WORLD METEOROLOGICAL ORGANIZATION

MEETING OF THE COMMISSION FOR CLIMATOLOGY TASK TEAM ON THE DEFINITION OF EXTREME WEATHER AND CLIMATE EVENTS (TT-DEWCE)

22-24 APRIL 2015

GENEVA, SWITZERLAND

MEETING REPORT

9 July 2015
1. OPENING:
The meeting of the Commission for Climatology Task Team on the Definition of Extreme Weather and Climate Events (CCI/TT-DEWCE) was opened by Dr Wenjian Zhang, Director of WMO Observing and Information System Department. Dr. Zhang highlighted the importance of the issue the Task Team is addressing in the context of harmonization of approaches, definitions and providing guidance to the Members on extreme weather and climate events. This is not only required for WMO operational activities but also for international needs such as the DRR and climate risk assessment and climate adaptation and the Global Framework for Climate Services. Dr. Zhang noted that countries perspective is very important, in particular the fact that the task team is regionally well balanced with all regions being represented by at least one expert. This will benefit the team by sharing lessons and experiences which can help develop the guidance for best practices on the definition and monitoring of weather and climate extremes.

2. ORGANIZATION OF THE MEETING
The meeting was chaired by Professor Manola Brunet co-chair of CCI/OPACE-2, and Ms Ahira Sanchez Lugo and Dr Panmao Zhai, the two co-leaders of the Task Team. A joint session with the Task Team on Homogenization was held on Wednesday, 22 April 2015, from 14:00 to 16:30.

3. REVIEW OF WMO CONSITUENT BODY KEY DECISIONS ON EXTREMES
Manola Brunet informed the meeting on the Decision made by CCI 16, focusing mainly on the new structure of CCI with a particular emphasis on the work of the Open Panel on Climate monitoring and Assessment, the Terms of Reference of the Task Team and the expected deliverable from OPACE-2 and its teams. She presented the Terms of Reference of TT-DEWCE, which include:

a. Provide guidance to Members on the methodologies and standards for defining extreme weather and climate events and assessing their attribution and return periods, and advise on adequate computational tools for the assessment;

b. Identify and provide a set of tools and univocal definitions to analyze climate extremes, both point-based and regional indices;

c. Implement an inter-operable Web Portal holding a database for regional extreme weather and climate events;

d. Explore and propose additional extreme indices, especially those not addressed in CCI-XV
Omar Baddour informed the meeting on key decisions made by other commissions and Regional associations, reflecting the context of the Task Team work, in particular the importance highlighted by WMO executive council, commission for basic systems and regional associations, with respect to the need for providing guidance on extreme events and their monitoring tools. Executive council highlighted also the need to link the team work on extreme event with the WMO Severe Weather forecasting Demonstration project.

At regional level, regional associations highlighted the need for increasing their NMHSs technical capacity to operate high quality timely climate monitoring and watch systems which are essential for producing timely information on the onset, intensity, geographical extent, duration, evolution and cessation of extreme weather and climate events such as heavy rains, heat waves, cold waves, drought spells, etc., which can lead to disastrous impacts on health, agriculture, water and public services.

4. LINK WITH INTERNATIONAL AGENDAS AND PROJECTS

The meeting was informed on international agendas and WMO projects that are relevant to the work of the Task Team in one way or another. Mr Amir Delju provided a presentation on the UNFCC initiative on loss and damages, Dr Maxx Dilley informed on the GFCS climate Service information system, which is the GFCS component that produces information and services for the users. Ms Alice provided a presentation on the Data Processing and Information System and the Severe Weather Forecasting Demonstration Project (SWFDP). Giacomo Teruggi made a presentation on WMO Agriculture Meteorology Program with focus on drought and its management. From the presentations it is clear that the Task Team work needs to benefit from this international context which make the Team deliverable beneficial to the NMHSs but also beyond.

5. COUNTRIES PERSPECTIVES IN DEFINING WEATHER AND CLIMATE EXTREME EVENTS AND THEIR THRESHOLDS

Argentina
Maria de los Milagros Skansi provided a presentation on the experience in Argentina in defining and monitoring the extremes. Considering the need to assess and monitor extreme climate events in a territory of great extent, within the context of climate services goals, during 2013 Argentina launched a new product about extreme high and extreme low temperatures periods as well as heat waves and cold waves events across the whole country.

- Extreme high/low temperatures periods
It was defined as a 3 or more consecutive days period with minimum temperature or maximum temperature above/below 90th/10th percentile. The percentiles were calculated for all stations across Argentina, for extreme high temperatures and heat waves was used October to March period and for extreme low temperatures and cold waves was used April to September period (1961-2010). All these periods were identified and statistical charts, maps and tables were produced and are available from the web site.
• **Heat waves/cold waves events**
  Heat wave (cold wave) was defined as a 3 or more consecutive days period with minimum temperature and maximum temperature above (below) 90\(^{th}\) (10\(^{th}\)) percentile. In this case it was not calculated for all stations of Argentina. For heat waves were considered the stations where the maximum temperature 90\(^{th}\) percentile is greater than 18°C and for cold waves where minimum temperature 10\(^{th}\) percentile is less than 4°C.

