

REZA MODARRES

PhD

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Research Interests

- Statistical Hydrology and climate change modeling
- Extreme Hydrology and meteorology: modeling, predicting and Forecasting
- Public health and risk management

Teaching Interests

Teaching undergraduate and graduate courses on:

- Multivariate and Dynamic Statistical Hydrology and Climatology
 - Hydrological extremes and hazards
 - Climate change impact assessment on environmental resources
 - Environmental and natural hazards
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Summary of Qualification

- Over 20 years of consultant engineering experience in different water, watershed, Urban Hydrology and Natural Resources projects
- Over 15 years of experience in research-based and undergraduate and graduate teaching in hydrology and water resources modeling
- Excellent verbal and written communication skill in presenting research funding
- Global top scientist in Environmental Engineering

EDUCATION

PhD,

Water Resources (Hydrology), Quebec University, Institut National De la Recherche Scientifique (INRS), 2013

THESIS: Multivariate GARCH models for hydrologic and climatic variables

Master of Science,

Natural Resources Engineering, Isfahan University of Technology, Faculty of Natural Resources, 2003

THESIS: Hydrologic Drought Forecasting with Time Series Analysis in upstream Zayandehrood River

Bachelor of Science, Natural Resources Engineering, Natural Resources and Agricultural Sciences University of Gorgan, 1998

Awards and Honors

- **PhD scholarship, INRS, 2009**
- **Visiting International Fellow, 2017 EWRI Award**
- **Young Elite researcher award, 2017, Iran National Science Foundation (INSF)**
- **R4D Visiting Scientist Grant at ETH University, Switzerland, 2018**
- **Tubitak 2221 Fellowships for Visiting Scientists and Scientists on Sabbatical Leave Program award, Ankara University, 2019**
- **Nominated among World ranking of scientists (top 2%) in Environmental Engineering, 2020**
- **Nominated among World ranking of scientists (top 2%) in Environmental Engineering, 2022**

Publications

1-**Modarres, R.,** Khosravi Dehkordi, A., 2005. Daily air pollution time series analysis of Isfahan City. *International Journal of Environmental Science & Technology*, 2, 259-267

2-**Modarres, R.,** 2006. Regional Precipitation Climates of Iran. *Journal of Hydrology- New Zealand* , 45 (1): 13-27.

3-**Modarres, R.,** 2006. Streamflow Drought Time Series Forecasting. *Stochastic Environmental Research and Risk Assessment*, 21: 223-233.

4- **Modarres R.,** S. S. Eslamian, 2006. Streamflow Time Series Modeling of Zayandehrud River. *Iranian Journal of Science and Technology*, 30 (B4): 567-570.

5- Soltani, S., **Modarres, R.,** Eslamian, S. S., 2006. The Use of Time Series Modeling in the Determination of Regional Rainfall Climates of Iran. *International Journal of Climatology*, 27(6): 819-829.

6- **Modarres, R.,** da Silva, V. P. R., 2007. Rainfall trends in arid and semi-arid regions of Iran. *Journal of Arid Environment*, 70: 344-355.

7- Soltani, S., **Modarres, R.,** 2006. A Hierarchical and Divisive Cluster Analysis of Rainfall Spatio-Temporal Pattern of Iran. *Journal of Spatial Hydrology*, 6(2): 1-12.

