

Alfonso Delgado-Bonal

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Email: alfonso.delgadobonal@nasa.gov

Nationality: Spanish

Birthdate: September 3, 1986

Personal website: <http://adelgadobonal.com/>

Research Interest:

Space; Climate; Complexity Sciences; Economics; Law

Experience:

Associate Scientist – Universities Space Research Association (USRA), NASA Goddard Space Flight Center, USA	2020 (Feb)
NASA Postdoctoral Fellow, Climate and Radiation, NASA Goddard Space Flight Center, USA	2018 – 2020
Postdoctoral Fellow, Atmospheric Physics, Spanish National Research Council (IACT - CSIC), Spain	2016
Graduate Researcher Luleå University of Technology, Sweden	2015 (Jan – Jun)
Graduate Researcher Center of Astrobiology (INTA-CSIC), Spain	2010 – 2014

Education:

Bachelor of Laws, LL.B. International University of La Rioja – UNIR (240ECTS)	2018 – 2020
Bachelor, Economics Spanish Open University – UNED (240ECTS)	2013 – 2018
Ph.D., Physics (“Summa Cum Laude”) University of Salamanca – Center of Astrobiology (Spain)	2011 – 2015
M.Sc., Science and Technology of the Space University of Alcalá, Spain (60 ECTS)	2011 – 2012
M.Sc., Astronomy and Astrophysics International University of Valencia, Spain (60 ECTS)	2010 – 2011
Licenciado (~Bachelor + Master), Theoretical Physics University of Salamanca, Spain (300ECTS, 5-year degree)	2005 – 2010

Honors and Awards

NASA Scientific Achievement Award NASA Goddard Climate and Radiation laboratory	2020
Best college graduate final project in economics Spanish School of Economics in Madrid	2019
Postdoctoral Fellowship Award – NASA Postdoctoral Program (NPP) NASA Goddard Space Flight Center	2018
University of Salamanca, Spain - Extraordinary PhD Thesis Award Best PhD in Physics of the courses 2015-206 and 2016-2017	2017
“Professor Garmendia” Award Best science PhD, University of Salamanca, Spain	2016
Fundación Iberdrola “Energy Award” – National Program Postdoctoral Fellowship, Spanish National Research Council	2015
Spanish ministry of defense grant PhD program grant (FPI)	2011 – 2014
European Astrobiology Network Association (EANA) Oral presentation and travel award	2012
Astrobiology Graduate Conference Oral presentation and travel award	2012
University of Alcalá, Spain Master program grant	2011
Spanish ministry of education grant University studies grant	2005 – 2010

Professional Memberships

- American Geophysical Union
- Instituto Iberoamericano de Derecho Aeronáutico y del Espacio (Ibero-American Institute of Aeronautic and Space Law)
- Thermodynamics, Disequilibrium and Evolution focus group, NASA Astrobiology Institute
- International Institute of Space Law

Manuscripts under review

- **A. Delgado-Bonal** and A. García López, “Quantifying the randomness of the forex markets”

Peer reviewed publications

- **A. Delgado-Bonal**, A. Marshak, Y. Yang, and L. Oreopoulos “Daytime variability of cloud fraction from DSCOVR/EPIC observations,” *Journal of Geophysical Research: Atmospheres*, 125, e2019JD0314488 (2020)
- **A. Delgado-Bonal**, “On the use of complexity algorithms: a cautionary lesson from climate research,” *Scientific Reports* 10, 5092 (2020)
- **A. Delgado-Bonal**, A. Marshak, Y. Yang, and D. Holdaway, “Analyzing changes in the complexity of climate in the last four decades using MERRA-2 radiation data,” under review in *Scientific Reports* 10, 922 (2020)
- **A. Delgado-Bonal**, “Quantifying the randomness of the stock markets,” *Scientific Reports*, 9, 12761 (2019)
- **A. Delgado-Bonal** and A. Marshak, “Approximate Entropy and Sample Entropy: A Comprehensive Tutorial,” *Entropy*, 21(6), 541 (2019)
- **A. Delgado-Bonal**, “Entropy content in radiation: the unseen side of light,” *Scientific Reports* 7, 1642 (2017)
- **A. Delgado-Bonal**, F. J. Martín-Torres, “Human vision is determined based on information theory,” *Scientific Reports* 6, 36038 (2016)
- **A. Delgado-Bonal**, M.-P. Zorzano, F. J. Martín-Torres, “Martian Top of the Atmosphere 10-to 420 nm spectral irradiance database and forecast for solar cycle 24,” *Solar Energy* 134, 228-325 (2016)
- **A. Delgado-Bonal**, F. J. Martín-Torres, S. Vázquez-Martín, M.-P. Zorzano, “Solar and wind exergy potentials for Mars,” *Energy* 102, 550-558 (2016)
- **A. Delgado-Bonal**, F. J. Martín-Torres, “Solar Cell Temperature on Mars,” *Solar Energy* 118, 74-79 (2015)
- **A. Delgado-Bonal**, F. J. Martín-Torres, “Evaluation of the Mars atmospheric chemical entropy production,” *Entropy* 17, 5047-5062 (2015)
- **A. Delgado-Bonal**, F. J. Martín-Torres, “A Mathematic Approach to Nitrogen Fixation Through Earth History,” in: *The Early Evolution of the Atmospheres of Terrestrial Planets*, Springer 35, 23-31 (2013)