• **Intramet monitoring system**
  Every day the following maps are available: persistence of days with extreme high temperature, low temperature and both. This product was made with the intention to have a quick look to what is happening with extreme temperatures across Argentina. The technician will consider, then, if a special report should be done according to what already happened and the weather forecast for the following days.

• **Drought indices**
  For monitoring of drought we completed implementation of the calculation of several drought indices: Standardized Precipitation Index (SPI), Standardized Precipitation Evaporation Index (SPEI), precipitation deciles, categories of precipitation levels used by collaborators at Brazil’s Instituto de Meteorología de Brasil (INMET), and the percentage of normal precipitation. To take advantage of the multi-scale nature, all drought indices were implemented so they could be calculated for a range of temporal scales. All indices were calculated for scales of 1, 2, 3, 6, 9, 12, 18, 24, 36 and 48 months. Various visualization displays were produced to facilitate perception of current drought conditions or rainfall excesses throughout the countries in the RCC-SSA. Examples of various data views are presented in the various panels of Figure 1. This information will be available in June ([www.crc-sas.org](http://www.crc-sas.org)).
month in the historical record, excluding the time series displayed.

“Heatmap” of SPI-6 values in Belo Horizonte, Brazil. Each cell represents a month in the period 2000-January 2015. Months are shown along the x-axis and years are indicated in the y-axis.

Time series of SPEI-3 for neighboring stations around Aeroparque Buenos Aires, Argentine.

**Australia**

Blair Trewin presented the Australian experience in climate services and forecasting extreme climate events including heat waves and other events. A heat wave service was implemented since after the extreme 2009 heat wave. A threshold based on the average three days temperature exceeding 90th percentile is used combined with an amplification / relaxation factor representing the short term variability resulting from the statistics of the past 30 days. This led to the definition of thresholds of severe heatwave exceeding heat factoring (EHF). The thresholds and criteria are primarily developed for health warning needs. In the discussions it was recommended to share the WMO/WHO manual on heat wave early warning system which might be used by the Team when looking in details to the heat wave definition and monitoring.

\[
\begin{align*}
\text{EHI}_{\text{sig}} &= \frac{\left( T_i + T_{i+1} + T_{i+2} \right)}{3} - T_{95} \\
\text{EHI}_{\text{accl}} &= \frac{\left( T_i + T_{i+1} + T_{i+2} \right)}{3} - \frac{\left( T_{i-1} + \ldots + T_{i-30} \right)}{30} \\
\text{EHF} &= \text{EHI}_{\text{sig}} \times \text{Max}(1, \text{EHI}_{\text{accl}})
\end{align*}
\]

Long term temperature anomaly $\times$ (Pve Short term temperature anomaly)  
Heatwave detection $\times$ Amplifying term
Heat related mortality (green bars) and EHF (red squares, black line) for the 2009 extreme heatwave in SA. The three-day average daily temperature is superimposed, plotted against the first day of the three day period (blue line).

**Severe Heatwave threshold using 1958 to 2009 AWAP data**

**Brisbane extreme heatwave**
**EHF period 21-23 Feb 2004**

**China**
Panmao Zhai presented the current international efforts in defining criteria for characterizing extreme events. The need for defining the criteria for defining extreme weather and climate extremes are driven by Climate Change Studies and the need for the Monitoring of the extremes, warning and risk management. An Extreme event is generally defined as the occurrence of a value of a weather or climate variable above (or below) a threshold near the upper (or lower) ends of the range of observed values. Selection of threshold can be a relative threshold, such as $T_{max} \geq 95$th percentile for warm Day, or an absolute threshold, such as $T_{max} \geq 35C$ for Hot Day. The Joint CCI/CLIVAR/JCOMM Expert
Team on Climate Change Detection and Indices (ETCCDI) has developed 27 Core indices based on daily SAT and Precipitation, but most of those indices are for moderate extremes.

In addition high impact weather such as rain storm, blizzard, cold wave, sea gale, dust storm, extreme low/high Temperature, drought, frost, freezing, fog, and haze are deemed as extreme weather events in China, which are monitored operationally and for which warning signals are issued in the country.

Table 1. Definitions of temperature and precipitation extremes used in China’s National Climate Center (Provided by Zou, Xukai)

