

Strategic Education Plan for CREW

Overview

In 2005, IGES established CREW, a second center of excellence dedicated to basic research on the Earth's water cycle and how changes in this cycle impact the global environment. CREW performs "water cycle research making a difference" through a progressive path of deriving knowledge from water and energy cycle observations, transitioning this knowledge into useful prediction skill, and demonstrating these research results in real-world solutions.

Vision

It is our vision to **integrate research** across traditional disciplines in an end-to-end program **that transitions theoretical research to academic/public education** and real-world application, through partnerships with universities, government, and international agencies.

Mission

CREW's mission is to quantify and predict water cycle and environmental consequences of earth system variability and change through focused research investments in observation, modeling, and application.

Education -Service to Community

Water is essential to life and our future depends on our depth of understanding of our planet. The need for understanding the global water cycle has provided a justification for wide ranging efforts to quantify the variability of its subcomponents. Opportunities exist at CREW, and should be exploited, to transition theoretical research to academic/public education through demonstrated team work. Therefore, our educational goal is to have CREW's products be a trusted source of information, open to exploration, inquiry, and discovery, preparing the next generation.

To achieve this goal, we will:

1. Cultivate connections with COLA and George Mason University.
 - a. COLA, CREW and the GMU Climate Dynamics Department work in partnership as centers of excellence: educational excellence in a state university and research excellence in two dedicated research centers in order to train the next generation of scientists in climate dynamics with emphasis on the interactions among the elements of the Earth system.
2. Engage our broad base of partners within the scientific and educational community
 - a. Attract both physically and virtually visiting scientists, summer interns, application specialists, students and educators to CREW on an ongoing basis and participate in outside activities that align with our goal.
3. Include Education elements in funding opportunities when applicable
4. Create a web presence that addresses the needs of K-12, university, and professionals
5. Use cutting-edge technology to develop solutions to water problems faced by society.

Current Educational activities in place include:

- COLA, CREW and the GMU Climate Dynamics Department

Dr. Houser, CREW Director, is an Associate Professor at George Mason University, Climate Dynamics Department, College of Science specializing in global water cycle and hydrology.

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Students in the program have office space at CREW and interact with CREW and COLA scientists on a daily basis, participating in CREW research while pursuing graduate studies through George Mason University.

- **NDIC**

The NASA Energy and Water Cycle Study (NEWS) promotes the full and open sharing of all data with the research and applications communities, private industry, academia, and the general public.

The NEWS Data Integration Center (NDIC), will serve the overall NEWS team and its partners by compiling, integrating, diagnosing and disseminating water and related energy cycle observations and predictions that are required to pursue the NEWS challenge. Data integration is multifaceted: and encompasses (a) spatial-temporal rectification allowing inter-comparison and quality evaluation of disparate data; (b) physical data and error constraints using four dimensional data assimilation techniques, and (c) interconnection of disparate NEWS research teams. A key NDIC task is enable the quantification of global water cycling rates, which requires global data integration for vertical water fluxes, land water storages, and lateral land water fluxes. These observations will provide the basis for the NEWS team to develop: diagnostic trend studies, transient variability and predictability; model validation; and initialization. Essentially, the NDIC will integrate and interpret past, current and future global space-based and in-situ water and energy cycle observations and model predictions to instill improved water and energy cycle understanding and information into global prediction, application, and education systems. The NDIC will primarily serve the NEWS team, but will also be open for collaboration with a large number of scientists, educators, managers, and research organizations to quantify the rate of global water and energy cycling through integration and interpretation of information on global changes in the vertical fluxes, storages, and lateral fluxes.

- **CREW's data via GDS**

The GrADS-DODS Server (GDS) technology, developed in 2000-2001 enables users to access, subset, analyze and display data, that reside on the server at any other data distribution site that has installed a DODS server, from a remote desktop client, without necessarily transporting the data sets used or having detailed knowledge of their structure or format.

- **Real Time Water Cycle data**

CREW's Real Time Water Cycle data site is a Web portal updated in near real-time that provides numerous critical global observations, analyses, and forecasts of water cycling available in an easily interpretive and highly informative graphical format. It also displays statistics regarding forecast skill as well as long-term climatological precipitation anomalies. The site benefits both educators and the general public by being highly visual with a simplistic design, but also providing

a comprehensive collection of water-cycle and climate data that can be compared and displayed in a unique and powerful fashion.

- **Water and Energy Cycle Educational Resources**

An Education component of the funded project WaterNet is being developed at CREW to identify and coordinate credible NASA, and non NASA, water and energy cycle education resources into an actionable database that can be used to communicate and connect educators, students and the general public across the nation.

The database will contain a variety of water and energy cycle related resources that pertain to land, ocean, atmosphere, applications, and NASA satellite missions, along with general water cycle information and graphics. These resources will target K-12, university, and public audiences.