



Report of the Secretary-General on Oceans and the law of the sea  
Contribution by the World Meteorological Organization to the implementation

and coastal area service provision. This is in part fulfilling the WMO requirements under the International Convention for the Safety of Life at Sea (SOLAS), including for the regular provision of meteorological warnings and forecasts to ships at sea, including for the Polar regions and links to the Polar Code. In this regard two technical documents have been updated: *Manual on Marine Meteorological Services* (WMO.No-



Global mean temperatures in 2017 were about 1.1 °C above pre-industrial temperatures.<sup>11</sup> Despite the cooling effect of La Niña, 2018 January-April global temperature broke records of all previous La Niña years and even the strong El Niño 1998, 20 years ago. Currently 2018 ties closely with 2010 which was a moderate El-Niño year and is amongst the five warmest years with all years included.

Global sea surface temperatures in 2017 were somewhat below the levels of 2015 and 2016, but still ranked as the third warmest on record. Ocean heat content – a measure of the heat in the oceans through their upper layers down to 2 000 meters – reached new record highs in 2017.

The *Statement* indicated that the magnitude of almost all of individual components of sea level rise has increased in recent years, in particular melting of the polar ice sheets, mostly in Greenland and to a lesser extent Antarctica. The April average Arctic sea ice extent was the second smallest (after 2016) in 39 years.

For the second successive year, above-average sea surface temperatures off the east coast of Australia resulted in significant coral bleaching in the Great Barrier Reef.

The *Statement* contains a special section on ocean acidification from the IOC of UNESCO.<sup>12</sup>

As one of the sponsors of GESAMP (Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection), WMO supported the organization and hosted in Geneva the 44th Session of GESAMP and a related side event on connection between climate change and the oceans in September 2017.

In partnership with academic institutions, WMO developed and submitted to Prince Albert Foundation a proposal related to coordinated observations between atmospheric and ocean greenhouse gas communities.

*207. Notes with concern the severe impacts on coastal communities of extreme weather events, such as tropical cyclones and associated storm surges, and encourages cooperative actions by relevant United Nations bodies and organizations, including the World Meteorological Organization, to assist States in*

receive reliable and timely forecasting information based on impacts and in multi-hazard approach.

WMO continued strengthening regional coordination mechanisms through the organization and conduct of sessions of regional tropical cyclone committees.<sup>13</sup> Development of impact-based products is conducted under the initiative of the Regional Specialized Meteorological Centres (RSMCs) in collaboration with Members with experience in impact-based tropical cyclone forecast and warning services. RSMC Miami issued its first operational coastal inundation map associated with storm surge for the continental United States in 2017. It is planned to extend this product to other Members and regions.<sup>14</sup>

Information was provided to the UNSG concerning the disastrous hurricane season in the Caribbean and its possible linkages with global climate change together with suggestions for UN system actions to mitigate loss and damages from such severe hurricanes.

The Severe Weather Forecasting Demonstration Project (SWFDP)<sup>15</sup> aims to strengthen capacities to deliver improved forecasts and warnings of severe weather. With its expansion to West Africa and Eastern Caribbean in 2017, the number of regional subprojects has grown to eight with involvement of over 75 developing countries and SIDS, including LDCs in basically all Regions of WMO. Interest in other regions has been signaled.

WMO continued the implementation of the Coastal Inundation Forecasting Demonstration Project (CIFDP),<sup>16</sup> which provides a good example of how a Multi-hazard Early Warning System (MHEWS) can save lives. The project seeks to demonstrate how an integrated system can address all sources of coastal inundation, from storms to sea surges to cresting rivers. Three sub-projects are being implemented in the Caribbean, Fiji and Indonesia. The project in Bangladesh was completed.

### Alerting systems

To support the implementation of target (g) of the Sendai Framework for Disaster Risk Reduction 2015-2030, namely to "substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030", WMO adopted the vision of a Global Multi-hazard Alert System (GMAS),<sup>17</sup> as the central aggregator, disseminator and resource for authoritative warnings and information related to high-impact weather, water, ocean and climate events. The system aims to enable easy and global availability and access to authoritative information and provision of expert advice to WMO Members as well as

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<sup>13</sup> Four sessions were organized during the intersessional period. Africa: 22nd Tropical Cyclone Committee (Seychelles, September 2017); Asia: 44th WMO/ESCAP Panel on Tropical Cyclones (Bahrein, September 2017); 50th Typhoon Committee (Viet Nam, March 2018); North America, Central America and the Caribbean: 40th Hurricane Committee (France, April 2018).

<sup>14</sup> In addition, workshops and attachment trainings were organized in the five tropical cyclone regional bodies to improve tropical cyclone forecaster's skills and competencies for their forecasting and communication to the media and emergency managers. Competency standards at regional level were established in each of the five regional tropical cyclone bodies. Tropical cyclone forecaster competencies at global level will be further developed and agreed upon by consolidating those at regional level.

