

Andrew A. Ganse

andrew@ganse.org

<http://research.ganse.org>

<https://github.com/aganse>

Key skills summary :

- **PhD geophysics, 16 years research experience developing advanced statistical and numerical analysis algorithms.**
- **Extensive experience in underwater/seafloor acoustics, also work in electromagnetism and spacecraft gravimetry.**
- **Recent experience in the commercial data science startup arena, focusing on probabilistic classifiers.**
- **Deep expertise in nonlinear regression, inverse problems, time-series analysis, and Bayesian inference.**
- **Programming: Matlab, Python, R, Java, C, Fortran, SQL; Linux admin, distributed computing of 1TB datasets.**
- **Strong interpersonal communication skills via public speaking, technical writing, and leading small groups.**
- **Positive, enthusiastic attitude even in stressful situations, flexible when plans change, willingness to learn.**

Professional experience :

Principal Scientist & Founder, Anseres Research & Technology LLC, Kenmore, WA. *Sept 2016 – present.*

- Conduct research, consulting, and technology development in geophysical, defense, and space science applications.
- Apply expertise in inverse problems, machine learning, tracking problems, sonar and anti-submarine-warfare, ocean acoustics, geoacoustic inversion, and spacecraft gravity science to solve clients' research and development needs.
- Manage and write proposals and bids to SBIR, federal/state contracting, and subcontracting programs with our collaborating institutional partners.

Data Scientist, Spare5 (now Mighty AI), Seattle, WA. *Jan 2016 – June 2016.*

- Designed and developed machine learning algorithms for data quality assessment and user reputation evaluation, automated fraud detection, and workflow optimization on Spare5's intelligent crowdsourcing platform.
- Innovated in the use of probabilistic classifiers, expectation maximization, word2vec for new applications.
- Implemented machine learning batch training and real-time predictions in R, Python, PostgreSQL.
- Researched new methods and tools, engaged the data science and machine learning community.

Senior Research Physicist, Acoustics Department, Applied Physics Laboratory, Seattle, WA. *2013 – Nov 2015.*

- Planned research experiments, presented results at conferences, wrote proposals and reports to sponsors, interfaced with sponsors, wrote and reviewed research papers.
- Analyzed resolution of radio-science gravimetric sensing of icy moon features via proposed Europa Clipper spacecraft.
- Investigated controlled-source electromagnetic inverse problems to monitor salinity in sensitive estuarine ecologies.
- Solved nonlinear inversion and regression problems to track variations in ocean-scale salinity and sound-speed.
- Analyzed data and signal processing algorithms to identify known and unknown signals in a 1TB ocean acoustic dataset.
- Commercialized and organized technology transfer of a new APL-developed technology to a small business.

Research Physicist, Acoustics Department, Applied Physics Laboratory, Seattle, WA. *2008 - 2013.*

- Led system engineering and field testing for an experimental “towed CTD chain” cabled instrument containing 90 sensors, managed teams of 2-6 others at a time in testing and operation of the system.
- Proposed (to NASA) radio-science gravimetric sensing of Europa’s ice features in unarchived Galileo spacecraft data.
- Developed non-parametric regressions, nonlinear predictive filtering, and exploratory data analyses to tune and validate the results of oceanographic and acoustic measurements containing noise and nuisance signals.
- Presented research results at conferences, contributed to proposals and reports to sponsors.

Research Engineer, Environmental and Information Systems Department, Applied Physics Lab, *1999 - 2008.*

Selected projects included:

- Quantified uncertainty and regularization of a multi-sensor/multi-vehicle nonlinear ocean geoacoustic inversion.
- Developed Markov Chain Monte Carlo inversion of ocean acoustic data via distributed computing on a Linux cluster.
- Investigated alpha-stable (non-Gaussian) statistics in modeling of sea-surface radar backscatter.
- Managed two undergraduate student employees in scientific/statistical programming projects.

