

Hamada S. Badr

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Research Interests

- Remote Sensing and Data Assimilation
- Numerical Weather Modeling and Prediction
- Climate Dynamics, Modeling, and Regionalization
- Statistical Analysis and Seasonal Predictions
- Computational Fluid Dynamics (CFD)
- High Performance Computing (HPC)
- Applications to environmental related problems

Academic Background

2016 Ph.D. Earth & Planetary Sciences

Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU),
Baltimore, Maryland, USA

Advisor(s): Benjamin F. Zaitchik

Thesis: Applications of Climate Regionalization: Statistical Prediction and Patterns of
Precipitation Variability in Observations and Global Climate Models

2013 M.A. Earth & Planetary Sciences

Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU),
Baltimore, Maryland, USA

Advisor(s): Benjamin F. Zaitchik

2011 M.Sc. Aerospace Engineering

Department of Aerospace Engineering (AE), Cairo University (CU)
Giza, Egypt

Advisor(s): Atef O. Sherif, Basman M. N. Elhadidi, & Hamdy A. Kandil

Thesis: Ensemble Forecasting & Data Assimilation

2003 B.Sc. Aerospace Engineering

Department of Aerospace Engineering (AE), Cairo University (CU)
Giza, Egypt

Advisor(s): Atef O. Sherif

Graduation Project: Terrain Aerodynamics

Honors & Awards

2016 Assistant Research Scientist

Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU),
Baltimore, Maryland, USA

2016 Postdoctoral Fellowship

Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU),
Baltimore, Maryland, USA

2013 Honorable Mention Award

American Meteorological Society (AMS)
Boston, Massachusetts, USA

2012 Research Assistantship

Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU),
Baltimore, Maryland, USA

2011 Morton K. Blaustein Fellowship

Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU),
Baltimore, Maryland, USA

2011 Research Assistantship

National Authority for Remote Sensing and Space Sciences (NARSS)
Cairo, Egypt

Research Experience

2015 – 2016 **Porting NU-WRF to HHPC & MARCC**

Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU),
Baltimore, Maryland, USA

Porting NASA-Unified Weather Research and Forecasting (NU-WRF) Model to JHU
Homewood High Performance Compute Cluster (HHPC) and Maryland Advanced Research
Computing Center (MARCC).

More information about the NU-WRF model can be found at <http://nuwrf.gsfc.nasa.gov>.

2015 – 2016 **Climate Regionalization of Africa**

Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU),
Baltimore, Maryland, USA

Regionalizing Africa based on interannual variability of precipitation: spatial patterns of
precipitation variability in observations and global climate models (GCMs) at different times
from geological periods to historical simulations and future climate projections.

2013 – 2015 **Objective Climate Regionalization**

Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU),
Baltimore, Maryland, USA

Development of an open-source R package for **Hierarchical Climate Regionalization**
(HiClimR) to facilitate the application of rigorous regionalization for climate studies.
HiClimR is applicable to any correlation-based clustering.

2011 – 2013 Seasonal Precipitation Predictions

Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU),
Baltimore, Maryland, USA

Application of different statistical models to understand and predict seasonal rainfall anomalies as a function of large-scale indices of surface air temperature anomalies (SATA), sea surface temperature (SST), surface pressure, and other variables.

2010 – 2011 Prediction of Dust/Sand Storms

National Authority for Remote Sensing and Space Sciences (NARSS)
Cairo, Egypt

Development of a framework for dust/sand storms prediction using numerical weather prediction and remote sensing technology.

2010 – 2010 Porting WRF to EUMEDGRID

Africa 4 2010 - Joint EUMEDGRID-Support / EPIKH School for Application Porting
Cairo, Egypt

Porting the Weather Research and Forecasting (WRF) model to EUMEDGRID.

2010 – 2010 High Performance Computing (HPC)

IBM-Egypt and National Authority for Remote Sensing and Space Sciences (NARSS)
Cairo, Egypt

IBM AIX 5L system administration and running Code_Saturne Computational Fluid Dynamics (CFD) Solver on NARSS Blue-Gene/L.

2008 – 2010 Ensemble Forecasting

National Authority for Remote Sensing and Space Sciences (NARSS)
Cairo, Egypt

Development of a preliminary ensemble forecasting system for Egypt, which can be developed for operational use.

2008 – 2008 Estimation of Evaporative Rates

National Authority for Remote Sensing and Space Sciences (NARSS)
Cairo, Egypt

Evaluation of Lake Nasser water loss by evaporation using numerical weather prediction and remote sensing technology.

2006 – 2008 Data Assimilation

National Authority for Remote Sensing and Space Sciences (NARSS)
Cairo, Egypt

Implementation of the conventional and remotely-sensed observational data into the numerical weather modeling system for Egypt using Four-Dimensional Data Assimilation.

2005 – 2006 ATOVS Data Processing and Visualization

National Authority for Remote Sensing and Space Sciences (NARSS)
Cairo, Egypt

Development of an automatic framework for the processing and visualization of NOAA/ATOVS satellite data.