- 8- **Modarres, R.**, 2008. Regional Extreme Wind Speed Frequency Analysis for Arid and Semi Arid Region of Iran. *Journal of Arid Environment*, 72, 1329-1342.
- 9- Yurekli, K., **Modarres, R.**, 2006. Regionalization of Maximum Daily Rainfalls over Tokat Province, Turkey. *International Journal of natural and engineering*, 1(2): 1-9.
- 10- Rajabi, M. R., **Modarres, R.**, 2008. Wind Intensity-Duration-Frequency Curves: a new tool for wind engineering. *Journal of Wind Engineering & Industrial Aerodynamics*, 96, 78–82.
- 11-**Modarres, R.**, 2008. Regional Frequency Distribution Type of Low Flow in North of Iran by L-Moments, *Water Resources Management*, 22: 823- 841.
- 12- Nasri, M., **Modarres, R.**, 2009. Dry spells trend analysis of Isfahan Province, Iran. *International Journal of Climatology*, 29:1430-1438.
- 13- **Modarres, R.**, Sarhadi, A. 2009. Rainfall Trends analysis of Iran in the last half 20th century. Journal of *Geophysical Research-Atmospheres*, 114, D03101, doi:10.1029/2008JD010707.
- 14- **Modarres, R.**, 2009. Multi-criteria validation of artificial neural network rainfall-runoff modeling. *Hydrology and Earth System Sciences*, 13, 411-421.
- 15-Yurekli, K., **Modarres, R.**, Ozturk, F., 2009. Regional daily maximum rainfall estimation for Cekerek Watershed by L-moments. *Meteorological Applications*, 16, 435-444.
- 16- Shiau, J. T. and **R. Modarres**. 2009. Copula-based drought severity-duration frequency analysis in Iran. *Meteorological Applications*, 16, 481-489.
- 17- **Modarres, R.**, Sarhadi, A. 2010. Frequency distribution of extreme hydrologic drought of Southeastern Iran. *Journal of Hydrologic Engineering*, 15, 255-264.
- 18- **Modarres, R.**, 2010. Low flow scaling with respect to drainage area and precipitation in North of Iran. *Journal of Hydrologic Engineering*, 15, 210-214.
- 19-**Modarres, R.**, 2010. Regional dry spells frequency analysis by L-moment and Multivariate analysis. *Water Resources Management*, 24, 2365-2380.
- 20- **Modarres, R.**, Sarhadi, A. 2011. Statistically-based Regionalization of Rainfall climates of Iran. *Global and Planetary Change*, 75, 67-75.
21. Sarhadi, A., **Modarres, R.**, 2011. Flood seasonality-based regionalization methods: a data-based comparison. *Hydrological Processes*, 25, 3613-3624
22. **Modarres, R.**, Ouarda, TBMJ, Vanasse, A., Orzanco, MG, and Gosselin, P. 2012. Modeling seasonal variation of hip fracture in Montreal, Canada. *Bone*, 50, 909-916.
23. Shiau, JT, **Modarres, R.**, Nadarajah, S., 2012. Assessing Multi-site Drought Connections in Iran Using Empirical Copula. *Environmental modeling assessment*, 17, 469-482
24. Lee, T., **Modarres, R.**, Ouarda, TBMJ. 2012. Data based analysis of bivariate copula tail dependence for drought duration and severity. *Hydrological Processes*, 27, 1454-1463
25. **Modarres, R.**, Ouarda, TBMJ, 2012. Generalized autoregressive conditional heteroscedasticity for hydrologic time series. *Hydrological Processes*, 27, 3174-3191
26. Sarhadi, A., Soltani, S., **Modarres, R.**, 2012. Probabilistic flood inundation mapping of ungauged rivers: linking GIS techniques and frequency analysis. *Journal of Hydrology*, 68-78