Oracle Database Programmer, Pacific Fisheries Information Network, *1998.*

Pacific States Marine Fisheries Commission, NOAA Western Regional Data Center, **Seattle, WA.**

Programmed data processing and extraction routines for a large-scale database of commercial fishing in the western U.S., on a UNIX / Oracle Server 7 platform. Provided Oracle, SQL, and UNIX expertise to two PSMFC agencies.

Additional experience :

Recurring guest lecturer for graduate-level Inverse Theory class, University of Washington, 2008 – 2015.

Wrote and taught a number of 1.5 hour lectures for graduate-level mathematical geophysics classes of about ten students. Additionally developed the seven computational geophysics lab project assignments still used in this class.

Outreach talks and activities for elementary and secondary school groups, 1999 – present.

Presented exciting science talks to school groups of 20-100 children, ages 4-18, both at UW and in classrooms.

Education :

Ph.D. Geophysics, University of Washington, Seattle, WA. 2013.

Uncertainty and Resolution in Full-Wave Continuous Geoacoustic Inverse Problems, advisor: Robert I. Odom. (Worked on PhD concurrently with full-time positions listed above; promoted immediately upon graduation.)

B.S. Electrical Engineering, University of Washington, Seattle, WA. 1994.

Signal processing, optimization, and electronic circuit design specialties. Senior projects: genetic algorithm optimization to find Barker-like radar phase codes; design of a data acquisition board for personal computer.

Recent public presentations :

Ganse, A.A., “Intelligent Crowdsourcing: Combining Machine Learning & Human Intelligence”, Data Analysis & Machine Learning Meetup Group, Seattle, 24 May 2016.

Ganse, A.A., “Using Data Science in Space”, Seattle Data Science Meetup Group, Seattle, 25 April 2016.

Ganse, A.A., “Combining Human Insights and Artificial Intelligence at Spare5”, Datapalooza, Seattle, 10-11 Feb 2016.

Ganse, A.A., “An Overview of Bayesian Parameter Estimation and Inverse Problems”, guest lecture for graduate-level mathematical geophysics class ESS-523, Dept. of Earth & Space Sciences, University of Washington, 1 June 2015.

Selected publications :

Andrew, R.K., **A.A. Ganse**, A.W. White, J.A. Mercer, M.A. Dzieciuch, P.F. Worcester, “Low-frequency Pulse Propagation over 510 km in the Philippine Sea: A Comparison of Observed and Theoretical Pulse Spreading”, *J. Acous. Soc. Am.*, 140, 1 (2016).

Szuts, Z.B., T.B. Sanford, **A.A. Ganse**, N. Lauffenburger, Continuous Monitoring of Salinity Profiles from a Seafloor Instrument, Pacific Estuarine Research Society conference poster, Mar 2015.

Vance, S., J. Roberts, and **A.A. Ganse**. "Inverse Theory for Planning Gravity Investigations of Icy Moons." Abstract 2751, presented at the *46th Lunar and Planetary Science Conference*, The Woodlands, TX. (2015).

Ganse A.A., S. Vance, and J. Roberts (2014), "Inverse theory resolution analysis in planning radio science gravity investigations of icy moons", Abstract P43C-3997, Fall Meeting AGU 15-19 Dec, San Francisco (2014).

Ganse A.A., R.K. Andrew, F.S. Henyey, J.A. Mercer, P.F. Worcester, M.A. Dzieciuch, “Model and data comparisons of ocean acoustic intensity statistics in the Philippine Sea 2010 experiment”, *J. Acoust. Soc. Am.* 135 , 2306 (2014).

Ganse A.A., "Resolution analysis of the inverse problem for geoacoustic experiment design", *J. Acoust. Soc. Am.* 133, 3304 (2013).

Ganse A.A. and R.I. Odom, "Uncertainty and resolution in continuum inversion of ocean bottom geoacoustic properties", *J. Acoust. Soc. Am.* 124, 2501 (2008).

Ganse A.A. and R.I. Odom, "Higher Order Statistics for Nonlinear Inverse Problems via Analytical Methods", *Eos Trans. AGU*, 87(52), Fall Meet. Suppl., Abstract S42B-03 (2006).