



CHARULEKA VARADHARAJAN

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Biogeochemist and environmental data scientist. She studies the water, energy and carbon linkages to understand and minimized the impacts of human activities on water resources and climate.

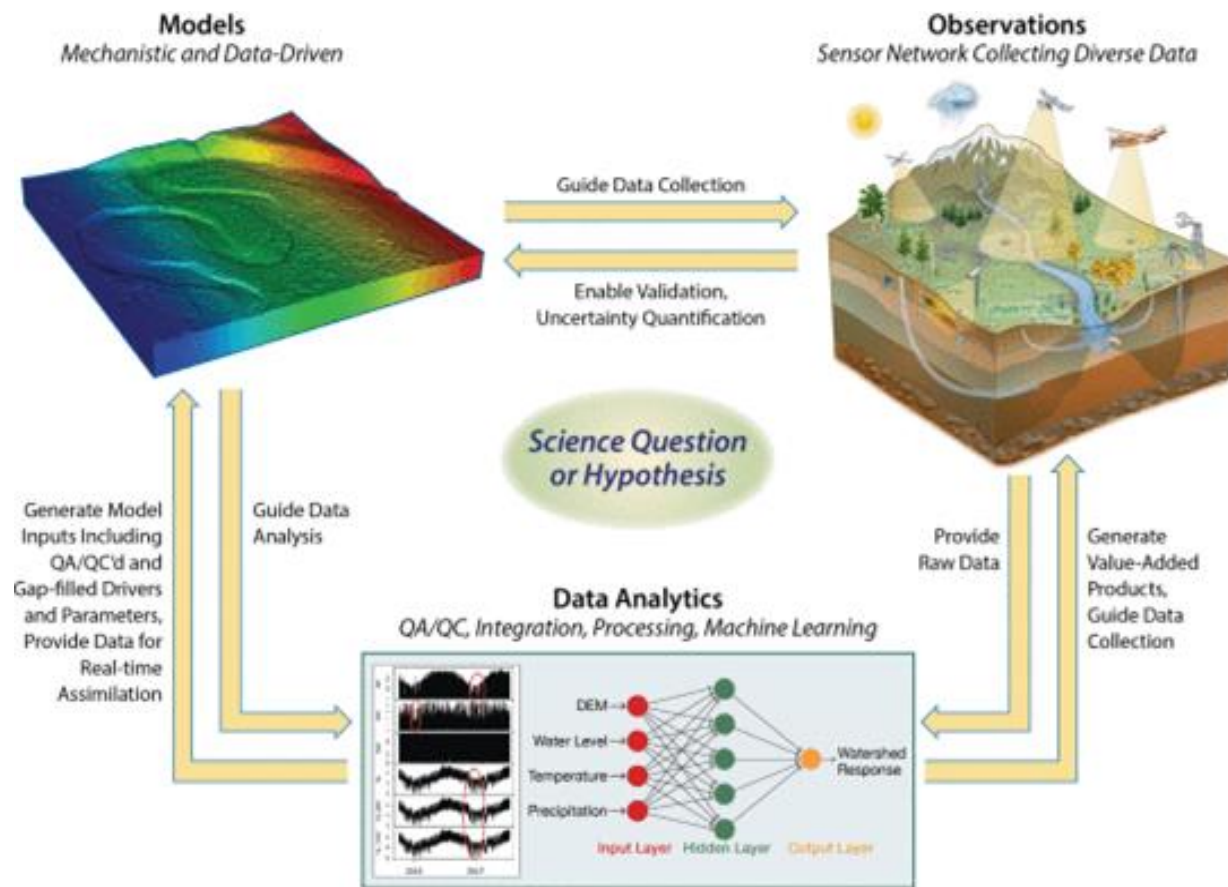
Deputy lead of the ESS-DIVE data repository, coleader of the Watershed Function Scientific Focus Area and Next Generation Ecosystem Experiments-Tropics data management teams, and senior fellow at the Berkeley Institute for Data Science.

HERSTORY

Her interdisciplinary profile is key for investigating the impacts of streamflow disturbances on water quality using a data-driven framework. Her excellence has been recognized, among others, by DOE Early Career Research Award.

DATA SCIENCE & CATCHMENT'S DYNAMICS

Data-driven frameworks integrate geological, geochemical, geophysical, hydrological, ecological, microbiological and climatic data and use advanced analytical and machine-learning techniques to predict the resistance and resilience of freshwaters to disturbances.



EBULLITION FLUXES

Methane (CH₄) ebullition is a major contributor of greenhouse gas emissions from aquatic ecosystems.

Due to its low solubility, CH₄ forms bubbles easily and accumulate until the buoyant forces outweigh the attaching ones and the bubbles are released to the atmosphere.



Michael Schwarz (2020).
Bubble trap based on Charuleka's design.

A major driver of ebullition is **small changes in hydrostatic pressure**.

Picture: Bubble trap for automatic CH₄ bubble sampling and a procedure for time series analysis of ebullition. It was designed by Charuleka Varadharajan.

RELEVANT CONTRIBUTIONS

Varadharajan, C., Han, R., Beller, H. R., Yang, L., Marcus, M. A., Michel, M., Nico, P. S. (2015). Characterization of chromium bioremediation products in flow-through column sediments using micro-X-ray fluorescence and X-ray absorption spectroscopy, *Journal of Environmental Quality*, 44, 729-738.

Varadharajan, C., Hemond, H.F. (2012). Time-series analysis of high-resolution analysis ebullition from a stratified, freshwater lake, *Journal of Geophysical Research: Biogeosciences*, 117, G02004.

Varadharajan, C., et al. (2018). Chapter 15: A review of studies examining the potential for groundwater contamination from CO₂ sequestration. In: *Geological Carbon Storage: subsurface seals and caprock integrity*, Wiley Blackwel.

Varadharajan, C. et al. (2019). Challenges in building an end-to-end system for acquisition, management, and integration of diverse data from sensor networks in watersheds: lessons from a mountainous community observatory in East River, Colorado. *IEEE Access*, 7, pp. 182796-182813.

LOOKING
FOR MORE?

You can find more information about her story and research at:

<https://eesa.lbl.gov/profiles/charuleka-varadharajan/>