<table>
<thead>
<tr>
<th>Name</th>
<th>Definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Temperature</strong></td>
<td></td>
</tr>
<tr>
<td>Extreme warm Day</td>
<td>Tmax &gt; 95th percentile</td>
</tr>
<tr>
<td>Extreme hot days</td>
<td>Number of hot days with Tmax ≥ 35°C and Tmax&gt; 95th percentile</td>
</tr>
<tr>
<td>Cool Day</td>
<td>Tmin &lt; 5th percentile</td>
</tr>
<tr>
<td>Extreme temperature decline</td>
<td>Scale of drop in daily Tmin &gt; 95th percentile</td>
</tr>
<tr>
<td>Extreme persistent temperature decline</td>
<td>Scale of drop in daily Tmin &gt; 95th percentile in a consecutive cold spell</td>
</tr>
<tr>
<td>Warm day ratio</td>
<td>Percentage of days when Tmax &gt; 90th percentile</td>
</tr>
<tr>
<td>Cool day ratio</td>
<td>Percentage of days when Tmax &lt; 10th percentile</td>
</tr>
<tr>
<td>Warm night ratio</td>
<td>Percentage of days when Tmin&gt; 90th percentile</td>
</tr>
<tr>
<td>Cool night ratio</td>
<td>Percentage of days when Tmin &lt;10th percentile</td>
</tr>
<tr>
<td><strong>Precipitation</strong></td>
<td></td>
</tr>
<tr>
<td>Extreme daily precipitation</td>
<td>Daily precipitation &gt; 95th percentile</td>
</tr>
<tr>
<td>Extreme precipitation of 3 consecutive days</td>
<td>Precipitation totals of 3 consecutive days&gt; 95th percentile</td>
</tr>
<tr>
<td>Extreme precipitation totals of consecutive rainy days</td>
<td>Precipitation totals of consecutive rainy days &gt; 95th percentile</td>
</tr>
<tr>
<td>Extreme consecutive rainy days</td>
<td>Number of consecutive rainy days &gt; 95th percentile</td>
</tr>
<tr>
<td>Extreme consecutive dry days</td>
<td>Number of consecutive dry days &gt; 95th percentile</td>
</tr>
</tbody>
</table>
Table 2. Weather and Climate Extreme Indices Used in China's National Climate Change Report (Qin et al, 2014)

<table>
<thead>
<tr>
<th>Extreme Type</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cold Wave</td>
<td>Large scale cold air from high latitudes, causing dramatic temperature drops severe wind and snowy-rainy weather</td>
</tr>
<tr>
<td>Frost</td>
<td>Tmin&lt;0°C</td>
</tr>
<tr>
<td>Heat Wave</td>
<td>Consecutive 5 days Tmax≥35°C</td>
</tr>
<tr>
<td>Extreme Precipitation</td>
<td>Daily amount &gt;90 percentile</td>
</tr>
<tr>
<td>Wet Spell</td>
<td>Consecutive rainy days</td>
</tr>
<tr>
<td>Drought</td>
<td>Based on Ci, and PDSI indices</td>
</tr>
<tr>
<td>Tropical Cyclone</td>
<td>Cyclone from tropical ocean, with wind speed ≥10.8m/s</td>
</tr>
<tr>
<td>Dust Storm</td>
<td>Dust day with visibility below 1000m</td>
</tr>
<tr>
<td>Hail</td>
<td>Hail weather phenomena</td>
</tr>
<tr>
<td>Strong Wind</td>
<td>Wind Speed ≥17m/s</td>
</tr>
<tr>
<td>Fog</td>
<td>Visibility &lt;1 km</td>
</tr>
<tr>
<td>Haze</td>
<td>Weather with aloft particles when visibility below 10km</td>
</tr>
<tr>
<td>Thunder and Lightning</td>
<td>Weather with thunder storm</td>
</tr>
</tbody>
</table>

Côte d’Ivoire
Kouakou Bernard DJE presented the case of Côte d’Ivoire where the increase of the frequency of extreme events such as droughts, floods and intense rains generates significant impacts on lifestyles and livelihoods of populations. These hazards caused lot of damages to the economy of the country especially floods and wildfires. Droughts are rare, with the exception of the years 1973, 1983 and 1998 where the country experienced these events. To monitor extremes, the national meteorological service records each month extreme values of temperature and rainfall and uses statistical tools for calculation of cumulative frequencies and probabilities of exceeding some values for each station. Extremes values are determined by the percentile method, i.e using 10th and 90th percentiles thresholds.

He highlighted on the need to address impacts that can also be caused by events which are not necessary classified as extremes. Example: On 11 June, 103 mm caused floods in Abidjan, which is not an extreme value. There is a need to know what threshold we can use for launching an advisory. There is also a need to catalogue extreme events and their impacts and determine years of extreme events (drought, floods), calculate indices and results of these years, calculate SPI. New activities are ongoing to define thresholds for operational weather and climate extreme events:
- Identification of appropriate indices from Rclimdex indices to cope with national realities
- Determine years of extreme events (droughts, floods),
- Calculate indices and analyze results of these years,

Research activities include:
- A research team involving NMS and Universities are working since 2014 on determining threshold of heavy rainfall causing floods,
- In parallel, a small team in Met Service is working on temperature and humidity to determine thresholds for wildfires,
- In addition, a sub-regional research team is working on the theme: *Extreme thermal intensification in West Africa* (Ringard et al.). In this study, the POT method (Peaks Over Threshold) is used to obtain extreme temperature threshold values.