<sup>15</sup> See <http://www.wmo.int/pages/prog/www/swfdp/>.

<sup>16</sup> See [https://www.jcomm.info/index.php?option=com\\_content&view=article&id=167](https://www.jcomm.info/index.php?option=com_content&view=article&id=167).

<sup>17</sup> Decision 3 (EC-69).

to the United Nations and other humanitarian agencies to respond to their immediate needs and requests in anticipation of, during or after hydrometeorological hazard situations. GMAS will use standards such as the Common Alerting Protocol (CAP) and will comprise of existing and future regional warning mechanisms including the World Weather Information Service (WWIS),<sup>18</sup> the Severe Weather Information Centre (SWIC),<sup>19</sup>

review of the observing system for tracking ocean heat and freshwater content, a forward strategy for air sea fluxes observations, embracing new technologies; and a project to guide the development of sustained observing systems for boundary currents and their interaction with the shelf.<sup>25</sup>

WMO is also promoting facilitating the making of marine meteorological observations from within exclusive economic zones for operational meteorology purposes and in support of safety of life at sea.<sup>26</sup>

The WMO-IOC JCOMM *in situ* Observing Platform Support Centre (JCOMMOPS),<sup>27</sup> the focal point for the coordination of the *in situ* ocean observing systems defined by JCOMM, continued to assist in the implementation and deployment of the observing networks; establishing, maintaining and verifying mechanisms for the timely exchange of data and metadata, including the facilitation of quality control and archival functions; and developing the consistent set of tools needed to monitor the status of the observing system and data and metadata distribution, so as to identify action areas and improve the overall effectiveness and development of the system.

### El Niño/La Niña

WMO released its latest El Niño/La Niña Update on 14 June 2018,<sup>28</sup> with estimated probabilities for the third quarter of 2018. Sea surface temperatures in the east-central tropical Pacific Ocean as well as most of the overlying atmosphere indicators suggest that ENSO-neutral conditions are prevailing. Most climate models indicate continuation of neutral conditions into the third quarter of 2018. While there is a small chance of El Niño development, re-emergence of La Niña can be practically ruled out. Many models further indicate this period to be marked by a gradual warming of the tropical Pacific, eventually reaching possible weak El Niño level by the fourth quarter of the year. However, these predictions are subject to a high level of uncertainty characteristic of long-lead forecasts made at this time of the year.

### Climate services in the Arctic

Substantial progress has been made in strengthening climate services in the Arctic. A new Pan-Arctic Climate Outlook Forum (PARCOF) has been launched, which met for the first time in Ottawa, Canada, on 15 and 16 May 2018.<sup>29</sup> The Forum provided seasonal outlook for the forthcoming summer ice-breakup season, in support of climate risk management and climate change adaptation and inform policy and decision-making in climate-sensitive sectors operating in the Arctic environment. The Outlook predicts that average surface temperatures will continue to be above average for June, July and August, while the sea-ice conditions will be below normal for most

<sup>25</sup> In addition, OOPC is strengthening its relationship with the ocean forecasting programme OceanPredict (GODAE OceanView), noting the developments in Earth system approaches and seamless prediction systems, including coupled numerical weather prediction, will place new demands on the ocean observing system.

<sup>26</sup> A draft 2019 Congress Resolution in this regard is expected to be recommended by the Executive Council in June 2018.

<sup>27</sup> See <http://www.jcommops.org/board>.

<sup>28</sup> See <http://www.wmo.int/pages/prog/wcp/wc>

of the Arctic. Further, a new Arctic Regional Climate Centre Network (ArcRCC-Network)<sup>30</sup> launched its demonstration phase during PARCOF-1 to seek WMO designation. ArcRCC-Network also coordinates the PARCOF sessions on a regular basis.<sup>31</sup>

#### Research and modelling

The WMO/IOC-UNESCO/ICSU World Climate Research Programme (WCRP) carries out



buoy vandalism, endorsing the Draft Strategy to Reduce Damage to Ocean Data Buoys from Vandalism provided by the Data Buoy Cooperation Panel (DBCP) (DBCP Technical Document No. 58).<sup>36</sup> This recommends the WMO Executive Council and the IOC Assembly to adopt the draft Strategy; requests the DBCP to continue to seek further input from relevant national and regional organizations to promote the strategy and raise awareness about the issue of data buoy vandalism and its impacts on forecasting climate, weather, and tsunamis; and urges Members to actively engage, support and collaborate in the efforts of the DBCP and its Working Group on Data Buoy Vandalism to collect existing education and outreach materials related to national or regional mitigation of data buoy vandalism efforts.

*292. Decides to proclaim the United Nations Decade of Ocean Science for Sustainable Development for the 10-year period beginning on 1 January 2021,*

