

Graziela R. Keller

graziela.r.keller@gmail.com

<https://www.linkedin.com/in/grazielakeller>

Citizenship: US

Address: Glendale, CA.

Summary

I am a technically resourceful scientist with experience in both Astronomy and Remote Sensing of the Earth and an interest in supporting space exploration missions. I have a Ph.D. in Astronomy and experience in planning observations; acquisition, calibration, analysis, and visualization of data sets; scientific programming, mathematical modeling, and algorithm development. I have also worked as part of the MODIS Characterization Support Team (MCST) as a contractor at NASA/GSFC in the radiometric calibration and characterization of remote sensing instruments.

Key Skills - Remote Sensing; Astronomy; Programming

Proposing, Planning, and Acquiring Observations: Co-I of 2 Hubble Space Telescope programs and PI of an ESO/VLT program.

Mining Data Archives: I have extensive experience mining data archives: Level 1 and Atmosphere Archive & Distribution System (LAADS), Mikulski Archive for Space Telescopes (MAST), Sloan Digital Sky Survey (SDSS), among others.

Data Calibration and Analysis:

- While with the MCST at NASA/GSFC, I worked in the radiometric calibration and characterization of remote sensing instruments: Terra and Aqua MODIS, GOES-16 ABI, Himawari-8 AHI; L1A and L1B data analysis and visualization; data fusion for instrument intercomparison;
- As a Ph.D. student and post-doc researcher, I worked in the analysis and modeling of spectra, images, and hyperspectral data from multiple instruments from Space and Earth based observatories (HST/STIS, HST/FOS, HST/GHRS, IUE and FUSE space telescopes, and SDSS, ESO VLT/UVES, among others).

Data Visualization: Extensive experience producing visualizations of data sets in 2 and 3 dimensions, including animations.

Algorithm and Pipeline Development:

- Experience developing algorithms to process data and extract scientific information from images, spectra, data cubes, catalog data, and telemetry. A recent example is an algorithm to model and mitigate electronic crosstalk artifacts on Aqua MODIS L1B imagery.
- I have also implemented pipelines to process data according to specifications. A recent example is a pipeline to validate the calibration of GOES-16 ABI reflective solar bands.

Observation Geometry: I have used SPICE/Icy (by JPL/NAIF) to calculate the observation geometry of remote sensing Earth and calibration images, to schedule solar diffuser observations, and find serendipitous occurrences of the Moon in full disk Earth images. I attended a week of SPICE training with the NAIF team in 2017.

Programming: IDL, Python, Fortran, Linux shell scripts, and SQL.

Tools: Git, Latex, Linux environment, netCDF, HDF, FITS; various data reduction pipelines; observation geometry: NAIF SPICE/Icy; Data mining: TopCat, CDS X-Match, CasJobs.

Documentation, Presentation, and Communication skills: I am experienced in presenting results at scientific conferences, group meetings, and meeting with clients, as well as documenting results, algorithms, and pipelines through journal papers, conference proceedings, internal memoranda and reports, and preserving version control through the use of Git repositories.

Professional Experience

The Johns Hopkins University Department of Physics and Astronomy USA
Visiting Scholar 04 – 05/2018

- Developed a pipeline to derive stellar parameters for a sample of White Dwarfs in binary systems and their companions using UV and optical spectral data compared to grids of synthetic spectra using a chi square minimization algorithm. Used results to place objects in evolutionary tracks.

Science Systems and Applications, Inc. (SSAI) USA
Senior Research Scientist - MODIS Characterization Support Nov. 2015 –
Team at NASA/GSFC Mar. 2018

- Supported the operational radiometric calibration of the MODIS instruments. Developed an algorithm to model and mitigate electronic crosstalk artifacts on images from Aqua MODIS thermal emissive bands. Conducted research on the use of flux measurements of stellar sources visible in images from the space view port of Suomi-NPP VIIRS Day/Night Band as an independent calibration method. Supported research on instrument inter-comparison by implementing IDL software to handle and georeference Himawari Standard Format Data and calculate observation geometry using SPICE/Icy. Implemented the pipeline to validate the calibration of GOES-16/ABI reflective solar bands.

