Satellite Data Assimilation
or Aerosol Data Assimilation Researcher
Research Scientist I, II or Research Associate III

Description of Work Unit
The Cooperative Institute for Research in the Atmosphere (CIRA) at Colorado State University seeks to fill up to two professional scientific research positions designed to conduct collaborative research with the National Oceanic and Atmospheric Administration (NOAA) Global Systems Laboratory (GSL) Data Assimilation Branch (DAB) in Boulder, CO. The office for this position will be in Boulder, CO at a federal facility and requires the ability to pass a National Agency Check with Inquiries (NACI, federal background check) for building access. An onsite presence at the laboratory in Boulder, CO, with an option for part-time telework, is desired for this position, but remote work will be considered.

The Cooperative Institute for Research in the Atmosphere (CIRA) at Colorado State University (CSU) is a multi-million-dollar research organization headquartered on CSU’s Foothills Campus in Fort Collins, Colorado. CIRA is a cooperative institute that is also a research department within CSU’s College of Engineering, in partnership with the Department of Atmospheric Science. Its vision is to conduct interdisciplinary research in the atmospheric sciences by entraining skills beyond the meteorological disciplines, exploiting advances in engineering and computer science, facilitating transitional activity between pure and applied research, leveraging both national and international resources and partnerships, and assisting NOAA, Colorado State University, the State of Colorado, and the nation through the application of our research to areas of societal benefit.

NOAA’s GSL is a federal science and research laboratory under NOAA’s Office of Oceanic and Atmospheric Research. GSL provides the National Weather Service (NWS) and the nation with environmental observing, prediction, computer, visualization, and information systems. These systems deliver data, forecasts, and predictions of weather, including severe weather events, within the next few minutes to weeks away. GSL is a leader in the applied research, directed development, and technology transfer of environmental data, models, products, and services that enhance environmental understanding with the outcome of supporting commerce, protecting life and property, and promoting a scientifically literate public.

Position Summary
This position will develop, refine, and assess tools to ingest meteorological and aerosol-indicating observational datasets, including meteorological satellite data, satellite aerosol optical depth measurements, and in-situ fine particulate matter detections, into high-resolution numerical weather prediction models that simulate thunderstorm-scale meteorology as well as dust and
wildfire smoke concentrations. Along with refining data assimilation systems, the researcher will assess observation/assimilation impacts through testing in experimental configurations of the Rapid Refresh Forecast System (RRFS), NOAA’s regional component of Unified Forecast System (UFS). The effort will include testing and evaluation with the FV3-LAM (limited area model), the Gridpoint Statistical Interpolation (GSI) data assimilation system, and the Joint Effort for Data assimilation Integration (JEDI) data assimilation system. This work will be conducted in close collaboration with other scientists in GSL as well as the broader operational modeling community. They will work as part of a team in testing and refining algorithms for real-time, operational use. This position will report to the Applied Mathematical Development Scholar for Model Evaluation & Data Impact Assessment.

This position will be classified Research Associate III or Research Scientist I or II according to the credentials of the finalist selected for hire as follows:

For position title Research Associate III
M.S. in atmospheric sciences, mathematics, or a related field AND two (2) years experience

For position title Research Scientist I
Ph.D in atmospheric sciences, mathematics, or a related field

For position title Research Scientist II
Ph.D in atmospheric sciences, mathematics, or a related field AND three (3) years post doctoral experience or equivalent

**Decision Making**

**RA III**
Decision making depends on the analysis of the user requirements, forecast system constraints, or technical issues involved with each data assimilation activity; the chosen implementation approach may need to be selected from many alternatives. This position normally receives little instruction in day-to-day work and receives general guidance on the overall data assimilation work conducted. The individual will set priorities that accurately reflect the relative importance of particular data assimilation and other work activities as well as established software release deadlines.

**RS I**
The individual in this position executes a plan of research that resonates with the underpinning science objectives of the supporting projects. The decision he/she makes and the approaches he/she takes are determined by the individual’s own scientific acumen and in consultation with the Principal Investigator. Successful execution of the proposed research, i.e. supporting the
deliverables mentioned in the project’s statement of work, hinges on the definition of a scientifically-sound plan and its execution. Ultimately this decision-making process lays a foundation that is critical for success in future proposals and builds an independent and self-sufficient research program. Similarly, the individual in this position conducts his/her research with an eye toward establishing strong partnerships with both CIRA research staff and sponsors.

RS II
As a self-sufficient researcher, the individual in this position will actively pursue sponsored research, recognize the needs of calls for proposals, organize staff into teams to pursue research, and coordinate/execute research plans to a fruitful end. They will control their research and decide how to conduct it, and their success in doing so will determine not only the fate of their managed projects, but also the bottom-line productivity and health of CIRA. Specifically, the individual in this position will define the scope of the work and sign off on all aspects of corresponding proposals, from travel to purchasing to staffing changes. They will be accountable for the successful execution and delivery of the work proposed, including all science and deliverables mentioned in the statements of work associated with every proposal. Key decisions will include scientifically-sound approaches. The success of this process will lay the foundation for success in future research.

Essential Duties
Data Assimilation (90%)
- Develop, test, and refine data assimilation techniques for aerosol-indicating and satellite observations within the RRFS analysis and forecast system
- Plan and conduct tests to evaluate observation impact on analyses and forecasts
- Install refinements in the RRFS JEDI data assimilation capability and commit code to community repositories
- Participate in group discussions and activities associated with development and enhancement of regional forecast systems

Documentation and Reporting (10%)
- Summarize research results for sponsors and broader scientific community
- Prepare manuscripts for publication
Required Job Qualifications

Research Associate III
- M.S. in atmospheric sciences, mathematics, or a related field, AND
- Two (2) years of relevant work experience.

Research Scientist I
- Ph.D. in atmospheric sciences, mathematics, or a related field.

Research Scientist II
- Ph.D. in atmospheric sciences, mathematics, or a related field, AND
- Three (3) years post-doctoral experience, or equivalent

Required for all classifications.
- Experience with variational and/or ensemble-based data assimilation systems (GSI, JEDI, or other)
- Experience with running, testing and evaluation of numerical atmospheric forecast systems (FV3, ARW, MPAS, or other)
- The office for this position will be in Boulder, CO at a federal facility and requires the ability to pass a National Agency Check with Inquiries (NACI, federal background check) for building access.

Preferred Job Qualifications
- Understanding of statistical principles underlying meteorological data assimilation and assessment
- Experience with the JEDI data assimilation system
- Experience with the GSI data assimilation system
- Experience with the FV3 numerical model system
- Experience with chemical data assimilation
- Experience with satellite data assimilation
- Familiarity with mesoscale meteorology
- Familiarity with atmospheric chemistry, including atmospheric chemistry modeling
- Knowledge of Fortran 90 and/or C++, including debugging and optimizing code
- Experience with version control systems for collaborative code development
- Proficiency in UNIX-based scripting languages
- Experience with workflow management systems
- High-performance computing (HPC) experience
To ensure full consideration applications should be submitted by 11.59pm MT Monday, December 4, 2023.

Apply electronically by clicking “Apply to this Job” at the following website: https://jobs.colostate.edu/postings/135596. References will not be contacted without prior notification of candidates. In your cover letter, please specifically address the required and preferred qualifications of this position. A cover letter that fails to address the required and preferred qualifications of this position may not be considered further after review by the search committee. CSU is an EO/EA/AA employer and conducts background checks on all final candidates.