1. Atmospheric Science and Meteorological Research Center (ASMERC)

Atmospheric Science and Meteorological Research Center (ASMERC) was established in 1989 as an extension center of Islamic Republic of Iran Meteorological Organization (IRIMO) to increase the effectiveness of atmospheric research.

The main objectives of the center are studied and researched in theoretical and applied fields of meteorology. In addition, the center directs some activities for the better understanding of atmosphere and development of new applications in the areas of meteorology, climatic and atmospheric disasters. In ASMERC there are nine active research groups as follows:

1. Physical Meteorology & Weather Modification
2. Climatology
3. Dynamic & Synoptic Meteorology
4. Agrometeorology
5. Hydrometeorology
6. Atmospheric Chemistry, Ozone, and Air Pollution
7. Marine Meteorology & Physical Oceanography
8. Atmospheric Prospecting
9. Aeronautical Meteorology

Some of the main research projects which are related to reducing risk are as follows:

- Statistical detection of climate change over Iran,
- Risk management and early warning systems for destructive weather phenomena like hailstone and avalanche,
- Study of climatic aspects of tourism in Iran,
- Study of road meteorology for disaster reduction through early warning systems like snowmelt, heavy rain, dense fog, and avalanche,
- Study of early warning systems for protection of agricultural products for chilling in six provinces (Eastern Azarbaijan, Ghazvin, Ghom, Western Azarbaijan, Tehran, and Zanjan),
- An integrated model for numerical weather prediction,
- Study of North Atlantic Oscillation (NAO) impacts on drought in Iran,

- Suitable early warning methods for drought in Iran,
- Interaction between wind-driven waves and swells in Persian Gulf,
- Wave prediction in Caspian Sea,
- An investigation of excessive rains leading to flash floods in province of Tehran,
- Mountain effects on urban air quality over the greater Tehran.

2. National Center for Climatology (included of Climatological Research Institute, CRI

Islamic Republic of (I. R.) Iran enjoys a diverse climatic conditions. Hence, a diverse social, cultural and economical lifestyle. Geographically, it is located in an area which was the focal point of contact and emergence of ancient civilizations. Iran is the center of origin of many food plants and a wide range of food production systems have been evolved here.

Construction and engineering of residential area in old towns and cities and in particular under harsh environmental conditions was mainly based on the climatic conditions. There are many examples of sophisticated and magnificent ancient monuments and buildings all around the country which are symbols of harmony of human and the surrounding environment, the climate. It is therefore, apparent that survival of our culture and civilization have been associated with adaptation and proper response to climatic conditions.

In regard to the role of climate in human activities, lack of an institution to deal with this vital and important aspect was felt. Therefore, an initiative was put forward to establish such a center in an area of the country with the most diverse climatic conditions. The authorities approved this proposal and Climatological Research Institute (CRI) was founded in 1996, which potentially could appear as a Regional Climate Center in Center and West Asia.

2.1. Objectives of the CRI

The main goal of CRI is scientific activities on climatology in parallel to WMO objectives:

-To conduct research and carry other academic activities on climatology,

-To guide and land scientific activities on climatology,

-To collaborate with international organizations and participate in their activities such as Climate Change Convention and CCl commission,

-To centralize climatic forecasting and monitoring activities in the country and regions,

-To develop and extend applied services of climatology to the public.

2.2. Site Specifications

CRI is located in Mashhad, the second largest city of Iran and in Khorasan the largest province of the country. The central administrative office occupies an area of 4,950 m^2

adjacent to Mashhad International Airport. This building consists of 60 rooms, a conference hall, library, study rooms, a computer center, laboratories and classrooms with three scientific departments of Climatology, Applied Meteorology and Training Center. Adjacent to this building there is a complex of 30 residential units for national and international participants and instructors to training courses, and research projects.

2.3. Scientific Organization

Scientific activities of the center is guided by council of research which consists of twenty distinguished faculty members of national universities and Junior scientific staff members of IRIMO.

