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Short Bio

I am Associate Research Scientist at the International Research Institute for Climate and Society (IRI), at Columbia University in the city of New York, USA, specializing in climate forecasting across time-scale from sub-seasonal to seasonal: S2S and seasonal to decadal: S2D, and its applications in managing weather and climate risks and developing climate services for developing countries. I joined IRI in September 2019 and contributing in the following project (World Food Program, and Columbia ACTODAY) in different capacities including research, forecasting, and training of National Meteorological officials in respective countries.

i. Forecast-based Financing in four Southern regions of Madagascar

ii. ACTODAY Ethiopia

iii. Drought management in Somali region of Ethiopia, Seasonal Forecasting and Application for FbF

iv. Developing of operational S2S forecasting system for the Arabian Peninsula using Saudi-KAU CGCM Products

I am actively participating in building the capacities of the National Meteorological Services of Madagascar, Ethiopia, and other countries through trainings on “next generation” seasonal forecasting methods based on IRI’s Climate Predictability Tool (CPT), and building a strong professional relationship with developing country scientists which have been important to the success of IRI international projects.

I received my PhD in Meteorology from the King Abdulaziz University (KAU), Jeddah, Saudi Arabia in 2018 on the thesis titled “Development of Convective

Clouds Parameterization Scheme in Saudi-KAU Global Climate Model for Enhancing Climate Prediction over Arabian Peninsula". During my PhD, I also worked as Researcher in Center of Excellence for Climate Change Research (CECCR), KAU Jeddah Saudi Arabia more than 8 years (Nov 2013 to Jan 2018), which was a first Climate Research Center of its kind in Saudi Arabia established and funded by university. At CECCR I worked on the development of Saudi-KAU model and established the seasonal prediction system based on Saudi-KAU Model. Under this project, I have been invited as a visiting scientist in the Climate Dynamics Lab in Seoul National university, Korea in 2011, where I worked for 6 weeks with different scientist under the supervision of Prof. In-Sik Kang. The regular seasonal forecast is conducted every months since March 2018, by using Saudi-KAU model and contributed to the IRI ENSO Plume, https://iri.columbia.edu/our-expertise/climate/forecasts/enso/2018-February-quick-look/?enso_tab=enso-sst_table. I also involved in the IRI-KAU project related to the installation of IRI Data Library in CECCR/KAU http://kcdl.kau.edu.sa/. This also include the work related to the translation of the DL pages from English to local language (Arabic).

I also worked in ICTP as a Junior Associate for the period 2013 to 2019 (6 years), that include visiting ICTP for 6-8 weeks during summer-time and conduct research under the supervision of Prof. Fred Kucharski. Prior to joining IRI in September, 2019, I worked in Earth System Physics (ESP), section of The Abdus Salam International Center for Theoretical Physics (ICTP), Trieste Italy as long-term visiting scientist (Feb 2018 to Aug 2019). I actively participated in the research activities carried in ICTP using SPEEDY AGCM, and Saudi-KAU CGCM, as well as using data from the different international projects like NMME as well as the IPCC coupled models. All this work was performed under the supervision of Dr. Fred and together we published several research articles in different high impact journals.

Research Interests

- Sub-seasonal to seasonal (S2S) and decadal climate forecasting (S2D)
- Prediction and Predictability in Arid and semi-Arid Regions
- Prediction of Extreme events
- Climate Change and Global Warming and its Impacts on regional climate
- Teleconnections in a warming climate
- Cumulus Convection Parameterization in Global Models
- Tailoring of climate information for use in conjunction with sectoral models for climate adaptation and risk management

Recent Publications (2020-21)

