RASHYD ZAABOUL

Lead Author of the IPCC AR6 (Chapter 12)

Climate change adaptation and sustainability in MENA and Africa

Current position: **Modeler - Climate Change at the International Centre for Biosaline Agriculture, Dubai, UAE** (April 2013 – present)

Date of birth: December 1st 1974 // **Nationality** Moroccan
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Overview of skills:

- Regional and local climate modeling for sustainable adaptation to climate change.
- Vulnerability assessment to support targeted adaptation actions and strategies.
- Development of climate, water and crop related applications: Drought Monitoring.
- Water modeling at regional and basin scales for climate change impacts assessment.

Education:

1995- 1998 **Master degree in Meteorology**
Hassania School of Public Works, Casablanca, Morocco and the National School of Meteorology (Météo-France), Toulouse, France

Professional experience:

2013 - Present **Climate modeling scientist**. International Centre for Biosaline Agriculture, Dubai, UAE

- Co-leading project on improving agricultural resilience to salinity through development and promotion of pro-poor technologies in seven countries in Africa (The Gambia, Sierra Leone, Liberia, Togo, Mozambique, Botswana and Namibia). The project is funded by the International Fund for Agricultural Development (IFAD) and the Arab Bank for Economic Development in Africa (BADEA). In this project, we are combining remote sensing and modeling techniques to identify vulnerable areas to climate change and salinity and proposing alternative crops and affordable water technologies to help smallholder farmers to cope with and adapt to climate change negative impacts. Salt-tolerant crops and appropriate, sustainable land and water management practices and technologies are introduced, and Climate-smart and salinity-resilient agricultural models and approaches incorporated into national agricultural development policies and strategies. We are also working with local women cooperatives to develop the value chain around new introduced crops such as Quinoa.
- Leading project on water modeling decision-support tools. Configuration, adaptation and validation of surface water models over MENA and selected basins. The models included in this project are LIS (Land Information System developed by NASA) and IHMS (Integrated Hydrological Modeling System developed by Ragab Ragab), especially its Distributed Catchment Scale Model (DiCaSM). The objective of this project is to develop water modeling tools to study the impact of climate change on surface water resources at different scales.
- Study the climate of MENA (Middle East and North Africa), Sahel, south Africa and Central Asia regions and assessment of Global and Regional Climate Models' predictions over these regions for informed decision-making actions and strategies in water and agriculture management.
- Dynamic downscaling of Global Climate data over MENA region using WRF (Weather Research and Forecasting model) to regional and country scales as part of the global effort to downscale climate data to fine scales. I am leading the regional downscaling team participating in the CORDEX-MENA initiative.

- Statistical downscaling and assessment of regional downscaled climate data over MENA, Sahel, south Africa and Central Asia regions mainly for vulnerability assessment and identification of climate hot spots.
- Development of a Drought Monitoring System for MENA region under USAID/FABRI granted project. Different scales and regional and national scopes covered by this system (regional: MENA and national: Morocco, Tunisia, Lebanon and Jordan). Different languages used including Shell, R and Python
- Use of cutting-edge methods and tools to analyze historical and future climate data to support hydrological and crop modeling for water and crop management under harsh climate conditions in many countries in Africa and Asia.
- Invited by the IPCC WG1 and TGICA bureau to the IPCC experts' meetings and activities:
    - Decision-Centered Approaches to the Use of Climate Information, New York, USA, 30 June - 2 Jul 2015
    - IPCC Sixth Assessment Report Scoping Meeting, Addis Ababa, Ethiopia, 1-5 May 2017
    - Currently Lead Author for the IPCC AR6 chapter 12 on "climate change information for regional impact and for risk assessment"
- Capacity building: Training more than 200 technical professionals from 8 countries on climate data downscaling and use for current and future efficient water resources management.
- Presenting climate change findings in high level workshops and conferences such as NASA (October 2014), Third Arab Water Forum (December 2014), Ecocity World Summit (October 2015), First Arab Conference on Weather and Climate (May 2016), FAO-RNE (July 2019).

