

Summary

Scientist with experience in developing and implementing algorithms and pipelines to calibrate, explore, and visualize remote sensing hyperspectral observations, and extensive knowledge and experience in IDL. Developed [titanbrowse](#), an IDL-based database, exploration, visualization and analysis tool for remote-sensing hyperspectral observations of Titan's surface and atmosphere, taken by Cassini's Visual and Infrared Mapping Spectrometer (VIMS). Applied radiative transfer models to VIMS reflected light observations, to derive Titan's methane, haze and cloud distributions. Developed pipeline for radiometric calibration and precise cartography of remote sensing observations. Developed innovative software for data visualization, to make use of more data and increase fidelity.

Key Skills

Data visualization:

- Experience developing innovative solutions for visualization of single and multi-band imaging, static and interactive, focusing on Earth and planetary remote sensing data.

Acquisition, calibration, mining, and analysis of remote sensing and astronomical observations:

 images, spectra, hyperspectral imaging.

- Experience with planning, acquisition, and calibration of observations from Keck, Hubble Space Telescope and Cassini, including cartography and image registration.
- Mining Virtual Observatory resources and development of algorithms, pipelines and databases to handle large volumes of observations.
- Experience applying radiative transfer models to analyze visible and near infrared remote sensing observations, to measure parameters of Titan's atmosphere and surface.

Programming: IDL

- Expert in IDL. 14 years of daily use to develop software to process, explore, visualize and analyze data. Collaborated in the testing and definition of new language features in IDL 8.0. Reviewed the book [Modern IDL](#) (Michael Galloy, 2011). Have been one of the most frequent writers at the [comp.lang.idl-pvwave](#) newsgroup. Development and maintenance of [pp_lib](#), a general-purpose IDL library, and [titanbrowse](#). Developed solutions to deploy IDL software in a variety of scenarios, including interactive GUIs and pipelines running on cloud and cluster environments.

Programming: Other

- Developed projects using Python, Fortran, C, SQL, Java, C++, CUDA, OpenMP, MPI.

Other

- NAIF SPICE, ISIS, Git, Amazon Web Services, w10n, Subversion, SExtractor, IRAF, Linux systems administration. Always interested in and quick to learn new tools to develop better software solutions.

Professional Experience

Jet Propulsion Laboratory Science Data Visualization Group (398I) Pasadena
Data Visualization Developer 2016 – current

- Working in the group developing OMINAS, a versatile toolkit to generate visualization products for Cassini and other planetary imaging missions.
- Working in the group developing DAISY, a platform for interactive visualization and exploration of webified Level 2 Earth remote sensing data,
- Support for creation of new visualizations of AIRS Near-Real-Time data.
- Development of an online-accessible version of `titanbrowse`.

Northern Arizona University Department of Physics and Astronomy Flagstaff
Postdoctoral researcher 2013 – 2016

- Developed code to generate mosaics of remote-sensing observations, resulting in cartographically-correct representation of the extent of each spatial pixel.
- Support analysis of Cassini VIMS observations of Titan’s surface and atmosphere, with a combination of PCA and radiative transfer models, to derive surface compositions and atmospheric parameters (PI: Caitlin Griffith, University of Arizona).
- Development databases of archived observations of Solar System bodies, to bring the possibilities of the Virtual Observatory into planetary science.
- Work on the maintenance and support of the Physics and Astronomy cluster; member of the NAU cluster committee.

Universidade de São Paulo Departamento de Astronomia São Paulo
Postdoctoral researcher 2008 – 2013

- Implemented a new version of `titanbrowse`, for improved performance and functionality.
- Collaborated on the use of `titanbrowse` to identify, for the first time, lakes on Titan’s tropics, by mining Cassini VIMS observations.
- Started developing perceptually-uniform colormaps.
- Worked on the selection, implementation, and operation of CPU and GPU clusters.

University of Arizona Department of Planetary Sciences Tucson
Ph.D. research 2003 – 2008

- Created `titanbrowse`, implemented in IDL.
- Created colormaps to visualize remote sensing observations of Titan which would show more structure, with less saturation, and to better show the structure in data over 2 bands.
- Analyzed VIMS observations to detect and characterize Titan’s clouds and their evolution.
- Modified and used radiative transfer codes, implemented in Fortran, to reproduce VIMS spectra and derive Titan’s methane and haze distributions.

Observatório Nacional Brazil
Master’s research 2002 – 2003

- Applied the model developed on undergraduate research to analyze the rotation of asteroid fragments created in collisions.
- Created movies of 3D renderings of the collisions.

Universidade Federal do Rio de Janeiro Dept. de Astronomia Brazil
Undergraduate research 1998 – 2002

- Developed a model to simulate the dynamics of a rubble-pile asteroid during a collision, implemented in Fortran.

