

## Vita for Craig G. Gelpi, Ph.D.

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Dr. Gelpi is an expert in remote sensing, geophysical data analysis and algorithm development for the purposes of target detection and environmental parameter retrieval. His work often entails the understanding of noise and signal sources, how they are manifested in specific sensor data, and in the development of algorithms that remove ambient clutter and noise, thereby increasing signal-to-noise ratios. The data fields themselves are varied, at times consisting of: electric and magnetic field measurements made at geosynchronous orbit; raw radar data and images including microwave and HF bands; SAR, Doppler and altimetry processed data; optical and infrared images; ocean surface wave heights; subsurface ocean temperature and current measurements, and ocean chemical parameters, e.g. pH, dissolved oxygen and chlorophyll.

This expertise has resulted in the development of novel algorithms, such as the Modulated Surface Reflectance (MSR), used to perform atmospheric corrections for low-reflectance surfaces observed from orbit. It has also resulted in the construction of complex system-performance models used to characterize the performance of national assets for a large variety of environments, and to verify the performance of such systems for acquisition and acceptance purposes. His understanding of sensor-environment interactions led to new requirements on, and better performance for, later-generation national asset systems. His expertise also obtained large Internal Research and Development funding as well as new business from a new customer for his organization.

Several of his algorithms are hosted on real-time detection systems including one that significantly reduces false-alarm rates to levels required for real-time operation. He has received Northrop Grumman patent payments for innovations performed in classified programs.

He has studied and elucidated oceanographic processes in the Southern California Bight, the results of which are useful for the analysis of nutrient flows and mechanisms for oceanic water overturning, an important constituent of climate change.

### **PROFESSIONAL EXPERIENCE SUMMARY:**

Dr. Gelpi's experience and duties extend from task conception to: experimental design and oversight; signal and noise modeling; data reduction, analysis and understanding; algorithm design and development; and, final evaluation including encapsulating technical insight gained and recommendations for future work. He currently holds a DoD Top Secret clearance as well as TS/SCI clearances.

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### Northrop Grumman XonTech July 2003 – April 2022

Dr. Gelpi headed the XonTech portion of the technical team that architected a complex sensor as part of a large (5 year) proposal effort. He devised novel, advanced processing algorithms, and championed and executed a large-scale experiment that illustrated and proved the effectiveness of these algorithms. He designed the philosophy and prototype algorithms for a large training simulator required for this effort. Dr. Gelpi was the physicist's face to the customer describing these advances and was the chief consultant for every area of sensor-environment interaction.

He retired as a Northrop Grumman Technical Fellow on April 1, 2022. Until his retirement, he continued research and algorithm development on large, established defense programs, working with a variety of senior scientists and physicists

### XonTech, Inc., Van Nuys, California (Technical Manager) October 1993 – July 2003

Dr. Gelpi was a Technical Manager at XonTech, Inc., where he led a team of scientists and engineers who performed scientific data analyses, algorithm design, and development in support of a defense acquisition project. Duties included interaction with customers to determine task definition and initialization, planning and resource allocation, as well as having direct responsibility for the technical quality of the company's product: research and algorithm development. He also led and actively contributed to an internal research and development project which used remote sensing technology (hyperspectral sensors, satellite SAR and radar altimeters) to address offshore problems and operations faced by exploration and marine engineering organizations.

### XonTech, Inc., Van Nuys, California (Senior Analyst) September 1985 - October 1993

Duties included the study and interpretation of field test data and the development and testing of specific application algorithms and special purpose filters. Specifically, he has performed data analysis of remotely sensed measurements using digital Fourier techniques and statistical analyses, usually with the goal of measuring, characterizing, understanding and removing environmental and sensor related noise. These efforts required knowledge of geophysics, sensor systems, numerical techniques, physical modeling, environmental and system simulation and emulation. Other tasks included the development and implementation of atmospheric models required to study the effects of the atmosphere on reentry vehicles. This work also involved the analysis of results obtained from computer simulations of complex physical phenomena related to radar discrimination work using Monte Carlo techniques.

