**Subject: 7th Training Course on WMO Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) Products (10-15 November 2018, Ahvaz, Iran)**

**From**: Sara Basart

**To**: BSC-ES

**Copy**: Enric Terradellas, Ernest Werner, Emilio Cuevas

**Introduction**

- Objective: Attending as a trainer
- Funding: K-Dust
- Attendants: Sara Basart
- Agenda and presentations are available through the WMO SDS-WAS Regional Center for Northern Africa, Middle East and Europe (https://sds-was.aemet.es/materials/training) web-site.
    - The local organisers prepare a full day of visits in the region out of the official agenda of the training school (on 15th November) with a formal welcome of the administrative governor of the Khuzestan province.
- Participants (in total over 45 participants):
    - International organisations: AEMET, BSC, CSIC.
    - Operational and research meteorologists as well as early career scientists (advanced students, PhD candidates and postdoctoral researchers) with interest on the Earth system sciences from different national agencies and universities from different provinces of Iran and one participant from Nigeria Meteorological Agency (NiMet).

**Results**

Realising the increasing challenge of addressing sand and dust storm in Iran and its impacts on various economic sectors such as agriculture, energy, communications transportation, health and others, I. R. of Iran Meteorological Organization (IRIMO) was organising the 7th Training course on WMO SDS-WAS Products in Ahvaz (Iran). One of the semi-arid bare lands in Iran, located in the South-West of Iran in Khuzestan province where the city of Ahvaz is. During the last years, intensive dust storms frequencies were significantly increased in Iran, while affecting human health in the southern parts of Iran like the southwestern Khuzestan Province and the northern part of southeastern Sistan and Baluchistan Provinces. Also, these storms are seriously disturbing the life of the people in these regions and putting even their breathing in trouble. Also, this natural disasters can influence the rate of internal migration in these regions. On average, natural disasters like dust storms occurrence and drought can increase the number of migrants in the affected areas. Substantial dust origins in Iran are Al-Howizeh/Al- Azim marshes and Sistan basin: Al-Howizeh/Al-Azim marshes are straddling the Iran-Iraq border and Sistan basin. Moreover, the foreign main dust sources are Iraq, Syria, Saudi Arabia and Kuwait. Specifically, Iraq is one of the main sources for dust storm in Iran.

Within this context, IRIMO organised this training course for the professionals in Iran to increase their technical capacities in handling this meteorological/environmental phenomenon. This is the

second Training Course on WMO SDS-WAS Products organised in Iran. IRIMO also was the local organiser of the 5th Training course on WMO SDS-WAS products (Tehran, Iran, 5-9 Nov 2016, https://sds-was.aemet.es/materials/training).

The objectives of the training workshop were to:

- Enhance the technical capacities of operational and research meteorologists from Iran on the analysis, prediction and projection of sand and dust storms, including the use of ground and satellite observations of dust, dust storm modelling and prediction, dust classification, etc.
- Enhance the understanding of multi-dimensional impacts of sand and dust storms and their impacts on socio-economic sectors and ecosystems.

The last day was dedicated to the participants. Summary of the participant's presentations:

- **Mahdi Akbari (Researcher in Urmia Lake Restoration Program: ulrp.sharif.ir/en):** After some extreme dust events, the Iranian government started a set of actions in the Urmia lake in 2013 to avoid the desiccation of the lake. Some of these actions include plantation among others. Dust emissions from this lake have a high concentration of salts, the mixture of dust and salts has a higher impact on health. Dust sources has an extension of 2km around the shore of the lake. After the starting of the Restoration Program, the frequency of the number of SDS coming from this region is going to be reduced. Satellite images are not enough good to indicate the degree of desiccation. There is soil moisture in the subsoil that is blind for the satellites. To know is the sources are potential active should be through in-situ check. One of the commitments of the Urmia Lake Restoration Program is to send an annual report to IRIMO about the status of the lake.
- **Fath Tabar Firoozjaee (Geological Survey): "Evaluation of the human activities impact on the occurrence of SDS".** This was a summary of a project started in 2015 focusing on the development of a Dust Hazard map for the Khuzestan province. The identification of the dust sources was done using remote sensing datasets, GIS and chemical samples (sedimentology). This source map is interesting for K-DUST, some dust sources in this province transport dust to Kuwait. We could check the Ginoux source mask with this one. There is a second project that is focusing on the identification of the minerals in the soil. There was no time for the presentation of this second project, but it can be interesting for FRAGMENT.
- **Amir Hossein Nikfal (IRIMO, Tehran, Research Center):** He studied a dust case on 5-7 March 2015 based on WRF-Chem simulations and also introduced an urban model for Tehran based on WRF-EUDAT-LASAT. The presentation was very general.
- **Alireza Azamian (IRIMO, Ahvaz):** The province of Khuzestan includes agricultural lands and important industrial activities. The Horoalazym wetland is starting to be an active dust source. Fires in the wetland (as the fire on 5 July 2018) and burning plants are one of the sources of the dust exarcebation.
- **Maimouna Usman Borno (Nigeria Meteorological Agency, NiMet):** She introduces the works ongoing in the biometeorological section of NiMet on health impact assessment. The Nigerian Center for Disease Control reported for 2017/2018 a total number of meningitis cases of 3,467 (# of deads: 303). Most of the persons affected were found in the NE Nigeria. Currently, they are providing some early warning for malaria and meningitis based on meteorological parameters. She is interested in the organisation of a training school in Nigeria maybe for the next year. Otherwise, the ongoing activities on health impacts can be interesting on the framework of inDust.

- **Mohamat Enayat (IRIMO, Tehran, Forecast Center):** This forecaster introduced a study case on sand and dust storm on 26-27 October 2018. For nowcasting, they are using metar/synop, GFS, ARPEGE and ECMWF. It seems that for Iran, ARPEGE is the model that better reproduce the convective systems.
- **Maryam Gharibzadeh (Geophysics Institute, previously in University of Zanjan):** "Study of optical properties related to radiative forcing in the Middle East". She introduced a climatology based on AERONET (AOD, AE, SSA, asymmetry factor, size distribution) – In IABS AERONET site, in December there is any presence of dust (there is no regional transport, and it is the snowing month). From this previous works, they run the SBDART model for the year 2013 for the available sites in the Middle East. The results are included in a manuscript that currently is under review.
- **Mohamad Sabzehzari (IRIMO, Head of the Khuzestan province):** He shows two study cases of haboobs in the Khuzestan region on May 2017 based on the results of the GFS model and observations. Haboob identification is based on meteorological parameters (low visibility, high wind speed – opposite than the model outputs, thunderstorm and rain – high values of K-index (~33), L-index and CAPE).

**Conclusions**

Iran is one of the few countries that has been implemented actions for the mitigation of. This was after a strong haboob in 2015 that affected the telecommunications in the Khuzestan province. In the Khuzestan province, they have implemented actions for the desertification of the region (plantation) and when there is a prediction of haboobs they active an emergency protocol that includes the closing of the schools when it is expected a strong SDS event. It is because of the clear impact on the society that they are interested in the operational predictions of haboobs. Just to point out the importance of the SDS in this country, they bring us to visit some areas of plantation, the regional MetOffice, and also we did a short interview with the regional governor as well as an interview with a journalist of a national newspaper (http://www.irna.ir/khuzestan/fa/News/83102708).