**Indonesia**

Ardhasena Sopaheluwakan made a presentation on Indonesia perspective on weather and climate extremes. Due to its equatorial geographical location, the climate in Indonesia is warm all year long, receiving ample solar radiation. Seasonal temperature variation exists, but however temperature differences between seasons are relatively small when compared to seasons in the higher latitudes. Its maritime characteristic supplies sufficient moisture to the atmosphere and hence humidity is relatively high throughout the months of the year.

This maritime characteristic inhibits / buffers the region from experiencing extreme heat phenomenon. This seemingly ‘uninteresting’ seasonal variation of temperature in the context of extremes is however different when it concerns rainfall. The rainfall distribution in Indonesia is very complex, and is influenced by many factors: ENSO, Asian-Australian monsoon, Indian Ocean Dipole Mode, local SST and the topography. Yearly rainfall climatology ranges from 700mm/year in the driest region to about 5500mm/year in the wettest region; with typical rainfall type is torrential. Thus, in the context of weather- and climate-extremes that have societal impact can be characterized by two categories: extreme wet and extreme dry. At the Agency for Meteorology, Climatology and Geophysics, the following operational definition of daily rainfall intensity is adopted:
The above definition of daily rainfall intensity is motivated by the rainfall climate based on the frequency occurrences of daily rainfall from year to year. To give perspective on the rain characteristics, following figures depict an example of rainfall for a city, Bogor [106.8°E, 6.6°S], showing the frequent occurrences of rainfall events with intensity > 50mm/day (left) and multiple occurrences of events with intensity > 100mm/day (right) in a year. Whilst for longer term rainfall characterization, we categorize rainfall according to the percentile ranks and categorize rainfall to be extreme if it exceeds the historical 95th percentile value. This categorization applies for dekad time scale (10 days), monthly and longer (seasonal) time scales. On the dry side of rainfall, we characterize drought using the Standardized Precipitation Index for 1 and 3 monthly timescales. We also monitor dry spell by evaluating consecutive dry days for nationwide rain gauges.

Montenegro
Mirjana Ivanov presented the experience in Montenegro. The Focus is made on using ETCCDI indices and RCIlimdex Software for the analysis of extremes. Heat wave is defined in two ways. One defines a heat wave as an event with at least 6 consecutive days with the daily max temp > Tx90. The other definition considers at least five consecutive days with maximum daily temperature 5°C higher than the average max temperature for that day with the reference period taken 1961-1990. For drought, three indices are used SPI, Fraction of Vegetation Cover (FVC) and Leaf Area Index (LAI). The two last are computed using remote sensed data in cooperation with the Drought Management Centre for Southeastern Europe (DMCSEE). SPI is computed using daily data or monthly data. For monthly and multi-month drought analysis SPI is computed for 1, 3, 6, 9 and 12 months.
Spain
Though we didn’t have a representative from the Meteorological Service of Spain, Manola Brunet provided an overview of a Spanish perspective. A number of weather and climate extremes listed such as snow-slide (Avalanches), accumulated snow in 24 hours storm surges, gales, high tides, rissagas with monitoring based on three level of warning. Thresholds are computed for example using total accumulated precipitation in 1 hour or 12 hours. Maximum Temperature and minimum temperature are used to monitor daily temperature extremes and for issuing warnings. There was no definition for heat-wave or cold wave provided yet. SPI is used to monitor drought.

United States of America
Ahira Sánchez-Lugo provided an overview of NOAA’s National Centers for Environmental Information (NCEI) suite of products that monitor extremes. Typically, NCEI defines an extreme as an occurrence that lies outside the 10th/90th percentile value over the period of record. Below is a list of products available:

1. **NCEI’s State of the Climate Reports:** The purpose of these reports is to provide scientific insight into the Earth’s climate and historical perspective on its variability and change. The reports are updated monthly and are usually available by the 20th of each month. The reports provide information on global/national temperature and precipitation, placing the information in a historical perspective. A monthly drought report is available on a national scale, providing numerous drought indicators and summary of the nation’s drought conditions during the previous month. Maps and graphics for temperature, precipitation, and drought are available. The reports are available at [www.ncdc.noaa.gov/sotc](http://www.ncdc.noaa.gov/sotc).

2. **Percentiles Maps:** As part of our reports we provide percentile maps. Anomaly maps are an essential tool when describing the current state of the climate across the nation and globe. Temperature anomaly maps tell us whether the temperature observed for a specific place and time period (for example, month, season, or year) was warmer or cooler than a reference value, which is usually a 30-year average, and by how much. While, the percentile maps complement the information provided by the anomaly maps by providing additional information by placing the temperature anomaly observed for a specific place and time period into historical perspective, showing how the most current month, season or year compares with the past. The Warmer than Average, Near Average, and Cooler than Average shadings on the temperature percentile maps represent the bottom, middle, and upper tercile (or three equal portions) of the sorted values or distribution, respectively. Much Warmer than Average and Much Cooler than
Average, refer to the lowest and uppermost decile (top or bottom 10 percent) of the distribution, respectively. For a 133-year period, Warmer than Average (Cooler than Average) would represent one of the 44 warmest (coolest) such periods on record. However, if the value ranked among the 13 warmest (coolest) on record, that value would be classified as Much Warmer than Average (Much Cooler than Average). Near Average would represent an average temperature value that was in the middle third (rank of 45 to 89) on record.