### Boston University, Massachusetts (Research Associate) September 1983 - September 1985

Dr. Gelpi worked on the analysis and interpretation of data measured with the Air Force Geophysics Laboratory Magnetometer Network. Special emphasis was placed

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upon the study of ground signatures of magnetic substorms and the correlation of these signals with spacecraft data. This project required complete program knowledge from the development of analysis algorithms to the writing of peer-reviewed research papers.

**EDUCATION:** Ph.D., Physics, University of Houston, Houston, Texas, 1983  
B.S., Physics and Mathematics, Tulane University, New Orleans, Louisiana., 1978

### PUBLICATIONS

Dr. Gelpi has published tens of significant classified reports and papers and has made hundreds of presentations that are not available to the public. Below is listed unclassified work that can be readily accessed.

#### Published Peer-Reviewed, Unclassified, Open-Literature Papers

1. “Two decades of CMS California Islands research: seasonal temperatures, internal waves, productivity and ocean acidification refugia”. C. Gelpi. Submitted to California Islands Symposium proceedings, 2024.
2. “Capacity building with volunteers: Divers and boaters collect data on Southern California Bight”. Gelpi, C., D. Kushner, A. Solomon, and S. Eckley. 2025. *Oceanography*, <https://doi.org/10.5670/oceanog.2025.103>.
3. “Dynamics of pH at Santa Catalina Island”. Gelpi, C.G. 2023. *PLoS ONE* 18(12): e0290039, <https://doi.org/10.1371/journal.pone.0290039>.
4. Wind-Event-Induced Ocean Upwelling, Relaxation and Chlorophyll Response in the Southern California Bight, Craig G. Gelpi, *Bulletin of the Southern California Academy of Sciences* (2023) 122 (2): 80–100.
5. Influence of shoaling internal waves on nearshore ocean pH, <https://doi.org/10.20935/AL3379>
6. “Diurnal and semi-diurnal internal waves near Two Harbors, Santa Catalina, California”, Proceedings of the 8<sup>th</sup> California Islands Symposium in Monographs of the Western North American Naturalists, Vol 7, 2014.
7. “Seasonal temperature dynamics of the upper ocean in the Southern California Bight,” C. Gelpi and K.E. Norris, *Journal of Geophysical Research.*, 113, C4, doi:10.1029/2006JC003820, 2008.

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8. "Estimated Surface-wave contributions to radar Doppler velocity measurements of the ocean surface," C. G. Gelpi and K. E. Norris, *Remote Sensing of Environment*, Vol. 87/1, pp.99-110, 2003.
9. "Ocean Waveheight Spectra Computed from High-Altitude, Optical, Infrared Images," by C.G. Gelpi, B. Schuraytz and M. Husman. *Journal of Geophysical Research*, Vol. 106, No. C12, p.31,403 , 2001.
10. "Removing path-scattered radiance from over-ocean spectrometer images for water vapor estimation," by C. Gelpi, *Remote Sensing of Environment*, 74:414-421, December, 2000.
11. "Catalina Conservancy Divers' Temperature Data." C.G. Gelpi and K.E. Norris, Proceedings of the Sixth California Islands Symposium, December 1-3, 2003.
12. "A Comparison of Magnetic Signatures and DMSP Auroral Images at Substorm Onset: Three Case Studies," by C. Gelpi, H.J. Singer and W.J. Hughes, *Journal of Geophysical Research*, A3, 2447, 1987
13. "Convection Electric Field Effects on Outer Radiation Belt Electron Precipitation," by C. Gelpi, J.R. Benbrook and W.R. Sheldon, *Planetary and Space Science*, 32, 271, 1986.
14. "Magnetic Disturbances in the Vicinity of Synchronous Orbit and the Substorm Current Wedge: A Case Study," by H. J. Singer, W.J. Hughes, C. Gelpi and B.G. Ledley, *Journal of Geophysical Research*, A10, 9583, 1985.
15. "The Mid-Latitude Pi2 Polarization Pattern and Synchronous Orbit Magnetic Activity," by C. Gelpi, W.J. Hughes and H. Singer, *Journal of Geophysical Research*, A7, 6451, 1985.
16. "Longitudinal Phase and Polarization Characteristics in Mid-Latitude Pi2 Pulsations," by C. Gelpi, W.J. Hughes and H. Singer, *Journal of Geophysical Research*, A10, 9905, 1985.
17. "Diurnal Modulation of the Quiet Time Penetrating Electron Flux," by W. R. Sheldon, J. Benbrook and C. Gelpi, in *Journal of Geophysical Research*, A1, 548, 1985.
18. "Ground Satellite Observation of Substorm Related Pi2 Pulsation and Current System," (Co-author) Proc. Conf, Achievements of the IMS, European Space Agency, ESA SP-219, pg. 673, Paris, 1984.
19. "The Plasma Wave Environment of an Auroral Arc, 2, ULF Waves on an Auroral Arc Boundary," by C. Gelpi and E. Bering, in *Journal of Geophysical Research*, A12, 10847, 1984.

