Prajeesh Ag

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Experience

Climate Change Center, KAUST, Research Specialist — Jeddah, KSA
Jan. 2023 to present

- Developed a regional coupled climate model tailored for sub-seasonal to seasonal scale forecasting across the Arabian Peninsula region. Integrated WRF and MITgcm through ESMF coupler, optimizing performance and accuracy
- Crafted a Command-Line Interface (CLI) preprocessing utility in Python, streamlining data generation, manipulation and visualization for the coupled model, enhancing efficiency and ease of use
- Orchestrated a fault-tolerant automated workflow, leveraging the Cylc workflow engine to manage a 50-member ensemble system for seasonal prediction over the Arabian Peninsula

Indian Institute of Tropical Meteorology, Scientist-D — Pune, India
Jan. 2020 to Dec. 2022

- Pioneered a novel spectral dynamical core for the atmospheric model of IITM-ESM, enabling 2D domain decomposition in both spectral and grid point domains using FFTW library. This innovation vastly improved scalability and throughput.
- Engineered a high-resolution (6km) global forecast model (HGFM) for Short Range Forecasting by implementing a novel TCO grid in the GFS model, enhancing prediction accuracy and resolution.
- Implemented MPI parallelization in the Ocean Dynamics Thermodynamic Model (ODTM), boosting model throughput by up to 30 times, thus accelerating simulations and analysis.
- Investigated Monsoon, IOD, and ENSO phenomena, employing CMIP6 data to elucidate interactions and feedback mechanisms, with publications in peer-reviewed journals
- Directed a team of 3-4 scientists in developing and enhancing IITM-ESM, overseeing project milestones and ensuring alignment with research objectives.

Indian Institute of Tropical Meteorology, Scientist-C — Pune, India
Jan. 2016 to Dec. 2019

- Managed and oversaw the CMIP6 experiments conducted with IITM-ESM.
- Orchestrated production workflows essential for CMIP6 simulations of IITM-ESM on High-Performance Computing (HPC) systems
- Architected an intuitive and modular I/O manager for IITM-ESM, harnessing modern Fortran's Object-Oriented Programming (OOP) capabilities alongside NetCDF4, facilitating data handling and interoperability.
- Spearheaded the implementation of a fractional grid for surface flux computation, resolving flux-transfer inconsistencies over sea-ice and land-ocean boundaries. This significantly improved the sea-ice simulations (Swapna et al., 2018).
- Developed post-processing software in Python, C, and Fortran, leveraging NetCDF4 and GRIB libraries to streamline data analysis and visualization workflows.
- Conducted climate change analysis, contributing to understanding of anthropogenic influences on climate dynamics

Indian Institute of Tropical Meteorology, Scientist-B — Pune, India
Jan. 2013 to Dec. 2015

- Engineered concurrent coupling using FMS coupler to enhance the throughput of the IITM-ESM model, optimizing resource utilization and computational efficiency.
- Identified and resolved memory leak issues in the IITM-ESM using Valgrind, ensur-

ing model stability and reliability.

- Conducted comprehensive performance analysis of IITM-ESM using Allinea MAP, pinpointing and addressing bottlenecks to optimize overall performance and efficiency.

Education

PhD — Apr. 2018 to Mar. 2024

University of Pune, Atmospheric Science

- **Thesis:** Indian Ocean Dipole variations in a warming climate and associated linkages to monsoon and marine primary productivity (pdf)
- **Course work**: Earth System Sciences and Climate, Physics & Chemistry of Atmosphere, Weather, Climate & General Circulation, Geophysical Fluid Dynamics, Statistical Methods, Large scale Air-sea Interaction, Observational Techniques
- Used advanced statistical techniques such as cross-correlations, principal component analysis, significance tests and anomaly composites

MSc — May 2008 to Apr. 2010

Cochin University of Science and Technology, Physical Oceanography

- **Main Subjects**: Physical Oceanography, Ocean Observation, Coastal and Estuarine Oceanography, Computer Programming, Ocean Modelling, Ocean Engineering
- **Marks**: 7.84/10 (Transcript)

Additional Experience And Awards

Instructor (2015 - 2022): Taught Computer Application for Climate Science course.

Web Development: Developed a football tournament web application using Django web framework with the facility of team and player registration, player transfer, match scheduler, on-ground score and match details entering, player and team statistics, and dynamic standings table

JRF-Fellowship, UGC-CSIR: Awarded JRF Fellowship from UGC-CSIR

Skills

Languages: Fortran (proficient), Python (proficient), Bash (proficient), C (Familiar), JavaScript (Prior Experience)

Data Formats: NetCDF4, GRIB1/2, JSON, XML, Binary, ASCII, YAML

High performance computing: Parallel Programming (MPI, OpenMP), Job Schedulers (Slurm, PBS, LSF)

Data processing and Visualization: CDO, NCO, Matplotlib, Cartopy, Xarray, Numpy, Pandas, Iris.cube, NCL

Software Libraries and Tools: Linux OS, Git, GitHub, Cylc Workflow Engine, Debuggers and Profilers, Earth System Modeling Framework, Flexible Modeling System, FFTW

Publications

For a list of my academic publications, please visit my Google Scholar profile