2001 – 2003 Terrain Aerodynamics

Department of Aerospace Engineering (AE), Cairo University (CU)

Giza, Egypt

Generation of a surface grid for Cairo area from Raster maps, measuring flow over prototypes in a wind tunnel, and comparing the numerical and experimental results.

Computer Skills

Some of my computer skills are listed at: pages.jh.edu/~hbadr1/#Skills.

Publications & Preprints

Satti, S., B. F. Zaitchik, **H. S. Badr**, and S. Tadesse, **2017**: Understanding and Enhancing Dynamical Seasonal Predictions through Objective Regionalization. *Journal of Applied Meteorology and Climatology (JAMC)*, **Published Online**: 2 March 2017.

DOI: 10.1175/JAMC-D-16-0192.1

Dezfuli, A. K., B. F. Zaitchik, **H. S. Badr**, E. Jason, and C. D. Peters-Lidard, **2017**: The role of low-level terrain-induced jets in rainfall variability in Tigris-Euphrates Headwaters. *Journal of Hydrometeorology (JHM)*. *Journal of Hydrometeorology (JHM)*, **18**, 819–835.

DOI: 10.1175/JHM-D-16-0165.1

Badr, H. S., B. F. Zaitchik, A. K. Dezfuli, and C. D. Peters-Lidard, **2016**: Regionalizing Africa: Patterns of Precipitation Variability in Observations and Global Climate Models. *Journal of Climate (JCLI)*, **29**, 9027–9043.

DOI: 10.1175/JCLI-D-16-0182.1

Regonda, S. K., B. F. Zaitchik, **H. S. Badr**, and M. Rodell, **2016**: Using Climate Regionalization to Understand Climate Forecast System Version 2 (CFSv2) Precipitation Performance for the Conterminous United States (CONUS). *Geophysical Research Letters (GRL)*, **43**, 6485–6492.

DOI: 10.1002/2016GL069150

F. Berhane, B. F. Zaitchik, and **H. S. Badr**, **2015**: The Madden-Julian Oscillation's influence on Spring Rainy Season Precipitation over Equatorial West Africa, *Journal of Climate (JCLI)*, **28**, 8653–8672.

DOI: 10.1175/JCLI-D-14-00510.1

Badr, H. S., B. F. Zaitchik, and A. K. Dezfuli, **2015**: A Tool for Hierarchical Climate Regionalization. *Earth Science Informatics (ESIN)*, **8**, 949–958.

DOI: 10.1007/s12145-015-0221-7

Badr, H. S., B. F. Zaitchik, and A. K. Dezfuli, **2014**: Hierarchical Climate Regionalization. *CRAN*, <http://cran.r-project.org/package=HiClimR>.

URL: <https://github.com/hsbadr/HiClimR>

Badr, H. S., B. F. Zaitchik, and S. D. Guikema, **2014**: Application of Statistical Models to the Prediction of Seasonal Rainfall Anomalies over the Sahel. *Journal of Applied Meteorology and Climatology (JAMC)*, **53**, 614–636.

DOI: 10.1175/JAMC-D-13-0181.1

Nasr, A. H., B. M. El Leithy, and **H. S. Badr**, 2012: Estimation of Radiometric Calibration Coefficients of Egyptsat-1 Sensor. The XXII Congress of the International Society for Photogrammetry and Remote Sensing, Melbourne, Australia, **XXXIX-B1**, 139-143.
DOI: 10.5194/isprsarchives-XXXIX-B1-139-2012

Badr, H. S., H. A. Kandil, B. M. N. Elhadidi, and A. O. Sherif, 2011: Evaluating the Physics Options of Regional Weather Models for Areas with Complex Land-Use Characteristics. *Proceedings of IEEE 2011 International Geoscience and Remote Sensing Symposium (IGARSS)*, Vancouver, Canada, 3257-3260.
DOI: 10.1109/IGARSS.2011.6049914

Badr, H. S., 2011: Ensemble Forecasting and Data Assimilation in Numerical Weather Modeling for Egypt. *M.Sc. Thesis, Department of Aerospace Engineering (AE), Cairo University (CU)*, Giza, Egypt.

Badr, H. S., B. M. N. Elhadidi, and A. O. Sherif, 2010: Evaluation of Data Assimilation on Numerical Weather Prediction for Egypt. *Proceedings of IEEE 2010 International Geoscience and Remote Sensing Symposium (IGARSS)*, Honolulu, Hawaii, USA, 3526-3529.
DOI: 10.1109/IGARSS.2010.5652441

Presentations & Invited Talks

Badr, H. S., N. M. Deluca, N. E. Levin, and B. F. Zaitchik, 2015: On The Regionalization of African Precipitation for Paleoclimate Studies. *Geological Society of America (GSA) Annual Meeting 2015*, Baltimore, Maryland, USA.