Education

University of Arizona Ph.D. in Planetary Sciences <i>Thesis title: “Study of Titan’s methane cycle”</i>	Tucson 2003 – 2008
Observatório Nacional M.Sc. in Astronomy <i>Thesis title: “Study of the angular momentum after the fragmentation of a rubble-pile asteroid”</i>	Brazil 2002 – 2003
Universidade Federal do Rio de Janeiro B.Sc. in Astronomy, <i>Magna cum Lauda</i> <i>Thesis title: “Interacting Ellipsoids: a model for the fragmentation of a rubble-pile asteroid”</i>	Brazil 1998 – 2002

Publications

- Google Scholar profile: <http://scholar.google.com/citations?user=QWxVqrYAAAAJ>
 - Researcher ID: <http://www.researcherid.com/rid/F-9081-2012>
 - Scopus profile: <http://www.scopus.com/authid/detail.url?authorId=9532691100>
1. *Current paradigms in parallelization: a comparison of vectorization, OpenMP and MPI*. **P Penteadó**. Journal of Computational Interdisciplinary Sciences (2015).
[doi:10.6062/jcis.2012.03.03.0057](https://doi.org/10.6062/jcis.2012.03.03.0057)
 2. *Software and cyber-infrastructure development to control the Observatorio Astrofísico de Javalambre (OAJ)*. A Yanes-Díaz, JL Antón, S Rueda-Teruel, L Guillén-Civera, R Bello, D Jiménez-Mejías, S Chueca, NM Lasso-Cabrera, O Suárez, F Rueda-Teruel, AJ Cenarro, D Cristobal-Hornillos, A Marin-Franch, R Luis-Simoes, G López-Alegre, MAC Rodríguez-Hernández, M Moles, A Ederoclite, J Varela, H Vazquez Ramió, MC Díaz-Martín, R Iglesias-Marzoa, N Maicas, JL Lamadrid, A Lopez-Sainz, J Hernández-Fuertes, L Valdivielso, C Mendes de Oliveira, **P Penteadó**, W Schoenell, A Kanaan. Proceedings of the SPIE, 9152, id. 915215 (2014). [doi:10.1117/12.2054944](https://doi.org/10.1117/12.2054944)
 3. *Goals and strategies in the global control design of the OAJ Robotic Observatory*. S Rueda-Teruel, A Yanes-Díaz, JL Antón, F Rueda-Teruel, M Moles, AJ Cenarro, A Marín-Franch, A Ederoclite, N Gruel, J Varela, D Cristobal-Hornillos, S Chueca, MC Díaz-Martín, L Guillén, R Luis-Simoes, N Maicas, JL Lamadrid, AL López-Sainz, J Hernández-Fuertes, L Valdivielso, C Mendes de Oliveira, **P Penteadó**, W Schoenell, A Kanaan. Highlights of Spanish Astrophysics VII, pp. 954-954. (2013). [2013hsa7.conf..954R](https://doi.org/10.1088/1741-4221/13/7/074001)
 4. *Possible tropical lakes on Titan from observations of dark terrain*. Catilin A. Griffith, Juan Lora, Jake Turner, **Paulo F. Penteadó**, Robert H. Brown, Martin G. Tomasko, Lyn Doose, Charles See. Nature 486, pp. 237-239 (2012). [doi:10.1038/nature11165](https://doi.org/10.1038/nature11165)
 5. *Goals and strategies in the global control design of the OAJ Robotic Observatory*. A. Yanes-Díaz, S. Rueda-Teruel, J.L. Antón, F. Rueda-Teruel, M. Moles, A.J. Cenarro, A. Marín-Franch, A. Ederoclite, N. Gruel, J. Varela, D. Cristobal-Hornillos, S. Chueca, M.C. Díaz-Martín, L. Guillén, R. Luis-Simoes, N. Maicas, J.L. Lamadrid, A. Lopez-Sainz, J. Hernández-Fuertes, L. Valdivielso, C.