1. "On the Next Generation (NextGen) Seasonal Prediction System to enhance Climate Services over Ethiopia". Acharya N, **Ehsan M.A.,** Admasu A, Teshome A., Kyle JCH. Climate Services (2021).
2. "Projected changes in hot, dry and wet extremes over SREX regions using CMIP6 data". Almazroui M., …, **Ehsan M.A.,** …, et al. Earth System and Environment. (2021).
3. "Assessment of CMIP6 models performance and projected temperature and precipitation changes over South America". Almazroui M., …, **Ehsan M.A.,** …, et al. *Earth System and Environment*. (2021)
4. "Seasonal Predictability and Forecast Skill of Ethiopian Kiremt Rainfall in ECMWF's SEAS". **Ehsan M.A**., Tippett MK, Robertson AW, Almazroui M, Ismail M, Dinku T, Acharya N, Siebert A, Ahmed JS, Teshome A. Climate Dynamics. (2021)
5. "Projected changes in temperature and precipitation over the United States, Central America and the Caribbean in CMIP6 GCMs". Almazroui M., …, **Ehsan M.A.,** …, et al. *Earth System and Environment*. (2021)
6. "Atlantic Ocean influence on Middle East summer surface air temperature". **Ehsan M.A.,** Nicoli D, Kucharski F, Almazroui M, Tippett M.K., Bellucci A, Ruggieri P, Kang I.S. *npj Climate and Atmospheric Science*. (2020)
7. "Current and emerging developments in subseasonal to decadal prediction". Merryfield W.J., **Ehsan M.A., …,** et al. *Bulletin of the American Meteorological Society*. (2020)
8. "Predicting Peak Summer Monsoon Precipitation over Pakistan in ECMWF SEAS5 and North American Multimodel Ensemble". **Ehsan M.A.,** Tippett

M.K., Kucharski F, Almazroui M, Ismail M. *International Journal of Climatology*. (2020)

9. “Potential predictability and skill assessment of boreal summer surface air temperature of South Asia in the North American multimodel ensemble”. **Ehsan M.A.** *Atmospheric Research*. (2020)

Earlier Publications (2012 to 2019)

1. “Potential predictability of boreal winter precipitation over central-southwest Asia in the North American multi-model ensemble”. (2019) **Ehsan M.A.,** Kucharski F, Almazroui M. *Climate Dynamics*.
2. “Saudi-KAU coupled global climate model: Description and Performance”. Almazroui M., Tayeb O., Mashat A.S., Yousef A., Al-Turki Y.A., Abid M.A., Bafail A.O., **Ehsan M.A**., et al. (2017), Earth Syst Environ. doi:10.1007/s41748-017-0009-7.
3. “Skill and predictability in multimodel ensemble forecasts for Northern Hemisphere regions with dominant winter precipitation”. (2017a) Muhammad Azhar Ehsan, Michael K. Tippett, · Mansour Almazroui,·Muhammad Ismail, · Ahmed Yousef,· Fred Kucharski, · Mohamad Omar, ·Mahmoud Hussein, · Abdulrahman A. Alkhalaf. Climate Dynamics, DOI: 10.1007/s00382-016-3267-4.
4. “Sensitivity of AGCM-simulated regional JJAS precipitation to different convective parameterization schemes”. (2017b) **Ehsan M.A.**, Almazroui M., Yousef A., Enda O., Tippett M.K., Kucharski F., Alkhalaf A.K., Int J Climatol. doi:10.1002/joc.5108
5. “Impact of different cumulus parameterization schemes in SAUDI-KAU AGCM”. (2017c), **Ehsan M.A.**, Almazroui M., Yousef A., Earth Syst Environ 1:3. doi:10.1007/s41748-017-0003-0.
6. “An improvement in mass flux convective parameterizations and its impact on seasonal simulations using a coupled model”. (2015) Ahmed Yousef, **Ehsan M.A.**, Mansour Almazroui, Mazen E. Assiri, Abdulrahman K. Alkhalaf**.** Theoretical and Applied Climatology.
7. "A quantitative assessment of changes in seasonal potential predictability for the 20th Century". (2013) **Ehsan M.A.,** In-Sik Kang, Mansour Almazroui, M. Adnan Abid, Fred Kucharski. Climate Dynamics.

