

Dr. Joseph H. Kennedy



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publications



@jhkenney

SENIOR RESEARCH SOFTWARE ENGINEER

I am an Interdisciplinary Scientist and Software Engineer with extensive multi-institutional project leadership and management experience. I specialize in bridging the gap between scientists and software engineers, building ground-up Cloud and HPC data processing/analysis platforms for users, managing global-scale processing campaigns, working with PB-scale Big Data, and generating analysis-ready Earth Observing/Modeling data. I have expertise in open-source development, packaging, and distribution of scientific software, especially within the scientific python ecosystem.

PROJECT HIGHLIGHTS

Transform internally and externally developed science (algorithm and processing) prototypes into Cloud and HPC production services, and effectively managed \$800K (2022) to execute multiple global-scale processing campaigns.

- ◇ Executed the [ITS_LIVE](#) global glacier velocity campaign, processing ≈ 25 million scene-pairs in two months, covering every available ice-intersecting Landsat 4-9, Sentinel-2, and Sentinel-1 scene.
- ◇ Productionized the HydroSAR flood monitoring service for the Hindu Kush Himalayas (HKH) region and successfully transitioned the service to [ICIMOD](#), our local partners in Nepal.
- ◇ Transitioned the [JPL ARIA processing system](#) to an open-source, serverless framework resulting in 10x reduction in cost per product, significantly growing the ARIA-S1-GUNW archive.

Lead the ground-up redesign and development of ASF's [HyP3](#), an on-demand SAR data processing system making analysis-ready RTC and InSAR data products. *Anyone* may request HyP3 products for free. HyP3 is deployed in NASA's Earthdata Cloud environment and integrated directly into ASF's main data search portal [Vertex](#).

Developed LIVVkit, an ice-sheet model verification and validation toolkit, to provide a wide range of validation analysis covering atmosphere-ice and land-ice interactions as well as ice sheet dynamics. These analysis exercise the entire data science pipeline, from data wrangling and cleaning to reporting, and incorporate everything from point measurements (e.g., weather stations and ablation stakes) to airborne radar altimetry (e.g., NASA IceBridge) and satellite observations (e.g., RADARSAT, NASA GRACE).

PROFESSIONAL EXPERIENCE

Alaska Satellite Facility, Fairbanks, Alaska, USA
Geophysical Institute, University of Alaska Fairbanks

September 2019 – present

Engineering Supervisor

march 2023 – present

As an Engineering Supervisor, I currently manage 5 engineers across all levels and am involved in recruiting candidates across the organization. I am responsible for setting performance targets, developing and implementing strategies to achieve them, and monitoring progress to make sure that they are meeting or exceeding expectations. I communicate regularly with employees to provide feedback, guidance, and support as needed, and work to create a positive and productive work environment. I ensure that my employees are properly trained and equipped with the necessary tools to perform their jobs effectively.

Senior Research Software Engineer

July 2021 – present

As a Senior RSE, I specialize in transforming internally and externally developed science (algorithm and processing) prototypes into Cloud and HPC production services, and manage \$800K to execute multiple global-scale processing campaigns. I lead the ground-up redesign and development of ASF's [HyP3](#), an on-demand, Analysis-Ready SAR data processing system freely available to *anyone*. I Build and maintain open-source scientific tools and services to meet ASF's mission of "Making Remote-Sensing Data Accessible" including Custom HyP3 deployments for customers, STAC Catalogs, Esri Image Services, and [SAR toolboxes](#). I curate global datasets, from inception to dissemination, such as the ARIA-S1-GUNW archive and the GLO-30 HAND dataset. I also contribute to and maintain community open-source SAR processing tools, including MintPy, ISCE2, RAiDER, autoRIFT, and more.

Perform research tasks using DOE’s Earth system model E3SM and ice sheet models (e.g., MPAS-LI, BISICLES, PISM, CISM); coordinate the verification and validation of E3SM, MPAS-LI, and BISICLES simulations; development of the Land Ice Verification and Validation toolkit (LIVVkit), a python-based toolkit for robust evaluation of ice-sheet models; and develop an extended V&V evaluation tool (EVE) for statistical climate reproducibility testing of ESMs.

Postdoctoral Research Associate
January 2015 – December 2016

Perform research tasks using the Community Ice Sheet Model (CISM) and coordinate the development of the Land Ice Verification and Validation toolkit (LIVVkit) — a python-based toolkit for robust evaluation of ice-sheet models.
Advisor: Dr. Katherine J. Evans

EDUCATION	University of Alaska Fairbanks , Department of Physics, Fairbanks, Alaska, USA Ph.D., 2015 , Physics. Advisor: Dr. Erin C. Pettit Western Washington University , Department of Physics, Bellingham, Washington, USA B.S., 2008 , Physics. Minor: Astronomy	
CERTIFICATIONS	♦ Certified Scrum Product Owner® <i>Scrum Alliance</i> , 09/30/2022. Expires 9/30/2024.	
TECHNICAL SKILLS	Languages: Operating Systems: DevOps: Data formats: SAR processing: Math/Science Packages: Climate/GIS Tools: Data Science: Frameworks/Skills:	Python, Julia, R, C++, FORTRAN, Matlab, SQL, Bash, L ^A T _E X Unix/Linux (desktops to HPCs), Windows, OSX GitHub Actions, GitLab CI/CD, Docker, Git Zarr, Cloud Optimized GeoTIFFs, HDF5, NetCDF4, CF-conventions, Parquet ISCE2/3, RAiDER, MintPy, PyAPS, GAMMA, Xarray-Sentinel conda/mamba, Scikit-learn, Pandas, Xarray, Numpy, Scipy GDAL, QGIS, NCO, PyNIO/PyNGL, NCL, GMT PCA, multivariate testing, regression analysis Agile software development, test-driven development, verification and validation, unit and integration testing, continuous integration, containerization
PUBLICATION HIGHLIGHT	<i>Kennedy, J.H.</i> , A.R. Bennett, Evans, K.J., S. Price, M. Hoffman, W.H. Lipscomb, J. Fyke, L. Vargo, A. Boghozian, M. Norman, P.H. Worley. (2017). LIVVkit: An extensible, python-based, land ice verification and validation toolkit for ice sheet models. <i>Journal of Advances in Modeling Earth Systems</i> , 9(2), 854–869. DOI:10.1002/2017MS000916	
AWARDS	♦ 2016 ORNL CCSI Professional Development Award, \$100,000 ♦ 2013–2014 UAF Thesis Completion Fellowship, \$15,000 + tuition ♦ 2011–2012 NSF CASE GK-12 Fellow, \$45,000	
SYNERGISTIC ACTIVITIES	2022–present 2018 2017	Serve on the NASA’s ESDS Community Development Best Practices Working Group. Organized a minisymposium on computational methodologies for next-generation climate models at the European Seminar on Computing (ESCO) 2018 conference in Pilzen, Czech Republic. Organized an international workshop on human activity at scale in Earth system models at Oak Ridge National Laboratory.
OTHER SKILLS AND ACTIVITIES	♦ Wilderness experience including a continuous 700 mile, 33 day, canoe trip down the Yukon River ♦ Extensive boat experience: sailing, canoeing, power-boating, etc. ♦ Enjoy outdoor recreation: biking, hiking, camping, etc. ♦ Trained in bear safety	