>ICSC-JSC 7: The meeting decided that sessions at the OSC should be devoted to YOTC, S2S and PPP and possibly the HIWeather project.</p>	<p>-</p>	<p>-</p>

World Weather Research Programme (WWRP) Report Series

Sixth WMO International Workshop on Tropical Cyclones (IWTC-VI), San Jose, Costa Rica, 21-30 November 2006 (WMO TD No. 1383) (**WWRP 2007 - 1**).

Third WMO International Verification Workshop Emphasizing Training Aspects, ECMWF, Reading, UK, 29 January - 2 February 2007) (WMO TD No. 1391) (**WWRP 2007 - 2**).

WMO International Training Workshop on Tropical Cyclone Disaster Reduction (Guangzhou, China, 26 - 31 March 2007) (WMO TD No. 1392) (**WWRP 2007 - 3**).

Report of the WMO/CAS Working Group on Tropical Meteorology Research (Guangzhou, China, 22-24 March 2007) (WMO TD No. 1393) (**WWRP 2007 - 4**).

Report of the First Session of the Joint Scientific Committee (JSC) for the World Weather Research Programme (WWRP), (Geneva, Switzerland, 23-25 April 2007) (WMO TD No. 1412) (**WWRP 2007 - 5**).

Report of the CAS Working Group on Tropical Meteorology Research (Shenzhen, China, 12-16 December 2005) (WMO TD No. 1414) (**WWRP 2007 - 6**).

Preprints of Abstracts of Papers for the Fourth WMO International Workshop on Monsoons (IWM-IV) (Beijing, China, 20-25 October 2008) (WMO TD No. 1446) (**WWRP 2008 - 1**).

Proceedings of the Fourth WMO International Workshop on Monsoons (IWM-IV) (Beijing, China, 20-25 October 2008) (WMO TD No. 1447) (**WWRP 2008 - 2**).

WMO Training Workshop on Operational Monsoon Research and Forecast Issues – Lecture Notes, Beijing, China, 24-25 October 2008 (WMO TD No. 1453) (**WWRP 2008 - 3**).

Expert Meeting to Evaluate Skill of Tropical Cyclone Seasonal Forecasts (Boulder, Colorado, USA, 24-25 April 2008) (WMO TD No. 1455) (**WWRP 2008 - 4**).

Recommendations for the Verification and Intercomparison of QPFS and PQPFS from Operational NWP Models – Revision 2 - October 2008 (WMO TD No. 1485) (**WWRP 2009 - 1**).

Strategic Plan for the Implementation of WMO's World Weather Research Programme (WWRP): 2009-2017 (WMO TD No. 1505) (**WWRP 2009 - 2**).

4th WMO International Verification Methods Workshop, Helsinki, Finland, 8-10 June 2009 (WMO TD No. 1540) (**WWRP 2010 - 1**).

1st WMO International Conference on Indian Ocean Tropical Cyclones and Climate Change, Muscat, Sultanate of Oman, 8-11 March 2009 (WMO TD No. 1541) (**WWRP 2010 - 2**).

Training Workshop on Tropical Cyclone Forecasting WMO Typhoon Landfall Forecast Demonstration Project, Shanghai, China, 24-28 May 2010 (WMO TD No. 1547) (**WWRP 2010 - 3**) (CD only).

2nd WMO International Workshop on Tropical Cyclone Landfall Processes (IWTCLP-II), Shanghai, China, 19-23 October 2009 (WMO TD No. 1548) (**WWRP 2010 - 4**).

5th WMO Symposium on Data Assimilation, Melbourne, Australia, 5-9 October 2009 (WMO TD No. 1549) (**WWRP 2010 - 5**).

7th International Workshop on Tropical Cyclones (IWTC-VII), Saint-Gilles-Les-Bains, La Réunion, France, 15-20 November 2010 (**WMO TD No. 1561**) (**WWRP 2011 – 1**).

Report of the Fourth Session of the Joint Scientific Committee (JSC) for the World Weather Research Programme (WWRP), Geneva, Switzerland, 21-24 February 2011, (**WWRP 2011 - 2**).

WWRP/ETRP Workshop on Operational Monsoon Research and Forecast Issues – Lecture Notes, Beijing, China, 24-25 October 2008, (**WWRP 2011 - 3**).

Recommended Methods for Evaluating Cloud and Related Parameters (**WWRP 2012-1**).

Proceedings of the 10th WMO Scientific Conference on Weather Modification, Bali, Indonesia, 4-7 October 2011 (**WWRP 2012-2**).

Fifth Session of the Joint Scientific Committee (JSC) for the World Weather Research Programme (WWRP), Geneva, Switzerland, 11-13 April 2012, (**WWRP 2012 - 3**).

Second WMO/WWRP Monsoon Heavy Rainfall Workshop, Petaling Jaya, Malaysia, 10-12 December 2012 (**WWRP 2013 - 1**).

International Workshop on Unusual Behaviour of Tropical Cyclones, Haikou, Hainan, China, 5-9 November 2012, (**WWRP 2013 - 2**).

Abstracts of Papers for the Fifth WMO International Workshop on Monsoons (IWM-V), Macao, China, 28–31 October 2013, Hong Kong, China, 1 November 2013, (**WWRP 2013 - 3**).

Second International Conference on Indian Ocean Tropical Cyclones and Climate Change (IOTCCC-II), New Delhi, India, 14-17 February 2012 (**WWRP 2013 - 4**).

WMO/WWRP International Workshop on Rapid Changes in Tropical Cyclone Intensity and Track, Xiamen, China, 18-20 October 2011 (**WWRP 2013 - 5**).

5th International Verification Methods Workshop, Melbourne, Australia, 5-7 December 2011 (**WWRP 2013 - 6**).

Verification Methods for Tropical Cyclone Forecasts (**WWRP 2013 - 7**).

Sixth Session of the Joint Scientific Committee (JSC) for the World Weather Research Programme (WWRP), Geneva, Switzerland, 18-19 July 2013 (**WWRP 2014 - 1**).