Colorado State University
Center for Geosciences/Atmospheric Research (CG/AR)
Quarterly Report No. 4
by T.H. Vonder Haar and Collaborators

Reporting period: July 1 – September 30, 2013
Cooperative Agreement #W911NF-12-2-0066

Overview

Colorado State University was awarded a new Cooperative Agreement with the Army Research Laboratory concerning the Department of Defense Center for Geosciences/Atmospheric Research (CG/AR), which became effective September 20, 2012.

Four Initial Research Task Options for the new Cooperative Agreement, as developed by Center leadership and the DoD Review Panel, in response to the DoD environmental research needs as coordinated by ARL and in consideration of CSU capabilities.

Task 1: Coordination and Staff Rotation with ARL Scientists to Improve Core Capabilities of ARL

Task 2: System Improvements to the AFWA Cloud Advection Process

Task 3: Creation of an AFWA Probability of Cloud Free Line of Sight (PCFLOS) WRF Post-Processing System

Task 4: Soldier Health and Aerosol Source Trajectories

Task 5: Army DMSP Follow-on Soil Moisture Project - This task established with the addition of funds via modification of the Cooperative Agreement

Additional research topics are periodically explored with our DoD colleagues as potential needs arise and funding opportunities are identified.

The University has provided some cost-share funding both to support tasks as needed and also to allow cooperative study of other environmental issues important to the DoD.

The following report will provide details of each of the ongoing tasks as well as the cooperative study of some new issues.
Tom Vonder Haar with Gorden Videen, Pamela Clark, James Cogan and others at ARL/Adelphi

Sonia Kreidenweis with Tom DeFelice and Alan Wetmore (ARL)

Tom Vonder Haar with Gorden Videen, Pamela Clark (ARL)

Tom Vonder Haar and Loretta Wilson with Dr. James Cogan (ARL)

Andrew Jones with Dr. Jeffrey Cetola (AFWA) and others

Andrew Jones with Gary McWilliams and others

Tom Vonder Haar with Jeff Cetola and others at AFWA

Tom Vonder Haar, Vince Larson, Russ Schumacher, John Forsythe, Andy Jones, Don Reinke, Jeff Niemann, Steve Miller, Phil Partain, John Haynes, Lauren Potter and Sam Atwood with James Cogan and Bob Dumais (ARL)

Tom Vonder Haar, Andrew Jones, Vince Larson and others with Jeff Cetola and Steve Rugg (AFWA) and John Eylander (ERDC/CRREL)
Task 1: Coordination and Staff Rotation with ARL Scientists to Improve Core Capabilities of ARL (Research Theme: Coordination and Staff Rotation)

Administrative

Nothing to report for this period.

Research activity and/or results

Dr. James Cogan participated by telecon in the August 29 CG/AR meeting with Dr. Jeff Cetola (AFWA), Mr. Steve Rugg (AFWA), and Mr. John Eylander (ERDC/CRREL) at CIRA, Fort Collins.

Travel

Prof. Thomas Vonder Haar traveled September 14-21 to Vienna, Austria to participate in the joint EUMETSAT and AMS Satellite Meteorology conferences and co-present research results. (Approximately 50% of the travel costs were supported by CG/AR including prior airfare credit from a cancelled trip to Adelphi, MD under the previous CA.)

Equipment/systems status

No report this period.
Task 2: System Improvements to the AFWA Cloud Advection Process (Research Theme: Clouds, Icing, and Aerosols Effects)

Task 3: Creation of an AFWA Probability of Cloud Free Line of Sight (PCFLOS) WRF Post-Processing System (Research Theme: Clouds, Icing, and Aerosols Effects)

Administrative

An Interim Summary Technical Progress Report, prepared for the sponsors of these research tasks in April, was designated as a CG/AR Technical Report under CIRA’s ISSN number and distributed.

Research activity and/or results

Dr. Jones coordinated a series of meetings and telecons with AFWA to continue the necessary technical background discussions related to formation of the technical roadmap for the ADVCLD and PCFLOS activities. In addition, CG/AR management discussions were held. AFWA and ERDC/CRREL management came for an on-site visit and discussions on August 14, and September 12.

A CG/AR management update meeting was held on August 29. Most management discussions occurred at the intensive on-site visit to CSU on August 14 by Dr. Jeff Cetola (AFWA), Mr. Steve Rugg (AFWA), and Mr. John Eylander (ERDC/CRREL).

Specific tasks accomplished in this period include:

1) Dr. Larson started a second series of end-to-end tests for the PCFLOS codes, focusing on the 3D attributes, and use of actual WRF model output data as the PCFLOS input variables. This will complete the set of software tests that will accompany the PCFLOS software to be delivered to AFWA in the near future. We had a series of discussions of targeted end users and how this was going to be handed-off to AFWA technical staff. We anticipate that the technical hand off will occur in November 2013, with internal AFWA tests to occur after that date.