Oral presentations

- Delgado-Bonal, A., Marshak, A., Yang, Y. and Oreopoulos “Daily variability of cloud fraction from DSCOVR/EPIC observations”, at the DSCOVR Science Team Meeting, September 17-19, NASA Goddard Space Flight Center, MD, 2019
- de Cabo García, A., and Delgado-Bonal, A., “Prediction of Mars meteorological variables using artificial neural networks”, VI Reunión de Ciencias Planetarias y Exploración del

Sistema Solar (CPRESS6), National Institute of Aerospace Technology, May 27-29, Madrid, Spain 2019

- Delgado-Bonal, A., "Average cloud properties", at the DSCOVER: EPIC and NISTAR Science Team Meeting, September 10-12, NASA Goddard Space Flight Center, MD, 2018
- Delgado-Bonal, A., "Entropy, Complexity and the Evolution of Human Vision", Centro de Astrobiología, Madrid, Spain 2016 (Invited talk)
- F. J. Martín-Torres et al. (including Delgado-Bonal), "Highlights from the Rover Environmental Monitoring Station (REMS) on Board the Mars Science Laboratory: New Windows for Atmospheric Research on Mars", Mars Atmosphere: Modelling and Observation, 5th International Workshop, Oxford, UK, 2014
- Delgado-Bonal, A., "Computing Gibbs free energy for Mars atmospheric reactions", IV workshop of the NAI "Thermodynamics, Disequilibrium and Evolution" Focus Group, Granada, Spain, 22th-24th Oct 2014
- Delgado-Bonal, A., "Accurate calculations of Ozone and liquid water over Gale Crater", European Astrobiology Network Association, Stockholm, Sweden, 15th-17th Oct 2012
- Delgado-Bonal, A., "Effect of radiative transfer in the photochemistry of rocky planets atmospheres", AbGradCon, Caltech, 26th-30th Aug 2012
- Eugenio Simoncini, A. Delgado-Bonal, and F. J. Martin-Torres, "Disequilibrium as a habitability sign: An integrate tool", 5th MSL Landing Site Workshop, May 16th-18th in Monrovia, CA., 2012
- Delgado-Bonal, A., "Nitrogen fixation at the Cambrian Explosion", Nitrogen in planetary systems: the early evolution of the atmospheres of terrestrial planets: the role of nitrogen, Barcelona, Spain, 21th-23th Sept 2011
- Delgado-Bonal, A., "Theoretical aspects of the effects of life in planetary atmospheres", 1st NASA Thermodynamic, Disequilibrium and Evolution Focus Group, Centro de Astrobiología (CSIC-INTA), Torrejón de Ardoz, Madrid, Spain , March 1st-3rd, 2011

Posters

- Delgado-Bonal, A., Marshak, A. and Yang, Y., "Analysis of Earth's reflectance using EPIC – Preliminary results", at the DSCOVER Science Team Meeting, September 17-19, NASA Goddard Space Flight Center, MD, 2019
- Delgado-Bonal, A., Marshak, A., Yang, Y., and Holdaway, D. "A complexity analysis of Earth's radiation based on satellite observations", European Geophysical Union conference, Vienna, Austria, 2019
- de la Cuesta Castillo, C., Delgado-Bonal, A., Mediavilla Gregorio, S. "Determination of a Wien's like law for the exergy of radiation", European Geophysical Union conference, Vienna, Austria, 2019