The research council also conducts the following functions:

-To approve research proposals and programmers,

-To draw general guideline and initiate policies for research and other scientific activities of the center and propose them to the board of trustee,

-To propose annual budget for research to the board of trustee,

-To evaluate and approve final research reports,

-To guide, and direct scientific activities of the center.

Based on the above framework and a mutable research activity, the CRI has been received the Institute grade from Ministry of Science, Research and Technology with three research groups, that have been organized as follows:

Climatology of Natural Disasters, Climate Change, Applied Climatology. The activities in the above Research group are as following;

Climatology of Natural Disasters Research Group

-Synoptic climatology and upper layer atmosphere

-Physical and satellite climatology

-Drought mitigation and monitoring

Climate Change Research Group

-Climatic classification, microclimatology and regional climatology

-Statistical modeling and dynamic processes

-Long-term climate modeling and predicting.

Applied Climatology Research Group

-Numerical weather prediction modeling

-Weather modification with cloud seeding

-Climate and water resources

-Climate "culture, tourism, economy, transport"

-Climate and "environment, pollution, industry"

-Climate and seas

-Climate and energy

-Climate and "building, architecture and urban development"

-Climate and "human health and sport"

-Climate and defense

2.4. Research Activities

About 20 iranian universities and Institutes collaborate with CRI in different fields of climate and atmospheric sciences, so more than 100 researchers do research part time and permanently in CRI. Following research projects have been approved by the research council and are in different of progress.

-Spatial variation of pattern of upper atmosphere layer for the Middle East for a period of 1967-1983,

-Development of models for predicting the effects of climate change on crop production in Iran,

-Impacts of mountains on the quality of air in metropolitan areas,

-Estimation of daily potential evaporation in different climatologic stations,

-Atlas of wind energy for Iran,

-Effects of climate on coastal wind,

-Climate and culture,

-Hydrological studies of Kerman-Zahedan railroad,

-Estimation of statistical PMP for standard time scale in Iran for the purpose of climatic classification on the basis of their distribution,

-Numerical weather prediction over Iran based on Advanced Regional Prediction System (ARPS),

-Drought mitigation and monitoring using drought indices,

-Long-term climate prediction system,

-Detection of climate change over I.R. of Iran by synoptic and dynamic analysis,

-Risk management of natural disaster,

-Weather modification by cloud seeding,

-Drought and flood early warning.

Besides these projects, 39 proposals have been submitted to the research council of CRI.

Furthermore, 14 M.Sc and Ph.D thesis on climatology from national universities have been partly funded by CRI.

Although this center is a newly established in situation, it is hopped to gain a center of excellence through regional scientific collaboration and cooperation.

2.5. *Training Unit*

On the basis of an agreement made by WMO, countries in the region including newly independent states of Central Asia can participate in the training courses carried out in Iran through financial support form WMO, UNDP, and CRI has arranged a joint collaboration with the Regional Meteorological Training Center RMTC-Tehran and adequate facilities have been made available for this purpose.

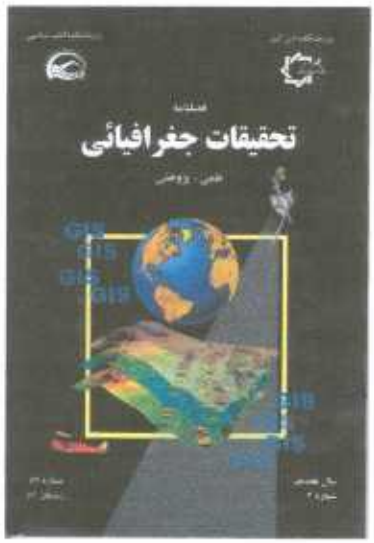
Beside these short-training courses, university degrees (M. Sc. and Ph. D) will be offered on climatologic and associated topics in the near future, through collaboration with universities, preliminary steps have been taken to active this goal.

