



Introducing Sage: Cyberinfrastructure for Sensing at the Edge.

Scott Collis^{1,2}, Pete Beckman^{1,2}, Eugene Kelly³, Charles Catlett^{2,4}, Rajesh Sankaran^{1,2}, Ikay Altintas⁵, Jim Olds⁶, Nicola Ferrier², Seongha Park², Yongho Kim², and Michael Papka²

¹Northwestern University, Chicago, USA

²Argonne National Laboratory, Chicago USA

³Colorado State University

⁴The University of Chicago

⁵San Diego Supercomputer Center

⁶George Mason University

There are many networks of sensors for earth system science. Most networks are local or regional in scale (eg mesonets). National weather services maintain networks for meeting stakeholder needs and responsibilities to the WMO Global Observing System. These systems are comprised of single task rigid sensors generally attached to logger systems. Sage [1] is a project which will deliver a cyberinfrastructure network allowing multi-tenant, multi-tasked sensor packages. In addition to traditional meteorological instrumentation and advanced static and pan-tilt-zoom cameras Sage nodes have powerful compute infrastructure allowing machine learning based phenomenology detection at the edge. This allows science question-based reconfiguration of sensor operation. A well described Application Programming Interface (API) will allow new algorithms to be pushed to the edge and new sensor packages to be added including those that have complex configuration spaces like LIDAR and Radar. This presentation will introduce Sage and present early example results such as using cameras for cloud classification, inundation caused by heavy rainfall and early wildfire ignition detection.

[1] <https://www.research.northwestern.edu/world-watchers/>