Country Report of Pakistan

(2017-2018)

for

45th Session of WMO/ESCAP Panel on Tropical Cyclones (PTC)
(Muscat, Oman from 23-27 September, 2018)

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1. Tropical Cyclone Activity:

1.1 Extremely Severe Cyclonic Storm “Mekunu” in Arabian Sea (21-27 May, 2018)

On 21st May, 2018, persistence of clouds over South Arabian Sea showed an area of convection with a potential of development of a cyclonic circulation over there. Tropical Cyclone Warning Centre-Karachi of Pakistan Meteorological Department kept the situation under observation. On 22nd May, at 1200 PST the well marked low pressure area over southwest Arabian Sea converted into a “Depression” near latitude 9.5°N and 57.0°E approximately 1330 Km south of Masirah Island, Oman having tendency to intensify and convert into a Tropical Storm during next 24 hrs, and is expected to move north-westwards (towards Yemen-Oman coast). After 24-hours, the Depression intensified into a Cyclonic Storm (MEKUNU) at near 11.2° N and 56.0° E(located approx. 1700 km south of Gwadar and 1940 km southwest of Karachi coasts) and was expected to further intensify into a Severe Cyclonic Storm and likely to move North-Westward (towards Yemen-Oman coast).None of the area of Pakistan’s coast is under threat by this tropical cyclone. On 24th May, at 1430 PST, it further intensified into Very Severe Cyclonic Storm and located near latitude 14.0° N and 55.5° E. It was likely to further intensify and to move north-westward (towards). The real-time regional meteorological data and most of the models are indicating that the MEKUNU will cross the southern coast of Oman & adjoining coast of Yemen on Friday evening/night as a Very Severe Cyclonic Storm with wind speed of 150-160 Km/hr gusting to 180 Km/hr.

On 25th May at 1430 PST, the Very Severe Cyclonic Storm (MEKUNU) further gained strength near southern coast of Oman at 16.0° N and 54.4° E, at 115 km southeast of Salalah (Oman).

At its peak intensity, Mekunu had a compact 13 Km eye, which was visible on satellite imagery. Between 18:30–19:30 UTC on May 25, Mekunu made landfall at peak intensity on southern Oman, just west of Salalah, near Raysut. It was the first storm of hurricane intensity to strike Dhofar Governorate since 1959. The storm rapidly weakened over the dry, mountainous terrain of western Oman.
2. Meteorological Component

2.1 Installation of Weather Radar at Islamabad under JICA through Grant-in-Aid Assistance

JICA/Government of Japan has taken a number of steps to enhance weather forecasting and warning capabilities of Pakistan Meteorological Department. Under JICA sponsored project “Establishment of Specialized Medium Range weather Forecasting Centre (SMRFC) and Strengthening of Weather Forecasting System in the Islamic Republic of Pakistan” installation of weather radar and a Wind Profiler system have been completed at Meteorological Complex, Islamabad and their calibration / test-run is in progress. Further, High Performance Computer Cluster system has also been installed at Islamabad to boost the short and medium range forecasting capabilities of PMD.

2.2 Project for “Installation of Weather Surveillance Radar at Karachi in the Islamic Republic of Pakistan”

A contract agreement was signed between JICA and the Government of Pakistan on 8th July, 2015 for the project titled “Installation of Weather Surveillance Radar at Karachi in the Islamic Republic of Pakistan”. The total cost of the project is PKR 1580.000 million (Rs.1542 million foreign aid by the Govt. of Japan and Rs.38.000 million by the Govt. of Pakistan). The construction work is under progress. The project is expected to be completed by 2020.
2.3 Installation of Weather Surveillance Radar at Multan (31st August, 2018)

After signing ceremony of Exchange of Notes and Grant Agreement between Mr. Asad Umer, Minister for Finance, Government of Pakistan and Mr. Kazuyuki NEKANE, State Minister for Foreign Affairs, Government of Japan, for the installation of weather radar at Multan through grant assistance and to witness the newly constructed weather radar with the grant assistance of the Government of Japan Mr. NEKANE paid post signing visit to Met Headquarters Office, Islamabad on 31st August, 2018. The honorable minister was briefed about the importance of radar and its products that would be available to PMD for regular monitoring of the weather systems.

