Amir Hossein **Nikfal**

Postdoctoral fellow · Environmental modeling and data scientist

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Education

Atmospheric Science and Meteorological Research Center (ASMERC)

Tehran, Iran

PhD in meteorology — *July 17, 2021*

- Researcher from 2013 to 2017
- PhD dissertation: correction of the soil erodibility factor for better dust simulation in the WRF/Chem model

University of Tehran

Karaj, Iran

MSc in Agro-Meteorology — *2009 - 2012*

- Highest rank university in Iran
- Thesis: weather (air quality/dust) numerical simulation, using the WRF/Chem model

University of Guilan

Rasht, Iran

BSc in water engineering — *2003 - 2009*

- MSc project: application of ArcET as an ArcGIS plugin in the estimation of evapotranspiration

Experience & projects

Outstanding project

Tehran, Iran

Development of a 24/7 operational system with applications in agro-meteorology — *Since septembre 2021, almost finished*

- A coupled system of WRF and SEBAL models
- Input atmospheric data for the SEBAL model simulated by the WRF model
- Input satellite data for the SEBAL model gained from VIIRS and SENTINEL2 data (as 2 different subsystems)

PhD thesis

Tehran, Iran

Correction of dust sources caused by wind erosion using WRF/Chem model in West Asia — *July 17, 2021*

- Based on the WRF/Chem model and SEVIRI satellite data
- Application of the RTTOV fast radiative transfer model to assess the outputs
- Application of Machine learning predictions using geographical features (vegetation, albedo, topography, etc.)

Atmospheric modelling

Rasht, Iran

Development of a 24/7 operational weather forecast system — *2020*

- Based on the WRF model
- Automatically run in a daily routine, with 3 days of forecasting
- Including (GFS) Download manager, and post-processing sub-systems

Remote sensing and GIS

Tehran, Iran

Satellite (raster) data processing and GIS — *2020 - present*

- Modern python libraries such as: satpy, xarray, rioxarray, gdal, pandas, etc.
- Most experienced with SEVIRI, VIIRS, SENTINEL2, and MODIS
- Satellite tracking over the study region and specification of the times of data files to be downloaded

Software development

PostWRF: Interactive tools for the visualization of the WRF model outputs — *2018 - present*

- Based on NCL and Linux shell scripts
- Available at https://github.com/anikfal/PostWRF
- Documentations: https://postwrf.readthedocs.io/en/latest

Operational tasks

Global forecast model data

GFS and ERA5 Data

- Incorporating the GFS and ERA5 data in the WRF model, for the forecast and historical runs, respectively
- Automatic daily download of GFS data, using bash scripts
- Downloading ERA5 data through the CDS API, with python codes
- Plotting ERA5 reanalysis data, mainly by NCL
- (Ongoing project) Incorporating ERA5 data processing in the PostWRF open-source software tools

Regional forecast model data

WRF model (well experienced in other models, especially SEBAL and RTTOV)

- Establishing 24/7 operational system based on the WRF model, mainly with bash scripts and NCL codes, on CentOS servers
- Establishing 24/7 operational systems of the coupled WRF-SEBAL model in agricultural applications, with bash, python, and NCL codes
- Compilation, compile-time error handling, and running the model
- Familiar with the WRF code structure, with extensive experince in the processing of the NetCDF and HDF data files
- Extracting the RTTOV model's input data from the WRF model, incorporated in the PostWRF open-source software tools

Satellite and GIS data processing

SEVIRI, VIIRS, SENTINEL2, and MODIS Data

- Incorporating satellite data into operational models (e.g. WRF-SEBAL)
- Automatic daily download of the SENTINEL2 data using the *dhusget.sh* code, over the specific lat/lon points
- Familiar with ML applications in remote sensing to detect specific areas (mainly by the scikit-learn package)
- Reformatting (e.g. from jp2 to geotiff), reprojecting (e.g. from EPSG:4326 to a UTM zone), and regridding of raster data files

Publications (selected)

Journal/conference articles

- Nikfal, Amirhossein. "PostWRF: Interactive tools for the visualization of the WRF and ERA5 model outputs." Environmental Modelling & Software 160 (2023): 105591.
- Nikfal, A., Vazifedoust, M., Khosravi Tabrizi, A., Karimi, M. A., Khorani, M., Rezvani, M., and Toofaninejad, Z.: Simulation of hydrological and land surface variables over Iran – a new 24/7 operational system based on the coupled WRF-SEBAL model, EGU General Assembly 2022, Vienna, Austria, 23–27 May 2022, EGU22-8222, 2022.
- Nikfal, Amir Hosein, Ranjbar Saadat Abadi, Abbas, Rahnama, Mehdi, Tajbakhsh Mosalman, Sahar, Moradi, Mohammad. Contribution of Source Emissions in the Air Pollution Modeling - a WRF/Chem Case Study. Journal of the earth and space physics, doi: 10.22059/jesphys.2021.299733.1007204
- Nikfal, A., Ranjbar SaadatAbadi, A., Tajbakhsh, S. and Moradi, M., 2021. Correction and assessment of dust sources in WRF/Chem„ caused by wind erosion, over West Asia. Iranian Journal of Geophysics
- Broomandi, P., Tleuken, A., Zhaxylykov, S. et al. Assessment of potential benefits of traffic and urban mobility reductions during COVID-19 lockdowns: dose-response calculations for material corrosions on built cultural heritage. Environ Sci Pollut Res (2021). https://doi.org/10.1007/s11356-021-16078-5
- Nikfal, A., Ranjbar SaadatAbadi, A., Rahnama, M., Tajbakhsh, S. and Moradi, M., 2020. Evaluation of the WRF/Chem aerosol models-a dust episode case study. Iranian Journal of Geophysics
- A Foroushani M, Opp C, Groll M, Nikfal A. Evaluation of WRF-Chem Predictions for Dust Deposition in Southwestern Iran. Atmosphere. 2020 Jul;11(7):757.
- Broomandi, P., Karaca, F., Nikfal, A., Jahanbakhshi, A., Tamjidi, M. and Kim, J.R., 2020. Impact of COVID-19 event on the air quality in Iran. Aerosol and Air Quality Research
- Nikfal, A; Ranjbar, A; Rahnama, M; Tajbakhsh, S; Moradi, M; Intercomparison of some dust models over West Asia, 2019. Central Asian dust conference, 2019, Dushanbe, Tajikistan
- Nikfal, A.; Sehatkashani, S.; A., Ranjbar; E., Fattahi; Numerical modeling of potential evapotranspiration using WRF regional model – Urmia Lake basin case study, 2018. Journal of Water and soil, University of Tehran, Tehran, Iran (In Persian)
- Nikfal, A., Ranjbar, A., Sehatkashani, S., Investigation of the dust schemes of the model WRF/Chem. 2018. Journal of Air Pollution and Health, University of Medical Sciences, Tehran, Iran
- Nikfal, A., Ranjbar, A., Karami, S., Sehatkashani, S., The capabilities of the model WRF/Chem in dust simulation - A dust storm case study in Tehran/Iran. Journal of environmental science, 2017. Shahid Beheshti University, Tehran, Iran (In Persian)
- Maleki, H., Sorooshian, A., Goudarzi*, G, Nikfal, A., Baneshi, M., Temporal profile of PM10 and associated health effects in one of the most polluted cities of the world (Ahvaz, Iran) between 2009 and 2014. Aeolian Research.