3. **Events Map**: Also a product provided in our State of the Climate Reports. These maps provide a snapshot of significant events that occurred across the U.S. or globe for the previous month/year.

4. **Climate Extremes Index**: This is a tool first developed as a framework for quantifying observed changes in climate within the contiguous U.S. The CEI measures the fraction of the area of the contiguous U.S experiencing extremes in monthly mean surface temperature, daily precipitation, and drought/moisture surplus. The CEI is based on a set of climate indicators:
   a. Extremes in monthly mean max/min temperatures
   b. Heavy 1-day precipitation events
c. The number of days with/without precipitation

d. Monthly Palmer Drought Severity Index

Extremes for each indicator are defined as occurrences that lie outside the 10\textsuperscript{th} / 90\textsuperscript{th} percentile value over the period of record. A CEI value of 0% indicates that no portion of the country or region was subject to any of the extremes of temperature or precipitation considered in the index. A CEI of 100% indicates the entire country or region had extreme conditions throughout the time period for each of the indicators, while a CEI of 20% is the expected long-term average percent area experiencing extremes. Additional information on CEI, please go to [www.ncdc.noaa.gov/extremes/cei](http://www.ncdc.noaa.gov/extremes/cei)

5. **U.S. Drought Monitor**: Assess and communicates the state of drought in the U.S. on a weekly basis. It is a synthesis of multiple indices and local impacts to best represent the current drought conditions.

6. **North America Drought Monitor**: Cooperative effort between Canada, Mexico, and the U.S. to monitor drought across the continent. The map and summary are updated on a monthly basis.

7. **North America Climate Extremes Monitor (NACEM)**: This product was developed to provide an accessible analysis tool that will help improve the understanding of observed changes in extreme climate conditions by providing users the ability to examine trends
and occurrences of certain types of extreme or threshold events at the station-by-station level. The data and analysis are provided for eight indices based on WMO’s Expert Team on Climate Change Detection Monitoring and Indices.

a. Number of Frost Days  
b. Number of Summer Days  
c. Number of Icing Days  
d. Number of Tropical Nights  
e. Much Below Average Minimum/Maximum Temperature  
f. Much Above Average Minimum/Maximum Temperature

8. **U.S. Billion-Dollar Weather and Climate Disasters**: Quantifies the loss from numerous weather events, such as Tropical Cyclones, Floods, Droughts/heat waves, severe local storms (Tornado & Hail), Wildfires, and Winter Storms. The U.S. Billion-dollar disaster assessment requires a broad array of public and private data sources.

### Discussions

There is need to focus on few events that are most frequent in the various countries, like heat wave, droughts, extreme rainfall. Though drought raises complexity, SPI seems to be a useful index for global exchange of information on drought. The team also noted the need for other events that are not statistically extremes but can have high impacts, such as hail, haze, storms, fog, dust, etc.

For taxonomy purpose, i.e defining the concept and the vocabularies, WMO Meteo Term resources can be used. For operational monitoring including assessment of extent, magnitude and duration there is a need to define objective and quantitative criteria of the extremes. A development of a catalogue of the existing criteria used worldwide could be a way to start. Secretariat provided a draft paper (ANNEX-III) for consideration by the team as a way forward on developing the guidance on the definition of extremes.

**6. REVIEW OF KEY ACTIVITIES IN THE PAST INTERSESSION PERIOD**

The meeting reviewed the actions raised from the previous meeting which was held in Marrakesh in February 2014. Fumin Ren and Blair Trewin informed the meeting on key recommendations from the previous Task Team meeting. An overview of the past achievements was summarized by Manola Brunet and Blair Trewin. The report of the previous meeting can be found at https://www.wmo.int/pages/prog/wcp/ccl/opace/opace2/documents/WMOTT-DEWCE-meetingreport.pdf.
The past team made an important progress in terms of developing a survey for the definition on extreme events, To.R of international portal on Extreme events, and publication on the regional identification Technique for Regional Extreme Events (OITREE). However there was no consensus reached on the definition of the extremes due the complexity of the issue. It was proposed that the definition be left to countries. Key pending issues were presented and discussed further as follows:

**OITREE**
Fumin Ren introduced the Objective Identification Technique for Regional Extreme Events (OITREE) followed by a presentation made by Zhiqiang Gong seconded expert from BCC, China at the GFCS office, who provided the OITREE underlying algorithm for the computation of indices for the extremes and their regional monitoring. There was some technical issues reported which need to be fixed in the technique. He suggested that modification can be done if the concept of the technique is accepted. The team noted that for the evaluation of OITREE or other methods, we can think of simple scale (one station) and a larger scale. Region definition is when we have multiple stations recording the events. We may include also a system involving multinational countries. The team reiterated the recommendation from the previous Team that a workshop on methods is a good way to address the existing methods and their evaluation. Further discussions on OITREE revealed the complexity of transposing the code. It was mentioned that José Antonio from Spain developed a code based on OITREE, but the question is to see if the results are comparable to the original OITREE. The team encouraged other people to contribute in this exercise.