Dr. Ghulam Rasul, Director General, PMD briefed the honorable minister in detail. He extended thanks to the Govt. and the people of Japan for provision of assistance for the Pakistani community. He also thanked the Japanese government for providing a state-of-the-art technology project for flood early warning of Lai Nullah basin. The project was completed in 2007 and since then no casualty was observed due to flooding in Lai Nullah. The project is one of the most successful projects of Government of Japan for Pakistan. The honorable minister visited various Met facilities as well as newly installed weather radar. He also assured of continuous support for PMD to mitigate the losses from natural disasters.

2.4 Installation of Weather Surveillance Radar at Sialkot

Government of Pakistan has approved the project of installation of weather radar at Sialkot with worth cost PKR 793.00 million. With the completion of the project, PMD capacity to monitor the weather systems entering from eastern side will further enhance for better estimation of flood potential and issuance of timely early warnings.

2.5 Establishment of Main Meteorological Office at new Islamabad International Airport

PMD has established Meteorological Office at new Islamabad International Airport which is equipped with latest meteorological equipment and communication system to provide aviation meteorological services to national and international airlines operated form the airport.

2.6 Expansion of Meteorological Services at Faisalabad Airport

Due to the increased flight operation at Faisalabad International Airport, PMD has expanded the setup of meteorological facilities to meet the requirement of round-the-clock operation.

2.7 Implementation of Quality Management System (QMS) ISO 9001:2015

PMD has achieved the Quality Management System (QMS) ISO 9001:2015 Recertification in provision of Aeronautical Meteorological Services to National and International
Air Navigators at 17 Meteorological Offices located at airports countrywide which is valid up to November, 2018.

2.8 Summer Protection and Monsoon Awareness Seminar (Karachi, on 27th April, 2018)

The Regional Integrated Multi-hazard Early-warning System (RIMES) and Pakistan Meteorological Department (PMD) have been holding Monsoon Forum since 2013 to provide an interface between forecast providers and stakeholders from various hazard-sensitive sectors in the country for better risk management.

Keeping in view the possible and urban flooding, PMD with the support of RIMES, KE (Karachi Electric) and National Disaster Management Authority (NDMA) organized a one-day seminar on Summer Protection and Monsoon Awareness at Karachi on 27th April, 2018. The meeting focused on monsoon, its predictability, general outlook as well as summer season preparedness with focus on heat waves, their warning system and precautionary measures;

Lt. General Oman Mahmood Hayat, Chairman, NDMA was the Chief Guest. The meeting was attended by Ms. Ruby Rose from RIMES, Dr. Ghulam Rasul DG-PMD, Mr. Fakhar from K-Electric along with Representatives of PDMA Sindh, University of Karachi, different NGOs and senior officers of PMD.

The Chief Guest appreciated the efforts of PMD, RIMES and K-Electric and stated that the seminar is the part of awareness campaign for the people of Sindh. Besides consolidating the learning and experiences of monsoon 2017, the conference will provide a more refined input for the preparation of monsoon and summer of 2018 to tackle adverse situations effectively.
2.9 Establishment of Flood Forecasting & Warning System for Kalpani Nullah Basin, Mardan

Mardan District has always been under threat of flash flooding in Kalpani Nullah which originates from Malakand hills. Since the last decade many causalities have been reported owing to flash flooding in this Nullah. For the purpose of safety of precious lives and property, the Government of Pakistan has approved the project titled “Establishment of Flood Forecasting & Warning System for Kalpani Nullah Basin, Mardan to improve PMD weather monitoring / forecasting capabilities. Under this project the installation of weather radar at Mardan has been completed and test-operation/calibration is in progress.

2.10 Establishment of Heatwave Early Warning System in Karachi

In wake of severe heatwave in Karachi in 2015 that took more than 1000 precious lives, PMD established Heatwave Early Warning Centre in Karachi to inform the general public to adopt precautionary measures to effectively handle the heatwave hazard. During 2017-18, PMD also organized heatwave awareness seminars in Karachi in RIMES, K-Electric, Provincial Disaster Management Authority, City Metropolitan Corporation, local NGOs and relevant stakeholders.