2.6. *Publishing Unit*

In this unit a seasonal newsletter "EQLIM", the technical scientific Journal of IRIMO "NIVAR" and "Scientific Bulletin of CRI" are published regularly. Other recent publications are:

-Comprehensive terminology of climate,

-Conventional methods of climatological classification.



Scientific Bulletin of CRI (in Persian)

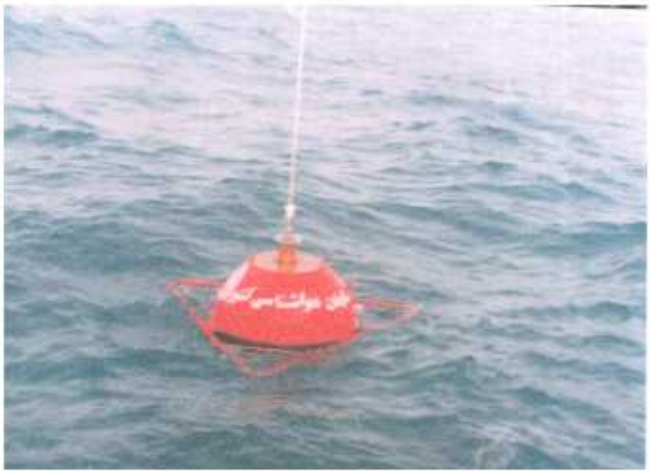
3. Oceanic & Atmospheric Science Center (OASC)

Oceanic & Atmospheric Science Center (OASC) of IRIMO was established on October 1989 by Prof. G. O. Obasi. At the time, its activities were on marine meteorology, physical chemical oceanography and marine pollution. With creation of national high council for oceanography on 1994, OASC was designated as its secretariat from 1995, OASC has established branches in three coastal provinces, one in North at Bandar Anzali which is operational and two in south, at Boshehr and Chabahar becoming operational. These are coordinators of OASC in Caspian Sea and Persian gulf. OASC is in collaboration with different parts of IRIMO, as following.

-General office of technical equipment and instrumentation,

-General office of network of stations,

-Data bank and meteorological training center.



Its main activities are coordinated with CMM of WMO, IOC, INOC and also with international programme such as GOOS, GARP, ARGOS, RAPME, UNDP, GEF.

Actually we have two new units in this center, library and computer section, library contains more than thousand books, magazines, publications, catalogues, CD, software's and IP connection with Internet by Iran Pac.

It holds weekly seminars and its main activities are on physical & dynamical aspects of sea and air-sea interaction.

3.1. Research

The title of some research projects in OASC are as following:

1-currents generated by waves,

2-Study of sea level change in the Persian Gulf,

3-wind waves in the Caspian sea,

4-Interaction between sea and swell waves.

5-Application of numerical model for storms in Caspian sea,

6-Determination of wave return period (wave roses) in Bushehr off –shore.

3.2. Participation in International Societies

-Participation in Ozone layer Protection workshop in Swiss,

-Speech about Ozone metering possibilities in Iran by WMO , Geneva, Swiss ,

-Participation in conference and workshop of El-Nino and it's by effects in Italy,

-Participation in IOC workshop and courses on oceanic data management (National Center of Oceanography).

-Papers presentation to ICOPMAS (2002)

3.3. Meetings

-Performing sessions of JCOMM,

-Performing sessions of CASPCOM,

-Establishing specialist committee of JCOMM,

-Participation in CEP sessions,

-Secretariat of Physical and Dynamical Oceanography committee ((Iranian supreme Council of Oceanogphy),

-Participation in National Committee of Oceanography sessions related to UNESCO.

4. Atmospheric Chemistry, Ozone and Air pollution Research Center (ACOARC)

IRIMO as it's mission in sustainable developing with the establishment are applying natural disaster risk management, as a goal, for early weaning systems issues to public and relative organizations, and using modern and unique ozone levels measurements (surface and upper level) and atmospheric chemistry lab equipments in ozone measurement center, has been considered the related research in 3 research groups as following.