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### Published Abstracts, Proceedings Papers and Presentations

1. "Electric and Magnetic Observations of a Hydromagnetic Wave in an Auroral Arc." Poster presented at the 4th General Assembly of IAGA. August, 1981, (Co-author).
2. "Diurnal Variation in Energetic Electron Precipitation in the South Atlantic Anomaly during Quiet Conditions." Poster presented at the Fall Meeting of the American Geophysical Union. December, 1982, (Co-author).
3. "ULF Waves on an Auroral Arc Boundary," presented at the Fall Meeting of the American Geophysical Union, December, 1982, (Co-author).
4. "ULF Waves on an Auroral Arc Boundary." Poster presented at the Chapman Conference on Waves in Magnetospheric Plasmas, 1983, (Co-author).
5. "Waves Observed Simultaneously at Mid-Latitudes and at Synchronous Orbit in the Pi2 Frequency Band, presented at the Fall Meeting of the American Geophysical Union, December, 1984, (Co-author).
6. "Electromagnetic Bias Computed from 2-D Model Spectra," by C. Gelpi, poster presented at the Fall American Geophysical Union Meeting, Baltimore, May 23, 1996.
7. "Estimated Significant Wave Height Computed for GOSAP SAR Images," by C. Gelpi, C. Wynn and P. Heffernan, poster presented at the Fifth International Conference, Remote Sensing for Marine and Coastal Environments, San Diego, CA. October 5-7, 1998.
8. "Separating Path-Scattered from Surface-Reflectance Radiance in Over-Ocean Spectrometer Images," by C. Gelpi and B. Nguyen, poster presented at the Fifth International Conference, Remote Sensing for Marine and Coastal Environments, San Diego, CA. October 5-7, 1998.
9. "Gulf Offshore Satellite Applications Project," presented at the Radarsat ADRO Final Symposium, Montreal, Canada, October 11-14, 1998, (Co-author).
10. "Estimating Gravity Wave Spectra from IR Images," by C. Gelpi and D. Messinger, Proceedings of the Sixth International Conference, Remote Sensing for Marine and Coastal Environments, Veridian ERIM International, May 1-3, 2000.
11. "Ocean-Surface Doppler-Velocity Signatures Obtained From SAR Spacecraft," by V.R. Pomeroy, C. Gelpi, K.E. Norris and R.L. Miller, Proceedings of the Sixth International Conference, Remote Sensing for Marine and Coastal Environments, Veridian ERIM International, May 1-3, 2000.