8. “Effect of mid-latitude blocking anticyclones on the weather of the Arabian Peninsula”. (2012) H. Athar, Mansour Almazroui, M. Nazrul Islam, M. Adnan Abid, and **EHSAN M.A.** International Journal of Climatology.
9. “Interannual variability of rainfall over the Arabian Peninsula using the IPCC AR4 global climate models”. (2012) M. Almazroui, M. Adnan Abid, H. Athar, M. Nazrul Islam, **Ehsan M.A.** International Journal of Climatology.

Publications under review (2021)

1. *“Projected changes in hot, dry and wet extremes over SREX regions using CMIP6 data”. Almazroui M., …, **Ehsan M.A.,** …, et al. Earth System and Environment. (2021)*
2. *“Evaluation of Potential Predictability of Indian Summer Monsoon Rainfall in ECMWF's Fifth Generation Seasonal Forecast System (SEAS5)”. Raju Attada, **Ehsan M.A.,** Prasanth A. Pillai. Meteorology and Atmospheric Physics (2021)*
3. *“On the Next Generation (NextGen) Seasonal Prediction System to enhance Climate Services over Ethiopia”. Acharya N, **Ehsan M.A.,** Admasu A, Teshome A., Kyle JCH. Climate Services (2021).*
4. *“ENSO Forecast skill in Saudi-KAU GCM and its comparison with NMME”. **Ehsan M.A.,** et al. ESEV. (2021)*

Communication Skills

- Scheduled and coordinated the IRI Seminars, that include invitation to the Speakers, announcement of Seminars to folks in IRI and across Lamont, and Zoom meeting scheduling, introducing speaker to audience and conducting Q/A at the end of the talk.
- Presentation of scientific work in different scientific Journals including, EurekAlert, Phys.org, Environmental News Network, and Long Room
  https://phys.org/news/2020-01-atlantic-ocean-fingerprint-climate-middle.html
  https://www.enn.com/articles/61920-the-atlantic-ocean-fingerprint-on-the-climate-of-the-middle-east
  https://www.eurekalert.org/pub_releases/2020-01/cf-e-tao012820.php
- Working with different reporters Sky News, infobae, Vox, GIZMODO.

https://news.sky.com/story/afghanistan-millions-at-risk-of-starvation-as-vital-seeds-go-to-waste-in-warehouses-12465586

https://gizmodo.com/the-climate-crisis-may-have-helped-spawn-massive-locust-1841385871

https://www.infobae.com/america/mundo/2020/05/17/una-plaga-biblica-puede-causar-mas-muertes-que-el-coronavirus-en-africa/

https://www.vox.com/2020/5/20/21158283/locust-plague-swarm-outbreak-africa-asia-2020

- Interviewed by a reporter from BBC Radio (Discovery)
  https://www.bbc.co.uk/programmes/w3csz9db

Conference/Workshop Presentations

1. Atlantic Ocean Influence on Middle East Summer Surface Air Temperature. EGU2020-10459, in OS1.9, Live chat on Monday, 04 May 2020.
2. Predictability of two types of El Niño assessed by ECMWF System 5 and its impacts on Western North American Climate. 100th AMS Annual Meeting, 12–16 January 2020, Boston Convention and Exhibition Center, 415 Summer Street, Boston, MA, USA.
3. Increasing Arabian Peninsula Summer Surface Air Temperature Response to Greenhouse Warming: The Role of Water Vapor Feedback. American Meteorological Society's 32nd Conference on Climate Variability and Change, 99th Annual Meeting, Sunday, 6 January 2019 to Thursday, 10 January 2019, in Phoenix, AZ, USA.
4. Poster Presentations on "Interannual variability and predictability assessment of JJA surface air temperature over the Arabian Peninsula in North American Multimodel Ensemble" and
5. "On the decreasing Arabian Peninsula Winter Precipitation and its teleconnections" M. Azhar Ehsan: International Conferences on Subseasonal to Decadal Prediction" organized by WCRP, Sep 17-21, 2018 – NACR, Boulder, CO, USA.
6. Oral Presentation "Interannual variability and predictability assessment of JJA surface air temperature over the Arid region of the Arabian Peninsula in North