-Atmospheric Chemistry

-Ozone

-Air pollution

Atmospheric Chemistry and Air Pollution Research Center (ACOARC) using advanced and unique equipments of international network, and carrying out research in atmospheric chemistry, ozone, and air pollution, some of the most important activities of this center would be mentioned as following:

- Daily measurement and monitoring of surface and upper levels ozone,
- Measurement of atmosphere background pollution to monitoring the impact of industrial activities on pollution,
- Studying and modeling pollutants diffusion and the condition of occurrence of critical air pollution,
- Studying the mixture of effective components in the pollution of industrial cities,
- Monitoring ultraviolet radiation condition and studying it's impact on human and environment,
- The study of thermal islands condition and photochemical smoke in major cities,
- Study role effective factors in inducing of hazardous conditions of air pollution for example, airports and industrial companies,
- Study on impact of agricultural and industrial damages on inducing and development of environmental pollution,
- Site selection of pollutant industries and manufacturing companies with considering regional climatologically conditions,
- Research on impact of climate change on increasing of environmental Pollutant factors on human and livestock and agricultural productions,
- Analysis of acidic precipitation and study of it's increasing of impact on human activities,
- Ozone measurement activities and air pollution monitoring at international networks,
- Necessary collaboration with national and international organizations in order to decreasing environmental pollutant,
- Carrying out some related researches according to sustainable developing and protection of earth for future human.

5. List of some scientific publications on disaster risk reduction

5.1. *Drought severity and extent monitoring system based on Palmer index mapping (in Persian)*

By Javanmard, S., J. BodaghJamali, J. Ahmadian.

First national conference on drought mitigation and water shortage, Shahid Bahonar University of Kerman, 2001.

5.2. *Assessment of Palmer drought severity index for Khorasan province (in Persian)*

By Javanmard, S., J. BodaghJamali, J. Ahmadian, N. Ghahraman, H. Moghaddam.

First national conference on drought mitigation and water shortage, Shahid Bahonar University of Kerman, 2001.

5.3. *Assessment of drought indices and using of Palmer Drought Severity Index in Iran (in Persian)*

By MohammadniaGhara,i S , N Javdani, S , Javanmard, L. Khazanedari, M Khosravi.

First national conference on drought mitigation and water shortage, Shahid Bahonar University of Kerman, 2001.

5.4. *Management strategies development of agriculture crop insurance in drought condition consideration of geographical areas (in Persian)*

By Moghadam, H , S Javanmard, J. Ahmadian, H Araghi, J. Seyyedan, A. Ebrahimi, J BodaghJamali, H. Tahqhiqhi

First national conference on drought mitigation and water shortage, Shahid Bahonar University of Kerman, 2001.

5.5. *Drought crisis and it's combat management (in Persian)*

By Khazanehdari, L , S Javanmard, J. BodaghJamali, Z Ahangarzadeh, H Moghaddam, J. Ahmadian.

First national conference on drought mitigation and water shortage, Shahid Bahonar University of Kerman, 2001.

5.6. *Classification of Khorasan areas in regard of agricultural crop insurance based on drought (in Persian)*

By H. Moghaddam, L Khazanehdari, S. Javanmard

First professional workshop on determination of Fars province drought problems, Shiraz University, 2000.

5.7. Meteorological indices in agricultural drought (in Persian)

By Kamali, Gh., M. Nikzad.

Nivar, No. 42-43, 2000.

5.8. Application of El-Nino and NAO indices (multiple method), for Assessment of impacts of these phenomenon on drought and winter precipitation for Fars and Khoozestan provinces (in Persian)

By Nazemossadat. M. J.

Agricultural crops insurance papers, 2000.

5.9. North Atlantic Oscillation and it's effects on Europe and Middle-East drought (in Persian).

By Babaeain, I., N. Ghahraman,

I.R. of Iran Meteorological organization (IRIMO) Scientific bulletin of National Climatology Center, 2001.