Universidade de São Paulo Departamento de Astronomia Brazil
Postdoctoral researcher 2012 – 2015

- CSPNe spectroscopy. Produced grids of synthetic spectra calculated with the non-LTE radiative transfer, stellar atmosphere code CMFGEN and used them in the analysis of far-UV, UV, and optical spectra of central stars of planetary nebulae (CSPNe) obtained from the MAST archive and high resolution, high signal-to-noise ratio ESO VLT/UVES spectra of CSPNe (ESO run 095.D-0256 - PI: Graziela R. Keller).
- White Dwarfs (WDs) from matched catalogs - Identification and characterization of hot WDs and hot WDs in binary systems, extracted from cross-matched SDSS and GALEX catalogs, modeled with synthetic photometry and spectroscopy. This project encompassed two HST snapshot programs in which I am a CoI and in which I was responsible for the planning of all observations: cycle 21 STIS spectroscopic snapshot program 13397 (PI: L. Bianchi) and cycle 23 WFC3 imaging snapshot program 14119 (PI: L. Bianchi).

The Johns Hopkins University Department of Physics and Astronomy USA
Visiting scientist 02 – 04/2014

Universität Tübingen Institut für Astronomie und Astrophysik Germany
Visiting scientist 10 – 11/2013

The Johns Hopkins University Department of Physics and Astronomy USA
Visiting scientist 01 – 04/2013

Universidade de São Paulo Departamento de Astronomia Brazil
Ph.D. research 2007 – 2011

- Built grids of synthetic spectra with the non-LTE radiative transfer, stellar atmosphere CMFGEN code, which accounts for expanding atmospheres and line blanketing.

- Used the grids on the analysis of ultraviolet and far-ultraviolet MAST archival spectra from H-poor central stars of planetary nebulae to derive stellar parameters and surface abundances.
- Teaching assistant for the “Fundamentals of Astronomy” undergraduate course at IAG/USP - AGA0215

The Johns Hopkins University Department of Physics and Astronomy USA
Visiting Ph.D. Student 2009 – 2010

Universidade de São Paulo Departamento de Astronomia Brazil
Master’s research 2004 – 2007

- The Alfvén wave wind driving mechanism was included in 1D stationary magnetohydrodynamical simulations of the radiative winds of Wolf-Rayet stars.

Universidade Federal do Rio de Janeiro Dept. de Astronomia Brazil
Undergraduate research 2002 – 2004

- Calibration of an age-chromospheric activity indicator for solar-type stars.

Universidade Federal do Rio de Janeiro Dept. de Astronomia Brazil
Undergraduate research 2000 – 2002

- Spectroscopic analysis of the two components of the α Centauri system.

Education

Universidade de São Paulo Brazil
 Ph.D. in Astronomy 2007 – 2011
Thesis title: “Hydrogen Deficient Central Stars of Planetary Nebulae: Synthetic Spectra and Spectral Analysis”

The Johns Hopkins University USA
 Visiting Ph.D. student at the Department of Physics and Astronomy 2009 – 2010

Universidade de São Paulo Brazil
 M.Sc. in Astronomy 2004 – 2007
Dissertation title: “Alfvén Waves Applied to the Winds of Wolf-Rayet stars”

Universidade Federal do Rio de Janeiro Brazil
 B.Sc. in Astronomy 1999 – 2004
Title of the Final Graduation Project: “Study of the Chromospheric Activity in Solar Type Stars Through the H and K Ca II lines”

Additional Training

SPICE Training (by the NAIF/JPL team), Pasadena, 2017; Python Programming, Anne Arundel Community College, 2017; 3D Spectroscopy Techniques - Principal Component Analysis (by J. Steiner), IAG/Universidade de São Paulo, 2012; Introduction to Computational Fluid Dynamics, IME/Universidade de São Paulo, 2007.

