



DEPARTMENT OF THE ARMY
FORT WORTH DISTRICT, CORPS OF ENGINEERS
P. O. BOX 17300
FORT WORTH, TEXAS 76102-0300

26 JUL 2018

REQUEST FOR STATEMENTS OF INTEREST

NUMBER W9126G-18-2-SOI-4438

PROJECT TO BE INITIATED IN 2018

Project Title: Probabilistic prediction utilizing alternatives to ensemble forecast modeling such as the Analog Ensemble technique

Responses to this Request for Statements of Interest will be used to identify potential investigators for a project to be funded by U.S. Army Corps of Engineers, Geospatial Research Laboratory which provides professional and technical support for its project Computationally Efficient Uncertainty Assessment for Environmental Parameters in order to facilitate successful implementation of basic research. Approximately \$34K is expected to be available to support this project. Additional funding in the amount of approximately \$8K will be available for each of the 4 option periods subject to availability of funds.

Background:

The Engineer Research and Development Center (ERDC) has a strong and robust basic research program. The Computationally Efficient Uncertainty Assessment for Environmental Parameters basic research project is currently funded by the ERDC basic research program. This fundamental research effort seeks to develop probabilistic predictions by experimenting with and developing new key theory related to the Analog Ensemble (AnEn) technique. The original AnEn technique was developed to generate a probability distribution function (PDF) of an expected outcome by utilizing a current deterministic forecast and corresponding sets of historical deterministic forecasts and verifying observations (Delle Monache et al., 2013). However, the AnEn has been developed, tested, and validated only for single point locations or by treating a grid as single point locations (Delle Monache et al., 2013; Sperati et al., 2017). The primary objective of this research is to enrich the understanding of the point based AnEn and formulate new theory necessary in order to develop a spatially aware AnEn technique. The goal is to generate forecast field predictions with an inherent assessment of uncertainty and to estimate the computational acceleration of the AnEn with respect to traditional ensemble

forecast methods. This CESU solicits proposals able to support these primary objectives in a cooperative agreement with the federal partner. This CESU seeks proposals from individuals with extensive experience in the AnEn technique and its implementation, geospatial analytics, geoinformatics, probabilistic forecasting, high performance computing, machine learning, and atmospheric science.

References:

Delle Monache, Luca, F. Anthony Eckel, Daran L. Rife, Badrinath Nagarajan, and Keith Searight. "Probabilistic weather prediction with an analog ensemble." *Monthly Weather Review* 141, no. 10 (2013): 3498-3516.

Sperati, Simone, Stefano Alessandrini, and Luca Delle Monache. "An application of the ECMWF Ensemble Prediction System for short-term solar power forecasting." *Solar Energy* 133 (2016): 437-450.

Type of Award:

In accordance with section 6305 – *Using cooperative agreements of the Federal Grant and Cooperative Agreements Act of 1977* (31 U.S.C. § 6301 et seq.), all CESU projects must carry out a public purpose of support or stimulation, instead of acquiring goods or services for the exclusive direct benefit of the United States Government.

In accordance with section 6305 – *Using cooperative agreements of the Federal Grant and Cooperative Agreements Act of 1977* (31 U.S.C. § 6301 et seq.), substantial involvement is expected between the federal partner and the nonfederal partner when carrying out the activities specified in the project agreement. The exact nature of the government’s involvement will be defined in the statement of objectives, issued with a request for full proposal.

As a result, it is anticipated that a cooperative agreement through the CESU program will be awarded. Such awards may be administered through a CESU only upon mutual agreement and official authorization by both parties of the acceptance of the application of the CESU Network IDC rate (17.5%).

Note: Must be a non-federal partner in the CESU Unit to be qualified to be considered.

Brief Description of Anticipated Work:

This research focuses on the following objectives:

- 1) Objective 1: Cooperative research and development towards the implementation of a spatially aware version of the AnEn technique.
- 2) Objective 2: Characterizing the performance of the following with respect to computational complexity, efficiency, and accuracy: a) the original Delle Monache et al., 2013, b) the AnEn technique using an extended search space currently under investigation by the federal government lead, and c) a spatially aware version of the AnEn technique that the federal government lead is investigating as a part of the basic research program objectives.
- 3) Objective 3: a) Incorporate the ability to determine static optimal predictor weighting as defined in Junk et al. (2015). b) In cooperation, and to the extent possible given that Objective 1 and 2 are the priority, experiment with additional means of determining optimal predictor weighting that have not been documented in the body of AnEn literature.
- 4) Objective 4: The university and government lead will work towards a publication related to the cooperative research developed as a part of this CESU.

Period of Performance. The base period of agreement will extend 12 months from award. Four option periods 12 months each are anticipated pending availability of funds.

Materials Requested for Statement of Interest/Qualifications:

Please provide the following via e-mail attachment to: Sandra.Justman@usace.army.mil
zia.burns@usace.army.mil (Maximum length: 2 pages, single-spaced 12 pt. font).

1. Name, Organization, Cage Code, Duns number, and Contact Information
2. Brief Statement of Qualifications (including):
 - a. Biographical Sketch,
 - b. Relevant past projects and clients with brief descriptions of these projects,
 - c. Staff, faculty or students available to work on this project and their areas of expertise,
 - d. Any brief description of capabilities to successfully complete the project you may wish to add (e.g. equipment, laboratory facilities, greenhouse facilities, field facilities, etc.).

Note: A full study proposal and proposed budget are NOT requested at this time.

Review of Statements Received: All statements of interest received will be evaluated by a board comprised of one or more people at the receiving installation or activity, who will determine which statement(s) best meet the program objectives. Based on a review of the Statements of Interest received, an investigator or investigators will be invited to prepare a full study proposal. Statements will be evaluated based on the investigator's specific

experience and capabilities in areas related to the study requirements.

Please send responses or direct questions to:

USACE

Sandy Justman

CESWF-CT

Email: Sandra.Justman@usace.army.mil

Office: 817-886-1073

Timeline for Review of Statements of Interest: The RSOI are required to be out for a minimum of 10 working days. Review of Statements of Interest will begin **10 August 2018**.