5.10. Assessment of agricultural and climatic indices changes in order to climate change (in Persian).

Final report of Tootak national project, I.R. of Iran Meteorological Organization, Climatological Research Institute, 2001.

5.11. Drought risk management based on weighting measurement soil moisture (in Persian)

By Javanmard, S., J. Ahmadian.

First Seminar on agricultural crop insurance, Tehran & workshop on Assessment of impacts of climate factors, Tabriz, 2001.

5.12. Assessment of drought indices and it's standardization for different areas of Iran (in Persian)

By Javanmard, S.

Final report of Tootak national project, I.R. of Iran Meteorological Organization, Climatological Research Institute, 2001.

5.13. Drought monitoring of Sistan Va Baloochestan province, based on SPI index, deciles, and Percent of Normal indices (in Persian)

By Moghaddam, H., J. BodaghJamali, S. Javanmard, A. Mahdavian, L. Khazanedari

First national conference on water crisis mitigation Strategies.

5.14. Assessment of various climate mapping methods on Sistan Va Baloochestan province and it's relationship with drought (in Persian)

By Mahdavian, A., J. BodaghJamali, H. Moghadam, F. Fadaivatan, S. Khojaste, A. Ghiami, J. Ahmadian.

First national conference on water crisis mitigation Strategies.

5.15. Determination of drought areas using of SPI drought index (in Persian)

By Nassaji Zavareh, M , M. Sanei.

First national conference on water crisis mitigation Strategies.

5.16. Assessment of Palmer Drought Severity index in Khorasan province (in Persian)

By Javanmard, S., J. BodaghJamali, J. Ahmadian, N. Ghahraman, H. Moghaddam.

First national conference on water crisis mitigation Strategies.

5.17. Determination of drought duration using of SPI drought index (in Persian)

By NassagiZavareh, M.,M. Sanei.

First national conference on water crisis mitigation Strategies.

5.18. Assessment of the last drought in Mashhad using some drought indices (in Persian)

By Kamali, Gh., L. Khazanehdari.

Nivar, No. 44-45, 2002.

5.19. Site Selection Study for Cloud Seeding Aimed at Precipitation Enhancement in North East of I. R. of Iran

By Javanmard, S., J. B. Jamali, Gh. A. Kamali

8th WMO Scientific Conference on Weather Modification (8WMC), WMP Report No. 39, Casablanca, Morocco, 2003

5.20. Improved numerical modeling of RETHIT and FILAS in LC Seeding based on field experiment over north Kyushu Island of Japan.

By BodaghJamali, J., S .Javanmard, N. Fukuta, M. Noorian

8th WMO Scientific Conference on Weather Modification (8WMC), WMP Report No. 39, Casablanca, Morocco, 2003

5.21. Numerical Study of Ice multiplication effect on precipitation Process

By Javanmard, S., J. B. Jamali, A. Sedaghatkerdar

8th WMO Scientific Conference on Weather Modification (8WMC), WMP Report No. 39, Casablanca, Morocco, 2003

5.22. Application of Clustered Systems to Numerical Weather Prediction Models

By Javanmard, S., J. B. Jamali, A. M. Noorian, A. Chezgi

23th International Conf. of Union of Geodesy and Geophysics (IUGG), Sapporo, Japan, 2003.

5.23. Utilization of Mesoscale Numerical Weather Prediction Systems Over I. R. Iran

By BodaghJamali, J., S. Javanmard, A. Chezgi

23th International Conf. of Union of Geodesy and Geophysics (IUGG), Sapporo, Japan, 2003.

5.24. Ceres –Wheat Model Application Under Climate Change Conditions Over I. R. of Iran

By Javanmard, S., A. Kiani, J. B. Jamali

23th International Conf. of Union of Geodesy and Geophysics (IUGG), Sapporo, Japan, 2003.