2) Dr. Jones updated his DoD HPCMP account access with the help of CSU Ventures, USAF AFWA, and CCAC helpdesk staff. This will enable future AFWA model interactions and testing which will be part of follow-on Army/USAF activities pending new funds. The accounts could also be used for initial DPEAS portability tests, assuming that the DPEAS Linux port starts to mature to that testing phase.

3) The DPEAS Linux porting efforts of Dr. Jones and Mr. Finley are progressing to where Mr. Finley has a fully testable executable, and Dr. Jones has provided test input scripts. Dr. Jones is currently starting a series of internal DPEAS tests, and will be interacting with Mr. Finley to resolve the remaining incompatibilities. Dr. Jones also synchronized with the NOAA DPEAS Linux/AIX porting efforts, and now has some synchronization capabilities between the institutions, which will enhance the final port of the DPEAS codes to the AFWA target machine architectures.
Travel

CG/AR supported travel for Dr. Vincent Larson from Milwaukee, Wisconsin to participate in the mid-course review of the CG/AR PCFLOS and ADVCLD projects on August 14.

Equipment/systems status

None this period.
Task 4: Soldier Health and Aerosol Source Trajectories *(Research Theme: Urban and Boundary Layer Environment)*

**Administrative**

Dr. Sonia Kreidenweis leads the technical activities of this task. Ms. Lauren Potter (Ph.D. candidate) joined the project at its initiation. Dr. Emily Bian began employment at CSU April 1. Her primary responsibilities are to another project and is supported by other funding, but as an expert in PMF and source apportionment, she has provided technical services to this project at small fractional time contributions.

**Research activity and/or results**

Ms. Lauren Potter conducted initial reviews of the data set and we provided a research summary to Dr. Tom DeFelice and Dr. Alan Wetmore of ARL in early July, followed by a conference call to discuss the findings and remaining questions about the data. We forwarded a second report in September and followed that with another conference call. Some issues regarding data quality remain but could not be resolved by either CSU or ARL, so it was decided to proceed with analyses keeping these limitations in mind.

Research progress was deemed good by our ARL contacts, and Ms. Potter and Dr. Bian continued to work on data analyses during this quarter, refining the initial quick-look products.

A final report will be completed in the fourth quarter to close out this project.

**Travel**

None during this period.

**Equipment/systems status**

Existing computing equipment has been used for this project thus far.
Task 5: Army DMSP Follow-on Soil Moisture Project *(Research Theme: Hydrometeorology)*

**Administrative**

Modification to the Cooperative Agreement for this new project was executed on 02 July 2013.

**Research activity and/or results**

Dr. Jones and Mr. McWilliams had technical exchange meetings on August 5 and 22.

**Travel**

Dr. Jones attended the DMSP Follow-on Soil Moisture kick-off meeting that occurred on September 25-26 at Adelphi, MD.

**Equipment/systems status**

Under this project, 2 data servers were ordered to host the soil moisture satellite and model data sets for the DoD Soil Moisture Working Group activities. Dr. Jones started the configuration process for the systems, and continues to work on their integration into the DPEAS processing network at CSU.
Other Cooperative Research

a) Estimating Precipitation from Satellites over Orographic Terrain in Remote Areas (Research Theme Area: Remote Sensing of Battlespace Parameters)

No report this period.

b) Developing Topics

Ian Wittmeyer and Tom Vonder Haar have completed a project supported by CSU cost-sharing funds to this Cooperative Agreement. It is a detailed review of current global aerosol data sets and realtime aerosol forecast products with annotated metadata and urls. This was a topic of interest at the last CG/AR Annual Program Review in Fort Collins. A presentation was given on August 14 during the mid-course review of the CG/AR PCFLOS and ADVCLD projects of particular interest to AFWA (and funded by AFWA to the Center via the DoD Cooperative Agreement). The PowerPoint file was also sent to Dr. Tom DeFelice (ARL), who expressed early interest in this topic, together with Dr. Jeff Cetola (AFWA) and is available upon request.

At the request of ARL, a draft budget and statement of work were prepared for the possible addition of a specific task involving the acoustic work of Dr. Vladimir Ostashev.

With contributions from Tom Vonder Haar, Vince Larson, Russ Schumacher and John Forsythe the white paper for the feasibility study for new technology methods and data for improved, high-resolution forecasts of winds and density was submitted to the sponsor. The submission was titled “Feasibility Study of Innovative New Methods to Improve “HIRES” Forecasting of Local Area Environmental Conditions Important to Artillery Operations.”
## Appendix 1

**CG/AR Researchers under Cooperative Agreement W911NF-12-2-0066**

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<thead>
<tr>
<th>Last Name</th>
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<th>Department</th>
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## CG/AR Graduate Students

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Appendix 2
Publications