1998-2013 **Full time researcher**. National Meteorological Administration, Casablanca, Morocco

- Development of the Moroccan Numerical Weather Prediction model (ALADIN) by conducting different studies to improve its physics schemes and 3D-VAR data assimilation system.
- Maintain and optimize the main operational forecast suites including testing new parallel libraries
- Work on ALADIN, ARPEGE and AROME code development including physics and coupling aspects (mainly on the externalized surface scheme SURFEX)

2007 **Visiting researcher.** NOAA/NWS/CPC/African Desk, Camp Springs, MD/USA (3-month secondment).
Drought monitoring and near real time warning system in North and West Africa using WRF in an ensemble configuration coupled with GEFS (Global Ensemble Forecasting System).

2002-2006 **Visiting researcher.** Météo France, CNRM, GMAP, Toulouse/France.
2 months visits each year to work on different development aspects of ALADIN/AROME models such as data assimilation, surface scheme, convection scheme, observations management, etc.

2001 **Visiting researcher,** CNR-IATA, Florence/Italy (6-month secondment).
Participation in the establishment of a support system for farmers to better manage water resources in irrigated areas for wheat and barley production. This system was scaled up later to cover Morocco and continue to be used as decision-support tool at the Ministry of Agriculture in Morocco.

Selected Publications:

- Y. Brouziyne, A. Abouabdillah, A. Hirich, R. Bouabid, **R. Zaaboul**, and L. Benaabidate (2018). Modeling sustainable adaptation strategies toward a climate-smart agriculture in a Mediterranean watershed under projected climate change scenarios. Agricultural Systems, 162, 154-163.
- D. M. Mitchell, K. Achutarao, M. Allen, I. Bethke, U. Beyerle , A. Ciavarella , A. Ciavarella , J. Fuglestvedt, N. Gillett, K. Haustein, W. Ingram, T. Iversen, V. Kharin, N. Klingaman, N. Massey, E. M. Fischer, C. Schleussner, J. Scinocca, Ø. Seland, H. Shiogama, E. Shuckburgh, S. Sparrow, D. Stone, P. Uhe, D. Wallom, M. F. Wehner, **R. Zaaboul** (2017). Half a degree additional warming, prognosis and projected impacts (HAPPI): Background and experimental design, Geoscientific Model Development 10(2):571-583, DOI: 10.5194/gmd-10-571-2017
- M. Seif-Ennasr, A. Hirich, Z. El Morjani, **R. Zaaboul**, A. Nrhira, M. Malki, L. Bouchaou, E. Beraaouz (2017). Assessment of Global Change Impacts on Groundwater Resources in Sous-Massa Basin, *Chapter in Water Resources in Arid Areas: The Way Forward, Springer Water, DOI:10.1007/978-3-319-51856-5*
- M. Seif-Ennasr, **R. Zaaboul**, A. Hirich, G. N. Caroletti, L. Bouchaou, Z. El Morjani, E. Beraaouz, R. A. McDonnell, R. Choukr-Allah (2016). Climate change and adaptive water management measures in Chtouka Aït Baha region (Morocco). *Science of the Total Environment (573):862-875, DOI:10.1016/j.scitotenv.2016.08.170*
- K. Bergaoui, D. M. Mitchell, **R. Zaaboul**, R. A. McDonnell, F. Otto and M. Allen (2015). The contribution of human-induced climate change to the drought of 2014 in the southern Levant region. *Special Supplement to the Bulletin of the American Meteorological Society, Vol. 96, No. 12, December 2015, DOI:10.1175/BAMS-D-15-00129.1*
- R. A McDonnell, K. Bergaoui, A. Khalaf, **R. Zaaboul**, and M. Belhaj Fraj (2014). Impacting Policy: Harnessing Science on Climate Change and Water through Partnerships with Decision-Makers in the Middle east and North Africa – Reflections. *Aquatic Procedia, 2: 3-8.* (http://www.sciencedirect.com/science/article/pii/S2214241X14000030)
- **R. Zaaboul** and É. Wattrelot (2007) Impact of reverse profiles from radar reflectivity data assimilation in AROME model. *Météo-France internal communication* (http://www.cnrm.meteo.fr/aladin/IMG/pdf/ZaaDec.pdf)
- **R. Zaaboul** (2006) Connecting the externalized surface physics in APREGE/ALADIN models. *Météo-France internal communication* (http://www.cnrm.meteo.fr/aladin/IMG/pdf/ZAABOUL-2.pdf)

Languages: (spoken and written): Arabic, French, English

Computer skills: UNIX, Linux, Windows, FORTRAN, NCL, R, CDO, Script shell, …