27. **Modarres, R.**, Ouarda, TBMJ, 2013. Modeling heteroscedasticity of streamflow time series. *Hydrological Sciences Journal*, 58(1), 54-64
28. **Modarres, R.**, Ouarda, TBMJ, 2013. Modeling rainfall-runoff relationship using multivariate GARCH model. *Journal of Hydrology*, 499, 1-18
29. **Modarres, R.**, Ouarda, TBMJ, 2013. Testing and modeling volatility change of ENSO. *Atmosphere-Ocean*, 51, 561-570
30. **Modarres, R.**, Ouarda, TBMJ, 2013. Modeling climate effects on hip fracture rate by the multivariate GARCH model in Montreal region, Canada. *International Journal of Biometeorology*, 58, 921-930
31. **Modarres, R.**, Ouarda, TBMJ, 2013. Modeling the relationship between climate oscillations and drought by a multivariate GARCH model. *Water Resources Research*, 50, 601-618.
32. Farsadnia, F., Rostami Kamrood, M., Moghaddam Nia, A., **Modarres, R.**, M.T. Bray, M.T., Han, D., and Sadati Nejad, J., 2013. Identification of Homogeneous Regions for Regionalization of Watersheds by Two-level Self-organizing Feature Maps. *Journal of Hydrology*, 509, 387-397
33. **Modarres, R.**, Ouarda, TBMJ, 2014. A generalized conditional heteroscedastic model for temperature downscaling. *Climate Dynamics*, 43: 2629-2649
34. Razie, T., Daryabari, J. Bordid, I. **Modarres, R.** and Pereira. LS. 2014. Spatial patterns and temporal trends of daily precipitation indices in Iran. *Climatic Change*, 124: 239-253
35. Sarhadi, A., Kelly, R., **Modarres, R.** 2014. Snow water equivalent time series forecasting in Ontario, Canada, in link to large atmospheric circulations. *Hydrological Processes*, 28, 4640- 4653
36. **Modarres, R.**, Sarhadi, A., and Burn, DH. 2016. Changes of extreme drought and flood events in Iran. *Global and Planetary Change*, 144, 67-81
37. Fathian, F., **Modarres, R.**, and Dehghan, Z. 2016. Urmia Lake Water-Level Change Detection and Modeling. *Modeling Earth Systems and Environment*, (DOI: 10.1007/s40808-016-0253-0, In Press)
38. Lee,T., Kwon,H., **Modarres, R.**, Kim, S., Chebana. F., 2016. Hydrological and Meteorological Extreme Events in Asia: Understanding, Modeling, Vulnerability, and Adaptation Measures, Editorial. *Advances in Meteorology*
39. Soltani, S., Helfi, R., Almasi, P., and **Modarres, R.** 2017. Regionalization of rainfall Intensity-Duration-Frequency using a simple scaling model. *Water Resources Management*, 13, 4253–4273 10.1007/s11269-017-1744-0.
40. **Modarres, R.**, Ghadami, M., Naderi, S, and Naderi, M. 2018. Future extreme rainfall change projections in north of Iran. *Meteorological Applications*, 25: 40–48, DOI: 10.1002/met.1667
41. Fathian, F., Fakheri-Fard, A., **Modarres, R.** Van Gelder, PHAJM. 2018. Regional scale rainfall–runoff modeling using VARX–MGARCH approach. *Stochastic Environmental Research and risk assessment* , 32,(4), 999–1016 DOI: 10.1007/s00477-017-1428-6
42. **Modarres, R.**, Sadeghi, S. 2018. Spatial and temporal trends of dust storms across desert regions of Iran. *Natural Hazard*, 90: 101–114, DOI: 10.1007/s11069-017-3035-8