2.11 Memorandum of Understanding between Chinese Academy of Sciences and Pakistan Meteorological Department to Promote Science Technology & Innovation Cooperation

The Government of Pakistan has approved the signing of a MoU with Chinese Academy of Sciences, China for the promotion of science, technology and innovation cooperation. The cooperation under this MoU will facilitate PMD to strengthen its early warning capabilities in wake of various hydro-meteorological and geophysical disasters and will also contribute in capacity building and improved service delivery of PMD.

2.12 WMO Designated Marine Meteorological Centre, Karachi as Regional Specialized Meteorological Centre (RSMC), Karachi

During June, 2018, WMO has designated PMD’s Marine Meteorological Centre at Karachi as “Regional Specialized Meteorological Centre (RSMC)” for provision of Marine Meteorological Services for METAREA-IX. This is first time in the history of PMD that one of its centres has been declared as RSMC by the WMO.

2.13 Strengthening of Early Warning System of PMD

Pakistan is facing the brunt of climate change ranking among Top Ten Most Vulnerable Countries in the world. In such a scenario, PMD’s facilities are required to be enhanced and necessary steps are required to be taken for the replacement of old-aged instruments with the latest technology and analyses facilities.

For expansion and up-gradation of PMD Hydro-meteorological & Climate services, a four year plan/project (based on National Disaster Management Plan) titled “Strengthening of EWS of PMD” has recently been recommended by the CDWP on 24th May, 2018. The capital cost of the proposed project is Rs.12942.00 million. Now the project is to be approved by the highest fora.

The modernization plan will be implemented priority-wise through which establishment of 08 new weather radar stations, induction of 200 Automatic Weather Stations (AWSs), establishment of 40 new Met Observatories and automation of 97 existing Met. Observatories, Establishment of Regional Flood Forecasting Centres at 04 locations, establishment of 36 centres in northern areas for monitoring of Glacial Lake Outburst Flood (GLOF), establishment of a Monsoon Monitoring Centre, to monitor upper atmospheric wind profile 03 Wind Profiler Radars are proposed.
2.14 Meteorological Service of Kingdom of Saudi Arabia Demanded Experts from PMD: Joining of PMD Expert at GAMEP

Upon the request of General Authority of Meteorology & Environmental Protection (GAMEP) of Kingdom of Saudi Arabia, and with the approval of the Government of Pakistan, two experts from PMD joined GAMEP for the duration of 3-years in order to train their staff in the field of meteorology and related disciplines.

2.15 Numerical Weather Prediction at PMD

Pakistan Meteorological Department (PMD) has been running ICONahedral Nonhydrostatic (ICON) model since March 2015. ICON is targeting a unified modeling system for global numerical weather prediction (NWP) and climate modeling. ICON dynamical core is designed to better tap the potential of new generations of high performance computing. The model is installed on a high performance computing cluster system of 184 cores. PMD was previously using High Resolution Regional Model (HRM) of DWD Germany which was hydrostatic model with limitations of very horizontal resolutions for complex topographic domain. Weather Research and Forecasting (WRF) modeling system also has been deployed on High Performance Cluster Computing System for operational weather forecast up to 72 Hours at a finer resolution (7km). The model is currently being used for diagnostic studies by researchers.

A GTS link via ftp has also been established between China Meteorological Administration (CMA), and PMD Islamabad. NWP products of CMA’s Global Spectral Model (GSM) in Grib1 format are being uploaded to our ftp server daily at 00:00, 06:00, 12:00, and 18:00 GMT. GSM has a horizontal resolution of TL639 (0.28125 deg) and is used for Short- and Medium-range forecast.