5.25. Monitoring Drought over North-East of I. R. of Iran Using Standardized precipitation Index (SPI)

By BodaghJamali, J., A. M. Noorian, S. Javanmard, A. Moghadam, R. Shirmohamadi

23th International Conf. of Union of Geodesy and Geophysics (IUGG), Sapporo, Japan,

2003.

5.26. Drought Monitoring Using Palmer Index Over North-East of I. R. Iran

By Javanmard, S., J. B. Jamali, G. A. Kamali, M. J. Ahmadian

23th International Conf. of Union of Geodesy and Geophysics (IUGG), Sapporo, Japan, 2003.

5.27. NAO and ENSO Projection on Iran Climate Predictability

By Babaeian, I., J. B. Jamli, S. Javanmard, L. Khazanedari

23th International Conf. of Union of Geodesy and Geophysics (IUGG), Sapporo, Japan, 2003.

5.28. Drought Monitoring Using Normalized Differences Vegetation Index (NDVI) Over I. R. of Iran

By BodaghJamali, J., S. Javanmard, M. Rahnema, S. Attarchi

23th International Conf. of Union of Geodesy and Geophysics, (IUGG), Sapporo, Japan 2003

5.29. Detection of Climate Change over I. R. of Iran Using Historical Synoptic Pattern of Middle East

By Javanmard, S., I, Babaeian, L. Khazanehdari, J. BodaghJamali, A. Shahabfar

World Climate Change Conference (WCCC), Moscow, Russia, 2003

5.30. Risk Management of Climate Change and Extremes in I. R of Iran

By Noorian, A. M., J. B. Jamali, S, Javanmard

World Climate Change Conference (WCCC), Moscow, Russia, 2003

5.31. Investigation of Climate Variability Trend in I. R of Iran

By BodaghJamali, J., S. Javanmard, G. A. Kamali, A. Shahabfar

World Climate Change Conference (WCCC) Moscow, Russia, 2003

5.32. Probable Correlation Between NAO And So And Precipition of I. R of Iran

By BodaghJamali, J., I. Babaeian, S. Javanmard, L. Khazanehdari, A. Shahabfar,K. Ehteramian, M. Mohamadi

World Climate Change Conference (WCCC), Moscow, Russia, 2003

5.33. Mitigation of Climate Change Impacts by Modified Architecture in Order to Reduce Fossil Fuels Usage

By Khazanehdari, L., S, Javanmard G. A. Beiraghdar, G. A. Kamali

World Climate Change Conference (WCCC), Moscow, Russia, 2003

5.34. Simulating the Impact of Climate Change on Wheat Yield in Different Climatic Zones of Iran and Evaluating Options for Adaptation

By Kiani, A., J. B. Jamali S. Javanmard, M. J Ahmadian, M. Koohi

World Climate Change Conference (WCCC), Moscow, Russia, 2003

5.35. Rainfall Prediction Using Recurrent Parametric Neural Networks in I. R. of Iran

By HashemiNejad, M. , J. BodaghJamali,

World Climate Change Conference, (WCCC), Moscow, Russia, 2003

5.36. Evaluation of surface air temperature trend and climate change in the north-east of I.R. of Iran

By Shahabfar, A., J.B. Jamali, S. Gharai, A. Ramesh

World Climate Change Conference, (WCCC), Moscow, Russia, 2003

5.37. Rain Enhancement in the Islamic Republic of Iran

By Noorian, A. M., J. B. Jamali

Regional Seminar on Cloud Physics and Weather Modification World Meterological Organization, Damascus, Syria, 2003

5.38. The Current Situation of Weather Modification Activities in I.R. of Iran

By BodaghJamali, J.

The national assembly forum and International workshop on the Weather Modification, Seoul, Republic of Korea, 15-18 September, 2003

5.39. Mapping and Monitoring of Khorasan drought condition, using Standardized Precipitation Index, (in Persian)

By BodaghJamali, J.,S. Javanmard,,R. Shirmohammadi.

Geographical Researches magazine, Tome, 67, 2003.