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12. "Water-vapor estimation for ocean scenes using modulated surface reflectance," 2000C.G.Gelpi and B. Nguyen in Summaries of the Ninth JPL Earth Science Workshop, edited by R.O. Green, Jet Propulsion Laboratory, Pasadena, California. 2000.
13. "Oceanographic and atmospheric retrievals from AVIRIS Hyperspectral data," C. Gelpi, B.C. Schuraytz and M. Husman, Proceedings of the Tenth JPL Airborne Earth Science Workshop, Robert. O. Green, editor California Institute of Technology, Jet Propulsion Laboratory, Pasadena, California, December 2001.
14. "Estimated Wave Spectra Contributions to Ocean Doppler Velocity," by K. Norris, C. Gelpi and B. Schuraytz, Proceedings, Seventh International Conference on Remote Sensing for Marine and Coastal Environments, Veridian, Miami, Florida, 20-22, May 2002.
15. "Retrieved Atmospheric and Oceanic Properties for Hyperspectral Data," by C. Gelpi, B. Schuraytz and M. Husman, Proceedings, Seventh International Conference on Remote Sensing for Marine and Coastal Environments, Veridian, Miami, Florida, 20-22, May 2002.
16. "Usage of Atmospheric Corrections to Hyperspectral Images of Coastal Data," M. Bailey, C. Gelpi, M. Husman, and B. Schuraytz, AMRS Conference 2003: Hyperspectral Issues for Coastal Zone Environments, Oceans 2003, New Orleans, LA, May, 2003.
17. "Atmospheric Correction of Coastal Hyperspectral Images with In-Scene Data," M. Bailey, C. Gelpi, M. Husman, and B. Schuraytz, Proceedings of the 30th International Symposium on Remote Sensing of Environment, Honolulu, HI, November, 2003.
18. "Catalina Conservancy Divers' Thermograph Project", C. Gelpi and K. Norris, Proceedings of the American Academy of Underwater Sciences, 23<sup>rd</sup> Annual Scientific Diving Symposium March 12<sup>th</sup>-13<sup>th</sup>, Long Beach, California, 2004. AAUS, 430 Nahant Road, Nahant MA 01908.
19. "Satellite Measurements of Ocean Doppler Velocity for Surface Current Retrieval", C. Gelpi, A. Butler, K. Norris, B. Schuraytz, E. Strom, D. Prout and N. Thantu., Presented at the IEEE International Geoscience and Remote Sensing Symposium (IGARSS 2004), Anchorage Alaska, September 22, 2004.
20. "Chlorophyll concentration dynamics in the Southern California Bight", Ocean Sciences Meeting, 2012, Salt Lake City, UT, 2012.
21. "Chlorophyll Concentration Dynamics in the Southern California Bight", Annual Meeting of the Southern California Academy of Sciences 2012, Eagle Rock, CA.

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22. “Diurnal and semi-diurnal internal waves at Big Fisherman Cover, Santa Catalina”, Eighth California Island Symposium, Ventura, CA, October 23, 2012.
23. “Chlorophyll dynamics at Santa Catalina Island”, CalCOFI Conference 2012, Pacific Grove, CA. 2012
24. “Momentum and thermal diffusion off the coast of Southern California”, C. Gelpi and A. Leinweber, Ocean Sciences Meeting 2014, Honolulu, HI, 2014.
25. “Chlorophyll Dynamics in the Southern California Bight”, C. Gelpi, Ocean Sciences Meeting 2016, New Orleans. LA, 2016.

### Magazine Article.

“Oceanographic and atmospheric properties from high-altitude hyperspectral Images,” by C. Gelpi, published in Backscatter, Volume 13, No. 2, AMRS Association, Spring/Summer 2002.

### Awards

Difference Maker Award, Northrop Grumman Corp., 2021.

Innovation award for “Magnetic self-calibration against platform-generated magnetism,” Northrop Grumman, 2021.

Outstanding Teaching Fellow in the Department of Physics for 1982-1983, University of Houston, 1983.

Daniel Stanley Elliot Prize for Physics, Tulane, 1978.

National Merit Scholar, 1974

### Affiliations

Member of the American Geophysical Union since 1982.

Founding member and Chief Scientist of the Catalina Marine Society, a nonprofit organization dedicated to oceanographic research off Southern California.

Formerly an American Academy of Underwater Sciences (AAUS) certified scientific SCUBA diver.

Editor and frequent contributor to OceanBights, the magazine of the Catalina Marine Society

Member of the Southern California Academy of Sciences.