43. Dehghan, Z., Eslamian, S., **Modarres, R.** 2018. Spatial clustering of maximum 24-h rainfall over Urmia Lake Basin by new weighting approaches. *International Journal of Climatology*, DOI: 10.1002/joc.5335
44. **Modarres, R.**, Ghadami, M., Naderi, S., Naderi, M., 2018. Future heat stress arising from climate change on Iran's population health. *International Journal of Biometeorology*, DOI:10.1007/s00484-018-1532-4
- 45- Dehghan, Z., SS Eslamian, F Fathian, **Modarres, R.** 2019. Regional frequency analysis with development of region-of-influence approach for maximum 24-h rainfall (case study: Urmia Lake Basin, Iran). *Theoretical and Applied Climatology*, 1-12
- 46- Nasri, M., **Modarres, R.** 2019. Hydrologic Drought Change Detection. *Natural Hazards Review* 20 (1), 04018022
47. OB Kashkooli, M Ghadami, M Amini, **Modarres, R.** 2019. Spatiotemporal variation of the southern Caspian Sea surface temperature during 1982–2016. *Journal of Marine Systems* 193, 126-136
48. M Amiri, R Jafari, M Tarkesh, **Modarres, R.** 2020. Spatiotemporal variability of soil moisture in arid vegetation communities using MODIS vegetation and dryness indices. *Arid Land Research and Management*, 1-25
- 49- Akbari, M., **Modarres, R.**, Alizadeh Noughani, M. 2020. Assessing early warning for desertification hazard based on E-SMART indicators in arid regions of northeastern Iran. *Journal of Arid environment*. doi.org/10.1016/j.jaridenv.2019.104086
- 50- Beyraghdar Kashkooli,O., **Modarres, R.** 2020. Is the volatility and non-stationarity of the Atlantic Multidecadal Oscillation (AMO) changing? *Global and Planetary Change*, doi.org/10.1016/j.gloplacha.2020.103160
- 51- Mohammadrezaei, M., Soltani, S., **Modarres, R.** 2020. Evaluating the effect of ocean-atmospheric indices on drought in Iran. *Theoretical and Applied Climatology*, 140: 219–230. doi.org/10.1007/s00704-019-03058-6
52. Ghadami M., Raziei T., Amini M., **Modarres, R.** 2020. Regionalization of drought severity–duration index across Iran. *Natural Hazards*, 103: 2813–2827
53. Amini, M., Ghadami, M., Fathian, F., **Modarres, R.** 2020. Teleconnections between oceanic–atmospheric indices and drought over Iran using quantile regressions. *Hydrological Sciences Journal*, doi: 10.1080/02626667.2020.1802029
54. Soltani, S., Almasi, P., Helfi, R., **Modarres, R.**, Mohit, P., Ghadami, M. 2020. A new approach to explore climate change impact on rainfall intensity–duration–frequency curves. *Theoretical and applied climatology* doi: 10.1007/s00382-015-2747-2
55. Jalili Pirani, F., **Modarres, R.**, 2020. Geostatistical and deterministic methods for rainfall interpolation in the Zayandeh Rud basin, Iran. *Hydrological Sciences Journal*, /doi.org/10.1080/02626667.2020.1833014
56. **Modarres, R.** 2021. Dust storm Frequency change in relation to climate drivers. *International Journal of Climatology*. 41:187-199

57. Mohit Esfahani, P., Soltani, S and **Modarres, R.** 2022. Assessing agrometeorological drought trends in Iran during 1985–2018. Theoretical and applied climatology. <https://doi.org/10.1007/s00704-022-04159-5>

58. Anli, A.S., **Modarres, R.**, and Apaydin, H., 2023. A Hybrid Approach for Regional Low Flow Frequency Analysis for Upper Tigris and Euphrates Basin. Journal of Hydrologic Engineering, 28(6) : 04023015, doi.org/10.1061/JHYEFF.HEENG-56

59. Sarhadi, A., **Modarres, R.** and Vicente Serrano, SM. 2023. Dynamic Compound Droughts in the Contiguous United States. Journal of Hydrology, Volume 626, Part A, 130129, <https://doi.org/10.1016/j.jhydrol.2023.130129>

60. Mohit Esfahan P, **Modarres R.**, beyraghdar Kashkooli O and Sharma A. 2024. Evaluating heatwaves in the middle-east using a dynamic thresholding alternative. Climate Dynamics. doi.org/10.1007/s00382-024-07207-0

Selected CONFERENCE PROCEEDINGS/PRESENTATION/POSTERS

1. Nasri, M., **Modarres, R.**, Moradi, Y., 2006. The analysis of drought indicators and related impacts in Ardestan region, Iran. International Symposium on water and land management for sustainable irrigated agriculture, 4-8 April, 2006, Dana, Turkey.

2. Nasri, M., Najafi, A., **Modarres, R.**, 2006. Statistical calculation of 24 Hour probable maximum precipitation and maximum perceptible water for Isfahan station, Iran. International Symposium on water and land management for sustainable irrigated agriculture, 4-8 April, 2006, Dana, Turkey.