Specifications of High Performance Computing Cluster

Peak Computational Performance: 1.7 TFlops
Dell Power Edge M600 Blade Servers: 32 Compute Nodes
Processor: 3.33GHz 2 x Quad Core Intel Xeon Processors. Memory: 8 GB Each
PowerEdge R720 Rack Server Intel® Xeon® processor E5-2600
PowerEdge R930 Rack Server Intel® Xeon® processor E5-8800
Connectivity: Infiniband Interconnect 20 Gbps, Fiber Channel 8Gbps
Storage: SAN Dell/EMC CX4-120 with Fiber Channel 8 Gbps Interconnect, 12 TB SATAII (12 drives of 1 TB each) - FC 5.2 TB (13 Drives of 400 GB each)
28TB PERC RAID Storage

3 Hydrological Component:

3.1 Strategic Strengthening of Flood Warning and Management Capacity of Pakistan-Phase-II

In the aftermath of Super Floods of 2010, UNESCO in collaboration with JICA/Government of Japan implemented a project “Strategic Strengthening of Flood Warning and Management Capacity of Pakistan” for enhancing the flood forecasting and warning capacity of PMD.

Under the first phase of the project, ICHARM under the auspices of UNESCO JAXA developed a flood forecasting and routing model Indus-IFAS (Integrated Flood Analysis System for River Indus) and was put into operation at PMD’s Flood Forecasting Division (FFD), Lahore for dissemination of lead-time flood warnings to the communities living in flood plains of the upper Indus and Kabul River. The project was completed in June 2014.
However, in wake of flooding during September 2014 in the Eastern Rivers urged the need to upgrade Indus-IFAS to cover the whole Indus River catchments including the Eastern Rivers of Jhelum, Chenab, Ravi, and Sutlej. Therefore, upon request of Pakistan, UNESCO and Government of Japan initiated Phase-II in January, 2016 with the objectives:

i. Indus-IFAS Model Improvement for Eastern Rivers of Pakistan.
ii. Densening of observation network through installation of Automatic Weather Stations.
iii. Undertake technical studies on strategic reinforcement of ground based observational network.
iv. Organization of short-term workshops/seminars for key stakeholders on river profiling and discharge measuring to understand the information, warning, technical terminologies, used in flood bulletins / advisories / warnings.

3.2 Development of AWS-station under UNESCO Project “Strategic Strengthening of Flood Warning and Management Capacity of Pakistan Phase-II”

Under UNESCO funded project, designing, assembling, testing and calibrating of Automatic Weather Stations was introduced. This activity was initiated after a model AWS was designed by the FFD engineers in the past. It was inspected by the UNESCO authorities who found it to be a worthy effort of FFD engineering staff. Later, it was included in the ongoing project to produce 24 AWS locally. The main aim behind this idea is to enhance the capability of FFD under capacity building besides saving foreign exchange in procuring this item from local market. Under this project up till now 15 AWS stations have been designed, assembled and calibrated from which 14 have been installed at different locations while remaining AWS are at development stage.

4 Disaster Risk Reduction Component

4.1 Seismic Monitoring Network of PMD

PMD has a network of 20 remote seismic monitoring stations throughout the country which are continuously recording the earthquake activity in the region. PMD issues SMS to media and other stakeholders immediately about the location, magnitude, depth, times and shock-wave information. Such SMS cover all earthquakes greater than magnitude 2 on Richter scale and earthquake information is disseminated within 3-minutes of the occurrence of earthquake through SMS to media and other concern stakeholders/government functionaries.

4.2 Reverse Linkage Project between Marmara Research Center (MRC), Turkey and Pakistan Meteorological Department on Earthquake Seismological Research
In the past, Pakistani nation has suffered severe life and economical losses due to devastating earthquakes and tsunami. To mitigate these losses from earthquakes and tsunami in Pakistan, the Islamic Development Bank (IDB), Kingdom of Saudi Arabia in collaboration with Marmara Research Center (MRC), Turkey has sketched out a project in order to enhance the capabilities of Pakistan (Pakistan Meteorological Department) in the field of earthquake, tsunami, and tectonics of the earthquake prone areas of the country. The total cost of the project is PKR 101 million through which Islamic Development Bank and MRC share is 77% while Government of Pakistan’s share is around 23%. This project is meant for the study of Makran Subduction zone and the tectonics of southern Balochistan.