**International Portal for monitoring Extreme Events.**
The team noted that the T.o.R of the portal as developed from the previous meeting needs to be communicated to the Member for seeking a potential host. (T.o.R are provided in ANNEX I). There was also a suggestion to take a more simple approach, such as using Excel sheet as first step or in parallel to the work on a more sophisticated web portal solution. Also it was suggested to Review TOR of the portal by the team.

**Survey on Extremes**
The team suggested to expanding the survey which was developed in the previous intersession period to add the drought and heavy precipitation. The new survey is provided in ANNEX II.

**7. FORWARD WORKPLAN BUILDING ON THE RECOMMENDATIONS FROM THE PAST MEETING WITH FOCUS ON THE FOLLOWING ISSUES.**

<table>
<thead>
<tr>
<th>Task</th>
<th>When</th>
<th>Lead</th>
<th>Others</th>
<th>Linkages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Put a text for the guidelines on DEWCE</td>
<td>End 2015</td>
<td>Mirjana</td>
<td>Ahira, Sena Bernard</td>
<td>ET-NCMP</td>
</tr>
<tr>
<td>Put a guidance on the Software</td>
<td>End 2015</td>
<td>Maru</td>
<td>Panmao</td>
<td>ET-CCDI</td>
</tr>
</tbody>
</table>
### 7.2 Heat Waves, Extreme rainfall and Drought

<table>
<thead>
<tr>
<th>Task</th>
<th>When</th>
<th>Lead</th>
<th>Others</th>
<th>Linkages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guidance on Heat wave and Cold Wave</td>
<td>2015</td>
<td>Panmao</td>
<td>Ahira, Maru</td>
<td>CCI-ET CSI. Manola facilitating linkage</td>
</tr>
<tr>
<td>Guidance on definition of intense Precipitation/ Wet Spells.</td>
<td>2015</td>
<td>Sena</td>
<td>Bernard</td>
<td>Chy formally facilitated through PR of commission</td>
</tr>
<tr>
<td>Guidance on Dry-spells Drought</td>
<td>2015</td>
<td>Ahira</td>
<td>Maru, Mirjana</td>
<td>CAgM / IDMP</td>
</tr>
</tbody>
</table>

### 7.3 Regional Extreme events monitoring (OITREE technique)

<table>
<thead>
<tr>
<th>Task</th>
<th>When</th>
<th>Lead</th>
<th>Others</th>
<th>Linkages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organize a workshop with involving various techniques, China</td>
<td>2016, date will be finalized</td>
<td>Panmao</td>
<td>All</td>
<td>D/CLPA and Amir Global workshop Socio Economic benefit conference</td>
</tr>
<tr>
<td>Organize an Expert Developer meeting</td>
<td>2016 Back to back to above</td>
<td>Fumin</td>
<td>Maru, Ahira, Gong</td>
<td></td>
</tr>
</tbody>
</table>

### 7.4 Data base for cataloguing extreme events and impacts

<table>
<thead>
<tr>
<th>Task</th>
<th>When</th>
<th>Lead</th>
<th>Others</th>
<th>Linkages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigate the feasibility of extending the RA VI-RCC extreme events database structure globally</td>
<td>2016</td>
<td>Mirjana</td>
<td>Losse and damages RA-VI RCC, Offenbach</td>
<td></td>
</tr>
<tr>
<td>Demonstration, showcase on linking losses with EWCE</td>
<td>2016-2017</td>
<td>Ahira</td>
<td>Fumin Blair (Contact point)</td>
<td>UN-ECE meeting in September 2015 (Mirjana, Amir linkage)</td>
</tr>
</tbody>
</table>

### 7.5 WMO portal for information on extreme events

<table>
<thead>
<tr>
<th>Task</th>
<th>When</th>
<th>Lead</th>
<th>Others</th>
<th>Linkages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investigate existing web information systems, circulate TOR of the portal.</td>
<td>2016</td>
<td>Sena</td>
<td>All</td>
<td>ET-NCMP UNDP country profile UN-ISDR</td>
</tr>
</tbody>
</table>
7.6 Other issues

(i) WMO Congress Resolution on Unique Identifier of Extreme events

Follow on this resolution as an ongoing activity and make a link with CCI-MG, WMO and ICT-CSIS. Bernard to serve as a focal point in this

(ii) Other high impact Weather and Climate Extremes

1- Develop a list of these events and the associated metrics, Panmao with all, 2016, DRR programme, SWDFP, PWS, UNFCCC (UNEP)
2- Develop a reference material on the observing systems currently available and gaps for monitoring and characterizing these events, Ahira + all, Link to WMO Rolling Review Requirements through CCI TT on SoG (CBS-OPAG IOS)

(iii) Extra Tropical Cyclone

1. TT develop the rational (user perspective, climate change perspective, operational Multi-hazards Early Warning, DRR, etc.) for working on this. Panmao, Blair, Xiaoalan Wang, Ahira, Mirjana. Recommend people from other institutions like ECMWF Reanalysis, Meteo France.
2. Get endorsement from CCI-MG to work on this with involvement of other groups, like students, interested individuals and research (i.e WCRP, IPCC- WGs) and operational institutions (i.e ECMWF, NCEP).

