The Cooperative Institute for Research in the Atmosphere (CIRA) at Colorado State University seeks to fill a professional scientific research position designed to conduct collaborative research with the National Oceanic and Atmospheric Administration (NOAA) located at the Global Systems Lab (GSL, formerly Global Systems Division of ESRL), Assimilation Branch in Boulder, CO. The office for this position will be in Boulder, CO at a federal facility and requires the ability to pass a Tier One federal background check for building access.

**Description of Work Unit**

The position will be with the Cooperative Institute for Research in the Atmosphere (CIRA) at Colorado State University (CSU) working in conjunction with and located at NOAA's Global Systems Laboratory (GSL), a federal science and research laboratory under NOAA’s Office of Oceanic and Atmospheric Research, located in Boulder, Colorado. CIRA is a multi-million dollar research organization located 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 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. The Global Systems Lab (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 is a two-year position with the possibility of extension contingent upon funding and performance. The individual in this position will report to the Sr Project Manager and work in collaboration with other mathematic model developers in GSL, as well as the broader community, testing and refining mathematical algorithms for assimilation of observations and data impact assessments. The Assimilation Branch conducts innovative research on use of conventional and novel observations for initialization of atmospheric and coupled earth systems models.

This position will develop mathematical techniques and computer software systems to improve use of satellite-based fire detection and aerosol optical depth products, indicating the onset of wildfires, their emissions and local conditions in areas surrounding wildfires. Aerosols and particulates produced by a wildfire also exert feedback effects on the surrounding weather, and this position will improve modeling of this influence. To improve the accuracy of a high-resolution convection allowing model (CAM), they will implement an assimilation procedure to improve initial distributions of aerosol tracers that influence wildfire-weather feedback. They will assimilate satellite-based aerosol optical depth (AOD) to improve modeling of interactions of aerosol tracers with radiation and microphysics, which should yield improved forecasts of temperature, winds, and moisture. NOAA’s Finite Volume-3 (FV3)-based Unified Forecast System (UFS) is the modeling
system that will be used, along with the Gridpoint Statistical Interpolation (GSI) analysis package, transitioning to the Joint Effort for Data assimilation Integration (JEDI) software. They will work within a data assimilation team, with additional work on complementary projects.

The position title of Research Scientist I will apply to the finalist with a PhD and limited (less than 3 years) research experience. Position title of Research Scientist II will apply to the finalist who possesses a PhD plus more than 3 years of experience testing and evaluating data assimilation systems.

Decision Making Statement
The individual in this position will execute a plan of research that will resonate with the mathematical objectives of the supporting projects. The decision he/she will make and the approaches she/he will take will be determined by the individual’s own mathematical 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, will hinge upon the definition of a sound plan and its execution. Ultimately this decision-making process will lay a foundation that will be critical for success in future proposals and build an independent and self-sufficient mathematically-oriented research program. Similarly, the individual in this position will conduct his/her research with an eye toward establishing strong partnerships with research staff and sponsors.

Essential Job Duties

Collaborative Research and Development – Wildfire Aerosol Tracers and Feedback 50%
- Increase realism of aerosol distribution in the CAM by including dust sources, sea-salt sources, and anthropogenic emissions to complete replacement of current aerosol climatology.
- Add satellite AOD products, including a smoke mask, into the CAM;
- Calibrate the CAM to ensure consistency of the daily averaged fire radiative power data with the model grid resolution;
- Evaluate the feedback effect of aerosols on radiation and microphysics for weather forecasts, biomass burning emissions, surface and upper-air temperature forecasts.
- Participate in group decisions about forecast skill in numerical prediction systems within the FV3-UFS.

Collaborative Research and Development –Data Assimilation for Other Aspects of Weather 40%
- Implement and test mesoscale data assimilation components of the FV3-UFS.
- Test strategies for filtering noise caused by more frequent state updates (4DIAU, digital filters).
- Evaluate impacts of high-temporal frequency observations (e.g., geostationary radiances, atmospheric motion vectors, tropical cyclone observations) on model forecasts.
- Improve forward operators to yield more accurate model initial conditions.
- Participate in group discussions and activities associated with data assimilation and numerical weather prediction systems.

Documentation and Reporting 10%
- Prepare software documentation in collaboration with other team members.
- Summarize research results for sponsors and broader modeling community;
- Prepare manuscripts for publication, based on these research results.

Required Qualifications
Please address the required qualifications in the cover letter.
- Ability to pass a National Agency Check with Inquiries (NACI, Tier 1 federal background check) because the position is located inside a federal building;
- Must be legally authorized to work in the United States by the proposed start date of May 1, 2020;
- Ph.D. in mathematics, atmospheric sciences, meteorology, or a related field;
- At least 3 years research experience for Research Scientist II or
- Less than 3 years research experience for Research Scientist I;
● Experience testing and evaluating data assimilation and/or numerical forecast systems;
● Experience working with variational and/or ensemble-based data assimilation systems;
● Proficiency in UNIX-based scripting languages and workflow management systems;
● Ability to communicate effectively (verbal and written) and work effectively in a team environment.

Preferred Qualifications
Please highlight the preferred qualifications in the cover letter.
● Experience using GSI data assimilation system;
● Experience using FV3 numerical model system;
● Experience using JEDI data assimilation system;
● Knowledge of satellite observations, including aerosol and fire indicator products;
● Understanding of statistical principles underlying data assimilation and assessment;
● Knowledge of Fortran and Fortran 90 including debugging and optimizing code;
● Experience maintaining robust community code in a real-time environment;
● Experience performing high-performance computing (HPC)

Background Check:
Colorado State University is committed to providing a safe and productive learning and living community. To achieve that goal, we conduct background investigations for all final candidates being considered for employment. Background checks may include, but are not limited to, criminal history, national sex offender search, and motor vehicle history. In addition, the final candidate will be required to pass a NACI Tier 1 federal background check because the job is inside a federal building.

Commitment to Diversity and Inclusion:
Reflecting departmental and institutional values, candidates are expected to have the ability to advance the Department's commitment to diversity and inclusion.

Application Deadline: To ensure full consideration applications should be submitted by 11:59PM on April 19, 2020. Apply electronically by clicking “Apply to this Job” at the following website: https://jobs.colostate.edu/postings/75751. References will not be contacted without prior notification of candidates. Please be sure to address the required and preferred qualifications in the cover letter. A cover letter that fails to address the required and preferred qualifications of this position may not be further considered after review by the search committee.

EEO Statement Colorado State University is committed to providing an environment that is free from discrimination and harassment based on race, age, creed, color, religion, national origin or ancestry, sex, gender, disability, veteran status, genetic information, sexual orientation, gender identity or expression, or pregnancy and will not discharge or in any other manner discriminate against employees or applicants because they have inquired about, discussed, or disclosed their own pay or the pay of another employee or applicant. Colorado State University is an equal opportunity/equal access/affirmative action employer fully committed to achieving a diverse workforce and complies with all Federal and Colorado State laws, regulations, and executive orders regarding non-discrimination and affirmative action. The Office of Equal Opportunity is located in 101 Student Services. The Acting Title IX Coordinator is the Assistant Vice President for Student Affairs, 201 Administration Building, Fort Collins, CO. 80523-8004, (970) 491-5312.

The Section 504 and ADA Coordinator is the Associate Vice President for Human Capital, Office of Equal Opportunity, 101 Student Services Building, Fort Collins, CO 80523-0160, (970) 491-5836.