Targets to be achieved under this project are given as under:

(a). Up gradation of earthquake analysis system of PMD, i.e. SeisComP3 which also works as a tsunami early warning system. The newer version will replace the old one installed at Islamabad and Karachi.

(b). Deployment of five (05) Global Positioning System (GPS) stations for Makran coast of Balochistan province and one set of equipment for backup.

(c). Deployment of five new seismic monitoring stations for Balochistan province and one set of equipment for backup.

(d). Installation of three (03) sets of site classification measurement systems for risk assessment.

A contract agreement was signed between Economic Affairs Division (EAD) of Pakistan and Islamic Development Bank (IDB) on 31st October, 2016 for financial and technical support to PMD. The startup meeting of the said project was held between Pakistan and Turkey at PMD on 10-11-2016. Completion of the project will facilitate PMD to further enhance its capacities in the field of seismological research, help to mitigate seismic risk through provision of improved seismological information and thus significantly contribute to the safety of lives and property of the people of Pakistan in the wake of geophysical disasters.

4.3 Technical Cooperation between PMD and Sultan Qaboos University, Oman regarding Tsunami Early Warning System

The Government of Pakistan has approved an Agreement on Technical Cooperation in Tsunami Early Warning System to be signed between Pakistan Meteorological Department and Sultan Qaboos University, Oman. The purpose of this agreement is to share real time seismic data regarding earthquake and tsunami for monitoring of seismological activities associated with the Arabian Sea and Gulf of Oman so that well in time both countries could generate warnings according to mutually agreed SOPs in order to save precious lives and to reduce the economic losses at both sides, as both Pakistan and Oman were affected by the devastating tsunami waves in 1945.

4.4 Tsunami Exercise IOWave-18 (4th & 5th September 2018)

Indian Ocean Tsunami Warning Mitigation System (IOTWMS) of IOC/UNESCO scheduled to conduct tsunami exercise titled “IOwave 18” on 4th & 5th September, 2018, alternatively with two scenarios of Makran Trench and Sunda Trench. The exercise put all Indian Ocean countries in a tsunami warning situation and required NTWCs and the National/Local Disaster Management Offices (NDMO/LDMO) in each country to activate their SOPs. A primary motive for IOWave18 was to enhance tsunami preparedness at community level through evacuation drills. This end-to-end exercise also provided an opportunity to test the SOPs and communication linkages at all levels of the tsunami disaster management chain.

During the pre-exercise consultations with stakeholders it was decided that Pakistan will participate in Makran Trench scenario on 4th September, 2018.
Exercise Earthquake Scenario:
Origin time: 04-09-2018 at 11:00:00 PST.
Magnitude: 9.0
Depth: 10 Km
Latitude: 24.8º N
Longitude: 58.2 º E
Location: Off Coast of Iran

Exercise Involvement
The following organizations were involved in the exercise:

- Pakistan Meteorological Department, National Tsunami Warning Centre, Karachi (Designated as NTWC by IOTWMS))
- NDMA Islamabad (Designated as NDMO by IOTWMS))
- PDMAs Sindh & Balochistan, (Designated as LDMO-P by IOTWMS))
- DDMAs Karachi, Thatta, Badin, Lasbella and Gwadar
- Pakistan Navy (8 offices)
- Pakistan Air Force (NHQ Peshawar, PAF Base Maripur & Faisal)
- KANNUP, Karachi

Pre-Exercise Events:

- In February 2018, IOC/IOTWMS sought each Indian Ocean Country to nominate a National Contact for IOWave-18. The designated National Contacts were assigned to make necessary arrangements within the country, including the identification of operational points of contact for receipt and dissemination of tsunami warnings downstream from the NTWC. The designated National Contact was also responsible for coordinating input to the exercise evaluation.
- A number of written and verbal consultations were made with the above organizations to make the event successful. Each organization nominated contact persons. NTWC, Karachi discussed the arrangements with each contact person.
- During these consultations PDMA Sindh agreed to arrange a community evacuation at a coastal location in District Thatta which was a primary objective of the exercise.
- A Press release was issued by NTWC, Karachi through PMD’s Website about one week before the exercise as per IOC/IOTWMS manual for IOWave-18. However extreme care was taken not to panic the general public inadvertently.