Badr, H. S., B. F. Zaitchik, and A. K. Dezfuli, 2014: Climate Regionalization through Hierarchical Clustering: Options and Recommendations for Africa. *American Geophysical Union (AGU) Fall Meeting 2014*, San Francisco, California, USA.

A.K. Dezfuli, B.F. Zaitchik, **Badr, H. S.**, K. Bergaoui, R. Zaaboul, and P. Bhattacharjee, 2014: Dynamical downscaling with WRF for the Middle-East and North Africa. *American Geophysical Union (AGU) Fall Meeting 2014*, San Francisco, California, USA.

Badr, H. S., B. F. Zaitchik, and A. K. Dezfuli, 2014: Statistical and Dynamical Prediction of Seasonal Rainfall over Tropical Africa. *Graduate Board Oral (GBO) Exam, Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU)*, Baltimore, Maryland, USA.

Badr, H. S., B. F. Zaitchik, and A. K. Dezfuli, 2014: Statistical and Dynamical Prediction of Seasonal Rainfall over Tropical Africa. *Regional Climate Modeling (RCM) Group Meeting, Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU)*, Baltimore, Maryland, USA.

Badr, H. S., B. F. Zaitchik, and A. K. Dezfuli, 2013: Regionalization of Africa based on Interannual Variability of Precipitation: An Improved Approach and A New Software Package. *American Geophysical Union (AGU) Fall Meeting 2013*, San Francisco, California, USA.

Badr, H. S., B. F. Zaitchik, and A. K. Dezfuli, 2013: Regionalization of Africa based on Interannual Variability of Precipitation: An Improved Approach and A New Software Package. *Journal Club, Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU)*, Baltimore, Maryland, USA.

Badr, H. S., B. F. Zaitchik, and S. D. Guikema, **2013**: Statistical Predictive Models for Seasonal Rainfall Anomalies over Sahel. *Journal Club, Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU)*, Baltimore, Maryland, USA.

Badr, H. S., B. F. Zaitchik, and S. D. Guikema, **2013**: Spatiotemporal Variability of Precipitation over Africa. *25th Conference on Climate Variability and Change, 93rd American Meteorological Society (AMS) Annual Meeting*, Austin, Texas, USA.

Badr, H. S., B. F. Zaitchik, and S. D. Guikema, **2012**: Statistical Predictive Models for Seasonal Rainfall Anomalies over Sahel. *11th Conference on Artificial and Computational Intelligence and its Applications to the Environmental Sciences, 93rd American Meteorological Society (AMS) Annual Meeting*, Austin, Texas, USA.

Badr, H. S., B. F. Zaitchik, and S. D. Guikema, **2012**: Statistical Predictive Models for Seasonal Rainfall Anomalies over Sahel. *Climate Dynamics of Tropical Africa: Present Understanding and Future Directions, Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU)*, Baltimore, Maryland, USA.

Nasr, A. H. , B. M. El Leithy, and **H. S. Badr**, **2012**: Estimation of Radiometric Calibration Coefficients of Egyptsat-1 Sensor. The XXII Congress of the International Society for Photogrammetry and Remote Sensing, Melbourne, Australia.

Badr, H. S., **2012**: PCA-based Regionalization of Precipitation over Africa. *Journal Club, Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU)*, Baltimore, Maryland, USA.

Badr, H. S., **2011**: Soil Moisture Response and Memory. *African Climate Group Meeting, Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU)*, Baltimore, Maryland, USA.

Badr, H. S., **2011**: The Atlantic multidecadal oscillation and its relation to rainfall and river flows in the continental US. *270.644: Physics of Climate Variability, Department of Earth and Planetary Sciences (EPS), Johns Hopkins University (JHU)*, Baltimore, Maryland, USA.

Badr, H. S., H. A. Kandil, B. M. N. Elhadidi, and A. O. Sherif, **2011**: Evaluating the Physics Options of Regional Weather Models for Areas with Complex Land-Use Characteristics. *IEEE 2011 International Geoscience and Remote Sensing Symposium (IGARSS)*, Vancouver, Canada.

Badr, H. S., B. M. N. Elhadidi, and A. O. Sherif, **2010**: Evaluation of Data Assimilation on Numerical Weather Prediction for Egypt. *IEEE 2010 International Geoscience and Remote Sensing Symposium (IGARSS)*, Honolulu, Hawaii, USA.

Badr, H. S., B. M. N. Elhadidi, and A. O. Sherif, **2007**: FDDA Enhancement of the Mesoscale Meteorological Modeling System for Egypt. *Cairo 10th International Conference on Energy and Environment (EE10)*, Luxor, Egypt.

Professional Memberships & Services

- Session Chair, Geological Society of America (GSA) Annual Meeting 2015
- Peer-review, Journal of Climate (JCLI)
- Peer-review, Theoretical and Applied Climatology (TAAC)
- Member, American Meteorological Society (AMS)
- Member, American Geophysical Union (AGU)

References

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Thomas W. N. Haine

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