3. Nasri, M., Gholami, A., Najafi, A., **Modarres, R.**, 2006. Using statistical analysis for determining the influencing parameters in flood formation and intensification. Proceedings of the International Symposium on Agricultural Constraints in the Soil-Plant-Atmosphere Continuum, 389-394, 4-7 September, Ghent, Belgium.

4. Nasri, M., Najafi, A., **Modarres, R.**, M. Shisheforush. 2006. The estimation of soil erosion and sediment yield using GIS and statistical multivariate techniques. Proceedings of the International Symposium on Agricultural Constraints in the Soil-Plant-Atmosphere Continuum, 99-106, 4-7 September, Ghent, Belgium.

5. Nasri, M., **Modarres, R.**, 2006. The role of watershed management in sustainable water resources development in the arid region of Ardestan, Iran. Proceedings of the International Perspective on Environmental and Water Resources, 18-20 December, New Delhi, India.

6. Sarhadi, A., Soltani, S. **Modarres, R.**, 2008. Flood hazard assessment with GIS techniques in Southeastern of Iran” 4th GIS Conference along with ISPRS Workshop on Geoinformation and Decision Support Systems 6-7 January 2008, Tehran-Iran.

7. **Modarres, R.**, Ouarda, TBMJ., 2010. Modeling heteroscedasticity of hydrologic time series. Water 2010. Hydrology, hydraulics and water resources in an uncertain environment, 5-7 July, Québec, Canada
8. Lee T., **Modarres R.**, and Ouarda TBMJ., 2010. Tail Dependence of bivariate copulas for drought severity and duration. Korea Water Resources Association Conference 2010, Daejeon, South Korea, ISSN 1733-2726, pp. 571-575
10. **Modarres R.**, Ouarda TBMJ, Vanasse A, Orzanco MG, Gosselin P, Modeling seasonal variation of hip fracture incidence in Montreal, Canada, American Public Health Association 138th Annual Meeting & Expo, Denver, 6-10 nov 2010.
11. Modarres R., and Ouarda TBMJ., 2012. On the volatility of Southern Oscillation Index. Canadian Meteorological and Oceanographical Society Congress. Montreal, May 29- June
12. **Modarres, R.**, Molnar, P. 2019. Rainfall-runoff dynamic association and memory in Swiss catchments: the role of physical characteristics, European Geoscience Union, May 9-1, Vienna, Austria
13. **Modarres, R.**, Ghadami, M., Farsadnia, F, Razie, T., 2019. Climate change impact on drought severity and duration in Iran. 6th regional conference on climate change, Tehran, 18-19 November
14. Mohit Esfahani, P., **Modarres, R.**, P. 2021. Dust storm frequency in relation to extreme droughts in arid regions of Iran, European Geoscience Union, May 9-1, Vienna, Austria
15. **Modarres, R.**, Advanced multivariate GARCH approach for modeling dynamic hydrologic processes. ICSH-STAHY 2021, 16-17 September, Valencia, Spain

Teaching Experience

- **Meteorology Laboratory**, Faculty of Natural Resources, Isfahan University of Technology, 2003
- **Engineering Hydrology**, Department of Water engineering, Isfahan University of Technology, 2003-2004
- **Computer Science for Fishery**, University of Applied Science and Technology, Isfahan, 2007
- **Introduction to Probability and Statistics**, University of Applied Science and Technology, Isfahan, 2008

2015-present (Department of Natural Resources, Isfahan University of Technology)

- **Water resources of Iran (Bsc)**
- **General Hydrology (Bsc)**
- **Applied Hydrology (Bsc)**
- **Water Harvesting Techniques in Arid and semi-arid regions (Bsc)**
- **Introductory probability and statistics (Bsc)**
- **Hydrology of arid regions (Msc)**
- **Rangeland Hydrology (Msc)**
- **Climate change impact assessment (Msc)**
- **Urban Watershed (Msc)**
- **Flood early warning and forecasting (Msc)**
- **Watershed Management (Msc)**
- **Advanced Hydrology (PhD)**
- **Rainfall-Runoff modeling (PhD)**