Exercise Day Events:

National:

During the exercise each participating organization was supposed to act according to their SOPs.
1. On 4th September 2018, NTWC, Karachi issued Tsunami Warning Bulletins according to its SOP. The Bulletins were issued through SMS, email and Fax.
2. Total Five (5) numbers of Test Tsunami Bulletins were issued; the first one issued at 10:55 PST was just an announcement to start the exercise.
   i. Bulletin-1 was issued 11:05 PST. The content of the bulletin included Earthquake Parameters, Evaluation of tsunami threat and an order for evacuation at coastal areas of Balochistan and stand by for rest of the coast.
   ii. Bulletin-2 issued at 11:17 PST, forecast arrival time and wave height was also included besides revised earthquake parameters and evaluation.
iii. Bulletin-3 was issued at 11:30 PST. The generation of tsunami was confirmed in this bulletin on the basis of Tide-gauge data along with an order for evacuation along coast of Pakistan.

iv. Bulletin-4 was issued at 13:30 PST with the evaluation that tsunami threat has passed but “All Clear” was left to local authorities. This was the last bulletin from NTWC, Karachi.

3. Participating organizations gave a feedback through telephone call as and when they received the Tsunami Warning Bulletins from NTWC.

4. The dissemination through SMS and email worked well but there were communication gaps while sending messages through Fax.

5. During the exercise PDMA Sindh informed that a community evacuation is being exercised in District Thatta. The details of the evacuation are still awaited.

6. DDMA Karachi (Commissioner Office), declared emergency situation in their disaster management centre to test their operational status.

7. District Municipal Committee District East

International:

1. During the exercise each RTSP (Australia, India and Indonesia) issued Tsunami Bulletins which were received through GTS, email, SMS and fax.

2. The reception of bulletins through GTS, email and SMS was timely but delayed through Fax.

3. NTWC of each country was required to report the “Threat Level” in their respective countries through an online password protected status form to IOC/ IOTWMS using website of any of RTSP. Pakistan National Tsunami Warning Centre reported its status 4 times during the exercise.

5. Training / Education

5.1 Capacity Building of PMD: Training Abroad & Human Resource Development

For the capacity building of its scientists, PMD has been sending potential scientists abroad for postgraduate studies and higher trainings (MS/Ph.D etc.) in Meteorology, Hydrology, Seismology and Climate Sciences with support by the Government of Pakistan and cooperation by international organizations, research institutions and foreign universities.
So far, twenty-six (26) officers have joined back to PMD after completion of their higher studies from UK, USA, Canada, China, Sweden, Hong Kong, Korea, Thailand etc.

- In September, 2017 one scientist proceeded abroad for undertaking 3-years Ph.D in Meteorology at Nanjing University of Information Science and Technology (NUIST), China under award of WMO fellowship.

- Besides this, one more scientist proceeded to Japan during September 2017 for undertaking Master Degree program in “Flood Disaster Risk Reduction” from International Centre for Water Hazard and Risk Management, Japan under support by JICA/Government of Japan.

- During December, 2017, one scientist joined back to PMD after completion of Ph.D in Hydrometeorology from the University of Arizona, USA under Fulbright Scholarship program.

- During July 2018, one scientist joined back to PMD after completion of his 3-years M.Sc (Hydrology) from Russian State Hydrometeorological University, St. Petersburg, Russian Federation under award of WMO Fellowship.

- While three (03) PMD scientists are still doing their 3-years Ph.D in Meteorology at the King Abdulaziz University (KAU), Jeddah, Saudi Arabia under the award of scholarship by KAU, they are expected to join back PMD by the end of this 2018.

During 2017-2018 around 40 short-term trainings/workshops/seminars abroad availed by PMD scientists. These opportunities were offered mainly by WMO, CMA, JICA, ICIMOD etc.

