

Monitoring evapotranspiration in Central Sands farms and forests

Statement of Work

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Dept of Atmospheric and Oceanic Sciences
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University of Wisconsin-Madison
July 1, 2018 – June 30, 2021

Wisconsin Potato and Vegetable Growers Association (WPVGA) Groundwater Task Force

The Desai lab has extensive expertise in application of micrometeorological measurement technology and processing algorithms to directly observe field-scale evapotranspiration (ET) and productivity using the eddy covariance (EC) technique. The Wisconsin Potato and Vegetable Association Groundwater Task Force is interested in acquiring seasonal and interannual estimates of evapotranspiration in both irrigated vegetable fields and in nearby forests. The Desai lab will deploy 2 EC flux systems in a co-located center pivot irrigated vegetable field and planted pine forest over the course of 24-36 months and deliver estimates of half-hourly, seasonal, and annual fluxes of ET and carbon fluxes.

To accomplish these tasks, we will purchase an additional eddy covariance flux system to complement an existing system in the lab. To reach forest height, we will purchase a portable trailer based 100 foot tower system and install the flux tower on that system. Additional support is budgeted to allow for reliable cellular communication, solar power, and data backup. These sites will be installed over summer 2018 based on sites selected in consultation with WPVGA. In return, fields will provide daily irrigation and water withdrawal data. Labor is budgeted for a Desai lab researcher for purchase, fabrication, and installation of these systems.

After first three months of data collection, the Desai lab will develop an online web portal to provide access to daily ET and carbon fluxes from each site in near real-time (within 24 hours of collection). A graduate student will be funded on this project and focus on running the data processing algorithm, web site development, and on providing analysis and interpretation of the observations. Additionally, the student will use these data for her own research needs and for submission of data to an online repository and in use for conference presentation and publication.

Additional funding from the state of Wisconsin Department of Natural Resources and the Desai lab funds from the UW Graduate School will be used to support funds provided in this contract to accomplish these tasks.

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Budget Justification

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We request funding of \$145,012 to support deployment and analysis of flux tower data. Of this amount, we are requesting \$69,012 from WPVGA, to be provided in installments of \$39,141 in FY18, \$14,936 in FY 19, and \$14,936 in FY 20. The remaining costs will be covered by Wisconsin DNR (\$15,000) and UW Desai lab funds and grants (\$35,000)

Personnel

Ankur Desai is Professor of Atmospheric and Oceanic Sciences will be lead PI and supervise staff and responsible for overall project. His 9-month salary is covered by UW academic appointment. Summer salary to support flux tower activities will be covered by existing related grants.

Jonathan Thom is Associate Research in Space Science and Engineering Center and will assist on purchase, fabrication and deployment of the eddy flux towers. One month of support is requested in FY18 for his salary and fringe.

A 8-months of 50% research assistant is requested (4 months in FY 19 and 4 months in FY 20), including 2 semesters tuition, to support processing of data. An additional 4 months of 50% RA support in FY18 will be supported through a contract with the WI DNR.

Equipment

We request \$30,000 to purchase a portable 100 foot flux tower trailer to deploy the tower in the pine plantation and upgrade an existing tripod to support operational deployment on an irrigated vegetable field.

A flux system for the 100ft tower will be fabricated and purchased for \$26,000 support by Desai lab existing lab funds. The second tower will incorporate equipment (valued at \$26,000) already purchased by the lab. DNR support will be used to purchase cellular data systems for each tower.

Supplies

Data storage and communication contracts will be supported through internal Desai lab funds (\$1500)

Travel

Maintenance travel to Hancock, WI or tower location is budgeted as \$1800 for 12 monthly day trips in FY18 for installation, data collection, including fleet vehicle rental, gas, meals.

Costs to attend and present at the WPVGA annual conference in Stevens Point is budget at \$500 for registration, overnight lodging, fleet vehicle, and meals.

Both travel items will be covered by Desai lab graduate school funds.

Indirect costs

As per UW agreement with WPVGA, no indirect costs are taken.