Recommendations:

For TT work

1- Activate TT group email Omar ,
2- WIKI Page, account, Omar
3- Skype conference, Early 2nd September
4- Txt summary for the report ; 8 May 2015
5- Send the WP
6- Survey to be mentioned at MG endorsed and send to Members ( through Secretariat) (Omar and Sena)
7- Next face to face meeting 1Q 2016
8- Expert visit to Geneva 2Q 2016
9- Expert visit in 2017, finalize the guidelines

NB: 1and 2 have been implemented using Moodle. WIKI will be discontinued. 8 was advanced to take place in August 2015.
On WMO programmes
Climate Watch: Recommendation for CCI and CBS to address CWS gaps at national level. Discussion at MG meeting in October, Omar will provide input for the agenda. Collaborate with CBS on SWDFP, on impact based forecast system, focal point: Bernard.

ICT-CSIS: Ahira focal point to follow on ICT-CSIS

On international agencies

1. GFCS partner advisory committee, action can be taken after Congress (through Secretariat), Result Framework for the implementation of the GFCS. 6 countries (Burkina-Faso, Tanzania, Bhutan, PNG, Moldova, Dominica) being supported. The Result Framework will put WMO work in supporting these countries

2. UNFCCC, Warsaw mechanism on loss and damage, executive committee (through Secretariat). Preparation of national adaptation plan, connect through secretariat on the training on the preparation of NAP. Green-funds: members see how they can be involved if their countries are part of GF. Tools to support NAP (the 6 countries)

3. UNISDR: Sandai conference through DRR programme, Keep be informed, and potential input

4. UN-SDG: Keep be informed, and potential input
The Task Team on the Definition of Extreme Weather and Climate Events (TT-DEWCE) has adopted, as one of its recommendations, that a global portal be established for extreme weather and climate events. The aim of this portal is to provide a single point of access to a wide range of national and regional material on extreme weather and climate events, thus assisting in making such information accessible and disseminating it to the widest possible audience. A great deal of material is being produced by NMHSs on extreme weather and climate events, but it is spread across a very large number of national-level sites and is often difficult to locate and access, especially for those unfamiliar with the local language. In other cases, such material is not available on line even it exists.

As much material on extreme events is contained in routine national climate monitoring products, such a portal would also be consistent with the objectives of the Task Team on National Climate Monitoring Products (TT-NCMP).

The terms of reference proposed below are seen as a first stage. The potential exists for extension of the range of material available over time, particularly if the coverage and quality of available global data sets at the daily time scale becomes sufficient to support near-real-time global analyses of extremes at that timescale.

An NMHS or other institution is sought to be the host for the infrastructure for the portal. This could be done by the NMHS alone, or with the support of a group of relevant experts from elsewhere.

In the first instance, it is not proposed that the host of a portal carry out any data analysis of its own, although that could be part of a longer-term extension in a second- or subsequent stage development.

More extensive background for this proposal is contained in a paper prepared for TT-DEWCE, and will also appear in the full set of papers from the February 2014 TT-DEWCE meeting once published.

Terms of reference for a portal

The following products are proposed for inclusion in a first-stage portal:

- Links to published national monthly, seasonal and annual climate summaries.
- Links to known, stable sources of national-level information on extreme events (e.g. the Special Climate Statements produced by Australia).
- Providing the capacity for NMHSs to upload information on high-impact events which have taken place in their country.
- Analyses, using GTS data, of extreme values at the monthly timescale. (In the first instance it is suggested that the Tokyo Climate Centre or NCDC be approached to make their analyses available to the portal, but at a later stage such an analysis could be carried out independently).
• A consolidated set of tropical cyclone information available soon after each cyclone. (This is suggested as a good initial option because there are only a relatively small number of data centres to deal with).
• An extension of the existing global and continental records portal, currently hosted by Arizona State University, to cover national and location-specific record information. (An alternative platform for this could be a WMO climate normals page, if one is likely to go online in the foreseeable future).
• A list of recommended documents (or links to these documents) that can help members in reporting about the extremes (this includes WMO, TT-DEWCE documents and may be others)
• A link to the recommended software (if any) for calculations with a downloading possibility

It is expected, on the basis of experience with the RA VI RCC (which is seen as a possible model for the proposed portal), that the host will need to play a reasonably active role in collecting and curating content; some countries will actively send material but other material will need to be actively sought if the portal is to have reasonable global coverage. Other models (static links to sources of existing content, a site which relied only on material submitted by countries to a central point, or a wiki-style site where countries uploaded their own content) were considered but it was thought that these models would be unlikely to achieve substantial global coverage and would result in reporting from only a small number of countries.
ANNEX-II: Survey on Extreme Weather and Climate Events

The WMO Commission for Climatology Task Team on the Definition of Extreme Weather and Climate Events is currently undertaking a survey of definitions which are being used in different parts of the world for extreme weather and climate events. Once we have received the survey results, the Task Team will consider whether to recommend one or more standard definitions as a basis for international reports. To help us in this task, we would appreciate it if you could answer the following questions for your country, and return the results to TT focal point with copy to Omar Baddour (WMO), at OBaddour@wmo.int, no later than Date to be added.