5.2 Training of Met. Personnel at IMG, Karachi

During 2017-2018, various regular and special courses on meteorology were also conducted at PMD’s Institute of Meteorology & Geophysics (IMG), Karachi for in-service Met personnel of PMD as well as for Met officials from other relevant organizations including Met branch of Pakistan Air Force and Navy. These courses include Initial and Preliminary Meteorology Courses (BIP–MT, Mid Level), Basic Forecasting Course (WMO BIP–M, Advanced Level) and others.

5.3 Training to the Met Officials from neighbouring Countries

PMD started to extend its training facilities to the National Meteorological and Hydrological Services (NMHSs) of the neighbouring countries for their capacity building through WMO Voluntary Cooperation Programme in 2008. For this purpose, special Preliminary Meteorology Courses (BIP-MT) were conducted in 2008, 2009 and 2010 at PMD’s Institute of Meteorology & Geophysics (IMG), Karachi in which 31 Met Officials from Bangladesh, Bhutan, Maldives, Myanmar, Nepal and Sri Lanka got benefitted from these courses.

In 2015, 2016 and 2017, upon request of Department of Meteorology, Sri Lanka, six (09) Met personnel were accommodated in 76th, 77th, 78th (BIP-MT, Mid Level) Preliminary Meteorology Course at IMG, Karachi. Air travel and stipend to the participants was borne by Government of Sri Lanka while PMD provided waiver towards tuition fee and free accommodation in hostel facilities of IMG Karachi. Similarly in 2018, three (03) more Met officials from Department of Meteorology, Sri Lanka have been enrolled in 79th Preliminary Meteorology Course (BIP-MT, Mid Level) commenced at IMG, Karachi w.e.f. 29th June, 2018 for 18 weeks duration.
5.4 Training Session of Automatic Weather Station (AWS) Installation held at Met Headquarters Office, Islamabad on 4-7 September, 2018

A training session on the installation of AWS was organized at Met Headquarters, Islamabad from 4-7 September, 2018 with special focus on installation of AWS at higher elevations and glaciated zones. The session was proposed by EV-K2-CNR to build the capacity of staff of PMD for the installation of AWS at higher elevations. The trainers for this training were specialized in working with hydro-meteorological equipment at glaciated zones in different areas of the world and also engaged in the manufacturing of these stations.

Mr. Gian Pietro Verza from EV-K2-CNR, Mr. Guido Bernardi and Mr. Luca Zingarettiare conducted the training session. Ms. Elisa Vuillermoz and Riaz-ul-Hassan from EV-K2-CNR Pakistan office also assisted the trainees during the training.

The participants learnt about the AWS installation, working mechanism of different sensors and their configuration with the logger. Problems faced during AWS installation process at higher elevations under harsh climatic conditions and their trouble shooting were explained to the participants with practical demonstrations. 14 engineers and PMD staff from Islamabad, Gilgit, Chitral, Skardu and Lahore attended the training.

The Ambassador of Italy to Pakistan H.E. Stefano Pontecorvo and Director General, PMD, Dr. Ghulam Rasul also visited the training session on second day of the training program.

5.5 Internship and research

PMD facilitated numbers of student belonging to different universities for conducting their Masters and Ph.D research work/thesis relating to various fields of meteorology at Research & Development Division, Islamabad. PMD provided laboratory facilities, access to Met Data and NWP products as well as deputed experts to supervise them in their
assignments / research work. About 189 students were accommodated in PMD during last five years.

6. Research/ Publications

6.1 Pakistan Journal of Meteorology

PMD started publication of its biennial research journal namely “Pakistan Journal of Meteorology” in 2004. PJOM has got eighty-one (81) citations in the year 2015 for different published papers. During 2017-2018 PMD published two (02) issues of Pakistan Journal of Meteorology. These issues contain 12 research papers which were contributed mainly by the scientists of PMD in addition to foreign researchers. Pakistan Journal of Meteorology can be accessed at the following web link:


Scientists of PMD also contributed (both as lead authors and co-authors) in around twelve (12) research papers which have been published in various national and international journals like Climate Dynamics, Agriculture and Forest Meteorology, Earth Systems and Environment, and Pakistan Journal of Meteorology. The detail of the Peer reviewed publications by R&D researchers is given as under:


Books/Monographs/Reports published