American Multimodel Ensemble" M. Azhar Ehsan: European Conference for Applied Meteorology and Climatology 2018" organized by European Meteorological Society, Sep 3-7, 2018 – Budapest, Hungary.

7. Sensitivity of AGCM Simulated Regional Summer Precipitation to Different Convective Parameterization. **M. Azhar Ehsan**: The Eighth Scientific Forum for King Abdulaziz University (KAU) students, 7-8 December, 2016, Jeddah Saudi Arabia.
8. Cloud Droplet Concentration and its relationship with precipitation. **M. Azhar Ehsan**: Summer School on Aerosol-Cloud Interactions and International CFMIP Conference on Clouds, Circulation and Climate Sensitivity (27 Jun-7 July, 2016), Trieste, ICTP, Italy.
9. Skill and predictability in multimodel ensemble forecasts for Northern Hemisphere regions with dominant winter precipitation. **M. Azhar Ehsan**: NOAA's 41st Climate Diagnostics and Prediction Workshop held in Orono, Maine, USA, 3-6 October 2016 (*Not able to join personally*).
10. Northern Hemisphere winter precipitation predictability: Arid versus Wet region. **M. Azhar Ehsan**: The Seventh Scientific Forum for King Abdulaziz University (KAU) students, 28-29 October, 2015, Jeddah Saudi Arabia.
11. Seasonal Prediction System in KAU: Experimentation, Validation and Inter-Comparison. **M. Azhar Ehsan**, In-Sik Kang, Michael Tippett, M. Ismail, M. Omar, Young-Min Yang: The First Seasonal Climatic Prediction Workshop for Arab Region " Dec 29 – Jan 01, 2014-2015, King Abdulaziz University, Jeddah, Saudi Arabia.
12. An improvement in mass flux convective parameterizations and its impact on Seasonal simulations using a coupled model. **M. Azhar Ehsan**: 6th Scientific Forum for King Abdulaziz University Students, December, 08-10, Jeddah Saudi Arabia.
13. Coupled Model Seasonal Prediction: Experimentation, Validation and Comparison. **M. Azhar Ehsan**, Mansour Almazroui, M. Ismail, M. Omar, Young-Min Yang; ICTP-IITM-COLA Targeted Training Activity (TTA): "Challenge in Monsoon Prediction" June 23 – July 4, 2014, Trieste, Italy.

14. Coupled Model Prediction Skill of Winter Precipitation: Inter-Comparison. M. Adnan Abid, Irfan Ur Rashid, M. Ismail, Kamil Shahzad, **M. Azhar Ehsan**, M. Omar, Mansour Almazroui; ICTP-IITM-COLA Targeted Training Activity (TTA): "Challenge in Monsoon Prediction" June 23 – July 4, 2014, Trieste, Italy.
15. Cumulus Convection Parameterization in KAU Climate Model: Present and Future Options. **M. Azhar Ehsan**: Technical Workshop in Munich, Germany, June 15 – 20, 2014, Fujitsu Technology Solutions, Munich, Germany.
16. Cumulus Convection in KAU Climate Model. **M. Azhar Ehsan**; Conference on climate Modeling; March 24 – April 05, 2013; Organized by Tsinghua University and INSPUR Group China, Beijing, People Republic of China.
17. A quantitative assessment of changes in the seasonal potential predictability in the 20th Century. **M. Azhar Ehsan**, In-Sik Kang, Mansour Almazroui, M. Adnan Abid, Fred Kucharski; Workshop on Hierarchical Modeling of Climate, 18-22 July, 2011, Trieste, Italy.