Country (please enter):

1. Does your country have a specific definition of a heatwave or extended cold spell? If so, what is it? (If your country uses multiple definitions – for example, different definitions in different places or regions – please state this).

2. Does your country have any standard indices which you use for the monitoring of heatwaves or extended cold spells? If yes, what are they?

3. Does your country routinely report on the occurrence of heatwaves or extended cold spells?

4. Does your country have any warning service for heatwaves or extended cold spells?

5. Does your country routinely monitor drought? If yes, what index or indices do you use for monitoring drought (Delete this question if it has already been asked in a CAGM survey (Maxx to advise).

6. Does your country have any standard indices for reporting on extreme heavy rainfall? If so, what are those indices, and what time period do they cover?

7. Are there any scientific papers or other reports documenting your country’s monitoring or forecasting of extreme weather/climate events, such as heatwaves, cold spells, heavy rainfall or drought? (If so, please give references or a link if possible).

8. Does your country have a website for reporting information on extreme climate events? (If yes, please give the address).

9. Does your country produce routine monthly, seasonal or annual climate summaries? (If yes, please give the web address, if available).

10. Does your country have any unmet needs for information on extreme climate and weather events for which you think support from WMO would be useful (If yes, please give details)
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AGENDA

DAY-1

1. 9:30 OPENING: Secretary General Representative, OPACE-2 Co-chair, Round table introduction

2. ORGANIZATION OF THE MEETING  Chair Manola
   2.1 Adoption of agenda
   2.2 Working arrangements  Secretariat

3. REVIEW OF WMO CONSITUENT BODY KEY DECISIONs ON EXTREMES  Chair Manola
   3.1 Review of the CCI-16 decisions  Discussions
       Manola Brunet
   3.2 Review of other WMO bodies decisions (CBS, EC, RAs)  Discussions
       Omar Baddour

4. LINK WITH INTERNATIONAL AGENDAS AND PROJECTS  Chair Manola
   4.1 International policy agenda, UNFCCC, SDG, HFA
       and GFCS Climate Service Information System
       Maxx Dilley / Amir Delju
   4.2 Severe Weather Forecasting Demonstration project (SWFDP) and
       Global Data Processing and Forecasting System (GDPFS)  Alice Soares
   4.3 WMO Agriculture Meteorology Program (drought and its management)  Giacomo Terguggi

Lunch Break 12:30

Afternoon
14:00 – 16:30
Joint TT-DEWCE/TT-HOM session
16:50-17:30 LINK WITH INTERNATIONAL AGENDAS AND PROJECTS  Continued
4.6 Discussions on various potential linkages and cross-cuttings rising from Item 4 and the joint session

DAY 2
Morning
5. COUNTRIES PERSPECTIVES IN DEFINING WEATHER AND CLIMATE EXTREME EVENTS AND THEIR THRESHOLDS  Chair Ahira / Panmao
   5.1 Argentina  Maria de los Milagros Skanski tbc
   5.2 Australia  Blair Trewin
   5.3 China  Panmao Zhai
   5.4 Côte d’Ivoire  Kouakou Bernard Dje
   5.5 Indonesia  Ardhasena Sopaheluwakan
5.6 Montenegro Mirjana Ivanov
5.7 USA Ahira Sánchez.Lugo
5.8 General discussions on key outcome from countries presentations

Afternoon

6. KEY ACTIVITIES IN THE PAST INTERSESSION PERIOD Chair Panmao/Ahira

6.1 Review of action list raising from the previous meeting Fumin / Secretariat
6.2 Achievements in the previous intersession period Blair / Manola

7. FORWARD WORKPLAN BUILDING ON THE RECOMMENDATIONS FROM THE PAST MEETING WITH FOCUS ON THE FOLLOWING ISSUES. Chair Panmao/Ahira

7.1 Basic indices and Multi-year indices
7.2 Heat Waves, Extreme rainfall and Drought

DAY -3

Morning

7. FORWARD WORKPLAN BUILDING ON THE RECOMMENDATIONS FROM THE PAST MEETING WITH FOCUS ON THE FOLLOWING ISSUES. (Continued)

7.3 Regional Extreme events monitoring (OITREE technique)
   - Presentation by Zhiqiang Gong
   - Presentation by Zhai Panmao
   - Discussions
7.4 Data base for cataloguing extreme events and impacts
   - Discussions
7.5 WMO portal for information on extreme events
   - Discussions
7.6 Other Issues

Afternoon

8. CONCLUSION AND RECOMMENDATIONS Chair Ahira / Panma

15:00 Closure of the meeting