Postgraduate Supervision and advisor

- ***More than 35 Master students***
- ***6 PhD students***

Selected Research and executive Projects

- Surface water collecting and sewer system design for Joyabad City, Iran, Poya Sabze-Sepahan Corporation LTD, 1999
- Surface water collecting and sewer system design for Maymeh Industrial Complex, Iran, Poya Sabze-Sepahan Corporation LTD, 2000
- Surface water collecting and sewer system design for Afoos City, Iran, Poya Sabze-Sepahan Corporation LTD, 2001
- The study of Azaran Watershed, Kashan, Isfahan, Iran, Poya Sabze-Sepahan Corporation and Ministry of Agriculture, Watershed Management Division, 2001
- The study of Doreh Watershed, Kashan, Isfahan, Iran, Ministry of Agriculture, Watershed Management Division, 2002
- The study of Komeh Watershed, Semrom, Isfahan, Iran, Zistban Corporation and Ministry of Agriculture, Watershed Management Division, 2004
- The design of flood control of Talkhonchek city, Isfahan, Zistban Corporation and Ministry of Power, 2004
- Mapping Drought Frequency-Severity of Isfahan Province using Markov Chains, Isfahan University of Technology, 2004
- Developing streamflow Database of Isfahan Rivers, Watershed Research Center of Isfahan, Ministry of Agriculture, 2004
- Time series drought forecasting for the capital provinces of Iran, Isfahan University of Technology, 2004

- Spatio-Temporal Classification of Drought in Isfahan Province Using Cluster Analysis, Isfahan University of Technology, 2005
- The study of Kahdan Watershed, Kerman, Iran, Ministry of Agriculture, Watershed Management Division, 2006
- The regional dry spell frequency analysis for Isfahan Province, Azad University, Ardestan Branch, 2006
- The study of rainfall-runoff relationship by Artificial Neural Network (ANN) for Zayandehrud River, Azad University, Ardestan Branch, 2007
- The study of win erosion resources of east Isfahan Province Zistban corporation and natural resources organization of Isfahan province, 2009
- The study of the impact of weather conditions on HIP fracture in Quebec Province, Canada, Quebec and Sherbrook University, 2011
- Analysis and estimation of environmental flow of Zayandehrud River, Isfahan University of Technology, Isfahan Department of Environment, 2015
- Low flow analysis of Zayandehrud Basin, Azad University, Ardestan Branch, 2015
- Modeling dynamic impact of drought and wind speed on dust storm frequency in arid regions of Iran, Iran National Science Foundation (INSF), 2017
- Climate change impact assessment on drought severity and duration in Iran, Iran National Science Foundation, 2018
- Modeling dynamic relationship between rainfall and runoff in Switzerland, ETH university, 2018
- Regional low flow frequency analysis in Upper Tigris and Euphrate, Tubitak, Turkey, 2019
- Assessing of climate change effect on flood risk in Karkheh basin, Iran National Science Foundation, 2020
- Analysis and estimation of environmental flow for Boshar River based on hydrologic and Biologic indicators, Iran Water Resources Management Organization, Ministry of Power, 2021
- Non-stationary flood frequency analysis in Iran, Iran Water Resources Management Organization, Ministry of Power, 2021
- Short term and long term forecasting of hydro-climatic variables in Zayandehrud River, Isfahan Water Resources Organization, 2022

EDITORIAL EXPERIENCE

- Journal of Hydrology
- Water Resources Research

- International Journal of Climatology
- Theoretical and applied climatology
- Water Resources Management
- Meteorological Application
- Climatic change
- Journal of climate
- ASCE-Journal of Hydrologic Engineering

LANGUAGES: Persian (Farsi): Native; English (Fluent); French (Basic)

HOBBIES: Reading, Chess, Football, Badminton

PROFESSIONAL AFFILIATION

- Watershed Management Society of Iran
- International Association of Hydrological Sciences
- American Geophysical Union (AGU)
- European Geoscience Union (EGU)
- Iran Hydrology Society