Attended Workshops

1. Targeted Training Activity (TTA) 2017: Monsoons in a Changing Climate. July 31 – Aug 4, 2017, ASICTP, Trieste, Italy.
2. Summer School on Aerosol-Cloud Interactions, 27 June- 1 July 2016, ASICTP, Trieste, Italy.
3. International CFMIP Conference on Clouds, Circulation and Climate Sensitivity, 4 - 7 July 2016, ASICTP, Trieste, Italy.
4. Fujitsu-KAU workshop on the KAU Climate Modelling Development, 25 April –6 May 2016, London, UK.
5. The 1st World Climate Research Program (WCRP) Summer School on Climate Model Development: Atmospheric Moist Processes, 15-26 June 2015, Max Planck Institute, Hamburg, Germany.
6. The First Seasonal Climatic Prediction Workshop for Arab Region 29 December, 2014 - 01 January, 2015, King Abdulaziz university, Jeddah Saudi Arabia.
7. KAU Climate Model Meeting, November 24 – 26, 2014, Fujitsu System Europe,

Toulouse, France.

8. ICTP-IITM-COLA Targeted Training Activity (TTA): “Challenge in Monsoon Prediction, June 23 – July 4, 2014, ASICTP, Trieste, Italy.
9. Technical Workshop in Munich, Germany, June 15 – 20, 2014, Fujitsu Technology Solutions, Munich, Germany.
10. Conference on Climate Modeling, Tsinghua University, March 26 – April 04, 2013 Beijing, People Republic of China.
11. Training school for climate prediction, Jan 16 – Feb 20, 2012, Climate Dynamics Lab, Seoul National University, Seoul, Korea.
12. Targeted Training Activity (TTA) on Oscillation Monsoon in the Current and Future Climate, July 30 – August 10, 2012, including the High-level Meeting on "The Looming Environmental Crisis and Global Sustainability" August 6-7, 2012, ASICTP, Trieste, Italy.
13. Climatology and Climate Variability of the Red Sea and Gulf of Aden Large Marine Ecosystem, January 24 – 26, 2011, Jeddah, Saudi Arabia.
14. Workshop on Hierarchical Modeling of Climate, July 18 – 22, 2011, ASICTP, Trieste, Italy.
15. Conference on Decadal Predictability, August 16 - 20, 2010, ASICTP, Trieste, Italy.
16. Targeted Training Activity (TTA) on Statistical Methods in Seasonal Prediction, August 2 - 13, 2010, ASICTP, Trieste, Italy.
17. 5th ICTP Workshop on the Theory and Use of REGional Climate Models May 31-June11, 2010, ASICTP, Trieste, Italy.

Organizing and Lecturing on the seasonal climate prediction training workshop for building capacity of the Arab world researchers

1. **Resource Person:** Prepared and Delivered the Lecture series and hands-on sessions to the Participants of the workshop on the seasonal predictions during “The First Seasonal Climatic Prediction Workshop for Arab Region” 29

December, 2014 - 01 January, 2015, King Abdulaziz university, Jeddah Saudi Arabia.

2. Participated as a Speaker on “Seasonal Prediction System in KAU: Experimentation, Validation and Inter-Comparison during the workshop: **M. Azhar Ehsan**, In-Sik Kang, Michael Tippett, M. Ismail, M. Omar, Young-Min Yang.

Awards

- Junior Associate member (**2014-2019**) at the Earth System Physics Section (ESP), International Center for Theoretical Physics, Trieste, Italy.
- Best Research Paper Presentation award worth (2500 SAR), at 8th Scientific Forum of King Abdulaziz University Students, March 2017.

Project Fundings

As PI, awarded funding ($ 9,994) for the proposal titled;

“The Impact of Climate on Coffee Production in Ethiopia”

by Lamont Climate Center from 7/1/21 to 6/30/23.