Publications

Journal Papers

1. Bianchi, Luciana; Keller, Graziela R. et al. Using GALEX-SDSS-PanSTARRS-HST-Gaia to Understand Post-AGB Evolution, 2018, ApSS, accepted.
2. Keller, Graziela R.; Wilson, Truman; Geng, Xu; Wu, Aisheng; Wang, Zhipeng; Xiong, Xiaoxiong. Aqua MODIS Electronic Crosstalk Survey: Mid-Wave Infrared Bands, 2018, TGRS, accepted.
3. Chang, Tiejun; Xiong, Xiaoxiong; Keller, Graziela R.; Wu, Xiangqian. GEO-LEO reflective band intercomparison with bidirectional reflectance distribution function and atmospheric scattering corrections. *Journal of Applied Remote Sensing*, 12(1), 014002, 2018.
4. Keller, Graziela R.; Wang, Zhipeng; Wu, Aisheng; Xiong, Xiaoxiong. Aqua MODIS Band 24 Crosstalk Striping. *IEEE Geoscience and Remote Sensing Letters* 14, no. 4, p. 475, 2017 (arXiv preprint arXiv:1703.04719)
5. Keller, Graziela R.; Bianchi, Luciana; Maciel, Walter J. UV spectral analysis of very hot H-deficient [WCE]-type central stars of planetary nebulae: NGC 2867, NGC 5189, NGC 6905, Pb 6, and Sand 3. *Monthly Notices of the Royal Astronomical Society*, v. 442, p. 1379, 2014.
6. Keller, Graziela R.; Herald, James E.; Bianchi, Luciana ; Maciel, Walter J.; Bohlin, Ralph C. A new grid of synthetic spectra for the analysis of [WC]-type central stars of planetary nebulae. *Monthly Notices of the Royal Astronomical Society*, v. 418, p. 705, 2011.
7. Laganá, Tatiana F.; de Souza, Rafael S. ; Keller, Graziela R. On the influence of non-thermal pressure on the mass determination of galaxy clusters. *Astronomy & Astrophysics*, v. 510, p. A76, 2010.
8. Keller, Graziela R.; Jatenco-Pereira, Vera. Wolf-Rayet optically thick winds with Alfvén waves. *Advances in Space Research*, v. 46, p. 493, 2010.
9. Porto de Mello, Gustavo F.; Lyra, Wladimir; Keller, Graziela. R. The Alpha Centauri binary system. Atmospheric parameters and element abundances. *Astronomy & Astrophysics*, v. 488, p. 653, 2008.
10. Maciel, Walter J.; Keller, Graziela R.; Costa, Roberto D. D. Metallicity effects on the modified wind momentum of CSPNe. *Revista Mexicana de Astronomía y Astrofísica*, v. 44, p. 221, 2008.

Articles in Conference Proceedings

1. Keller, Graziela R. et al. Aqua MODIS electronic crosstalk survey from Moon observations. In *Sensors, Systems, and Next-Generation Satellites XXI*, vol. 10423, p. 1042314. International Society for Optics and Photonics, 2017.
2. Keller, Graziela R. et al. Aqua MODIS Electronic Crosstalk on SMWIR Bands 20 to 26. In *Geoscience and Remote Sensing Symposium (IGARSS)*, 2017, 4174-4177, 2017. (arXiv preprint arXiv:1705.07988).
3. Keller, Graziela R. et al. MTF analysis using lunar observations for Himawari-8/AHI. In *Earth Observing Systems XXII*, vol. 10402, p. 104022I. International Society for Optics and Photonics, 2017.

4. Chang, Tiejun; Keller, Graziela R.; and Xiong, Xiaoxiong. Bridging the thermal band comparison between LEO-LEO sensors and between GEO-GEO sensors. In Earth Observing Systems XXII, vol. 10402, p. 104022F. International Society for Optics and Photonics, 2017.
5. Chang, Tiejun; Xiong, Xiaoxiong; Keller, Graziela R.; and Wu, Xiangqian. GEO-LEO reflectance band inter-comparison with BRDF and atmospheric scattering corrections. In Earth Observing Systems XXII, vol. 10402, p. 1040223. International Society for Optics and Photonics, 2017.
6. Chang, Tiejun; Wu, Aisheng; Geng, Xu; Li, Yonghong; Brinkmann, Jake; Keller, Graziela R.; and Xiong, Xiaoxiong. Model development for MODIS thermal band electronic cross-talk. In SPIE Remote Sensing, p. 100001Q. International Society for Optics and Photonics, 2016.
7. Keller, Graziela R. ;Bianchi, Luciana ;Herald, James E. ;Maciel, Walter J. Grids of Synthetic Spectra for H-poor Central Stars of Planetary Nebulae (CSPNe). In: Planetary Nebulae: An Eye to the Future, IAU Symp. 283, 2011, Tenerife. IAU Symposium, v. 283, p. 404-405, 2012.
8. Keller, Graziela R.; Bianchi, Luciana; Herald, James E.; Maciel, Walter J. Using Grids of High Resolution Synthetic Spectra in the Analysis of [WCE] stars. In: Circumstellar Dynamics at High Resolution, 2012, Foz do Iguaçu. Astronomical Society of the Pacific Conference Series, v. 464, p. 309-316, 2012.