- Mendes de Oliveira, **P. Penteado**, W. Schoenell, A. Kanaan. Observatory Operations: Strategies, Processes, and Systems IV. Proceedings of the SPIE, Volume 8448, id. 84481B-84481B-14 (2012). [doi:10.1117/12.925665](https://doi.org/10.1117/12.925665)
6. *Radiative transfer analyses of Titan's tropical atmosphere*. Caitlin A. Griffith, Lyn Doose, Martin G. Tomasko, **Paulo F. Penteado**, Charles See. *Icarus* 218, 2, pp. 975-988 (2012). [doi:10.1016/j.icarus.2011.11.034](https://doi.org/10.1016/j.icarus.2011.11.034)
 7. *Latitudinal variations in Titan's methane and haze from Cassini VIMS observations*. **Paulo F. Penteado**, Caitlin A. Griffith, Martin G. Tomasko, Steffi Engel, Charles See, Lyn Doose, Kevin H. Baines, Robert H. Brown, Bonnie J. Buratti, Roger Clark, Phillip Nicholson, Christophe Sotin. *Icarus* 206, 1, pp. 352-365 (2010). [doi:10.1016/j.icarus.2009.11.003](https://doi.org/10.1016/j.icarus.2009.11.003)
 8. *Ground-based measurements of the methane distribution on Titan*. **Paulo F. Penteado**, Caitlin A. Griffith. *Icarus* 206, 1, pp. 345-351 (2010). [doi: 10.1016/j.icarus.2009.08.022](https://doi.org/10.1016/j.icarus.2009.08.022)
 9. *VIMS spectral mapping observations of Titan during the Cassini prime mission*. Jason W. Barnes, Jason M. Soderblom, Robert H. Brown, Bonnie J. Buratti, Christophe Sotin, Kevin H. Baines, Roger N. Clark, Ralf Jaumann, Thomas B. McCord, Robert Nelson, Stéphane Le Mouélic, Sebastien Rodriguez, Caitlin Griffith, **Paulo Penteado**, Federico Tosi, Karly M. Pitman, Laurence Soderblom, Katrin Stephan, Paul Hayne, Graham Vixie, Jean-Pierre Bibring, Giancarlo Bellucci, Fabrizio Capaccioni, Priscilla Cerroni, Angioletta Coradini, Dale P. Cruikshank, Pierre Drossart, Vittorio Formisano, Yves Langevin, Dennis L. Matson, Phillip D. Nicholson, Bruno Sicardy. *Planetary and Space Science* 57, 14-15, pp. 1950-1962 (2009). [doi:10.1016/j.pss.2009.04.013](https://doi.org/10.1016/j.pss.2009.04.013)
 10. *Characterization of Clouds in Titan's Tropical Atmosphere*. Caitlin A. Griffith, **Paulo Penteado**, Sebastien Rodriguez, Stéphane LeMouélic, Kevin H. Baines, Bonnie Buratti, Roger Clark, Phil Nicholson, Ralf Jaumann, Christophe Sotin. *The Astrophysical Journal Letters* 702, 2, pp. L105-L109 (2009). [doi:10.1088/0004-637X/702/2/L105](https://doi.org/10.1088/0004-637X/702/2/L105)
 11. *Evidence for a Polar Ethane Cloud on Titan*. C. A. Griffith, **P. Penteado**, P. Rannou, R. Brown, V. Boudon, K. H. Baines, R. Clark, P. Drossart, B. Buratti, P. Nicholson, C. P. McKay, A. Coustenis, A. Negro, R. Jaumann. *Science*, 313, 5793, pp. 1620-1622 (2006). [doi:10.1126/science.1128245](https://doi.org/10.1126/science.1128245)
 12. *The Evolution of Titan's Mid-Latitude Clouds*. C. A. Griffith, **P. Penteado**, K. Baines, P. Drossart, J. Barnes, G. Bellucci, J. Bibring, R. Brown, B. Buratti, F. Capaccioni, P. Cerroni, R. Clark, M. Combes, A. Coradini, D. Cruikshank, V. Formisano, R. Jaumann, Y. Langevin, D. Matson, T. McCord, V. Mennella, R. Nelson, P. Nicholson, B. Sicardy, C. Sotin, L. A. Soderblom, R. Kursinski. *Science* 310, 5747, pp. 474-477 (2005). [doi:10.1126/science.1117702](https://doi.org/10.1126/science.1117702)
 13. *Observations of Titan's Mesosphere*. C. A. Griffith, **P. Penteado**, T. K. Greathouse, H. G. Roe, R. V. Yelle. *The Astrophysical Journal*, 629, 1, pp. L57-L60 (2005). [doi:10.1086/444533](https://doi.org/10.1086/444533)
 14. *Measurements of CH₃D and CH₄ in Titan from Infrared Spectroscopy*. **P. F. Penteado**, C. A. Griffith, T. K. Greathouse, C. de Bergh. *The Astrophysical Journal*, Volume 629, Issue 1, pp. L53-L56 (2005). [doi:10.1086/444353](https://doi.org/10.1086/444353)
 15. *Interacting ellipsoids: a minimal model for the dynamics of rubble-pile bodies*. F. Roig, R. Duffard, **P. Penteado**, D. Lazzaro, T. Kodama. *Icarus*, 165, 2, p. 355-370 (2003). [doi:10.1016/S0019-1035\(03\)00216-1](https://doi.org/10.1016/S0019-1035(03)00216-1)