- de Cabo García, A., Delgado-Bonal, A., Pla-García, J., and Perez-Lancho, B., “Prediction of Mars meteorological variables using artificial neural networks”, European Geophysical Union conference, Vienna, Austria, 2019
- Delgado-Bonal, A. and Marshak, A., “Analysis of diurnal variability of cloud properties using EPIC”, American Geophysical Union conference, Washington DC, USA, 2018
- Delgado-Bonal, A. “Meteoritic Impacts as a source of energy to produce organic nitrogen”, Kuressare, Saaremaa, Estonia, 16th-25th Aug 2013
- Pla-García, J., Martín-Torres F. J. and Delgado-Bonal, A., “Earth emission and transmission spectra through history and effects of the emergence of life: application to exoplanets”. 13th AbGradCon’13, Montreal, Quebec, Canada, 2013
- Delgado-Bonal, A., Simoncini, E. and Martín-Torres, F.J. “Thermodynamic disequilibrium as a biomarker in Mars”, European Geophysical Union, Vienna, Austria, 21th-27th April 2012
- Delgado-Bonal, A., Simoncini, E. and Martín-Torres, F.J. “Thermodynamic study of a martian cave”, European Geophysical Union, Vienna, Austria, 21th-27th April 2012

Outreach and workshop organization

- 3rd Thermodynamics, Disequilibrium and Evolution NAI workshop, Centro de Astrobiología, Madrid (Spain), Local committee, 2011
- 4th Thermodynamics, Disequilibrium and Evolution NAI workshop, Andalusian Institute for Earth Sciences, Granada (Spain), Local committee, 2012
- High school science outreach:
 - Everything you always wanted to know about SCIENCE but were afraid to ask, Santo Tomás de Aquino High School, Valladolid, Spain, 2013
 - The origins of life on Earth: is there more life out there?, Santo Tomás de Aquino High School, Valladolid, Spain, 2016

Attended Symposiums/Summer Schools

American Geophysical Union	2018-2019
Spanish Astrophysical Society Symposium	2018
Fundación Ramón Areces, “Origins of life and the search of life in the Universe”	2016
NORDITA Summer School, Impacts and their role in the evolution of life	2013
European Geophysical Union	2012
Josep Comas i Solá, X International School of Astrobiology Origins of the Buildings Blocks for Life	2012

Astrobiology Graduate Conference (ABGRADCON)	2012
European Astrobiology Network Association (EANA)	2012
Thermodynamics, Disequilibrium and Evolution NAI Workshops	2011 – 2012

Mentorship (co-director)

- De la Cuesta Castillo, Carmen, “Radiation in planetary surfaces and implications for vegetation”, Master thesis, Valencian International University, Spain (2017)
- De Cabo García, Alejandro, “MARSchine Learning: a data-driven approach to Mars’ meteorology”, doctoral thesis, University of Salamanca, Spain (to be defended in fall 2019)

Service

Manuscript peer review (Dynas, Elsevier, Nature, MDPI, Journal of Climate)

Computer skills

FORTRAN, C, R, Matlab, Mathematica, IDL

Language Skills

Spanish (native)

English (113/120 TOEFL ibt, 2015)

Certified courses

- Expert in Solar Energy: planning and installation
 - CENSOLAR: Centro de Estudios de la Energía Solar (Spain)
- Specialization: Foundations of Management
 - IESE Business School / Coursera. License 2XA44RX788D4
 - Operational Finance: Finance for Managers
 - IESE Business School / Coursera. License XX3VZCYCX65G
 - Accounting: Principles of Financial Accounting
 - IESE Business School / Coursera. License QU2JDUASL567
 - Marketing: Customer Needs and Wants
 - IESE Business School / Coursera. License HH2BT9DR8GHA
 - Organizational Behavior: How to Manage People
 - IESE Business School / Coursera. License C5PVRQ625MYT
 - Analysis of Business Problems
 - IESE Business School / Coursera. License LSBE33QT459A
- Introduction to Programming with MATLAB
 - Vanderbilt University / Coursera
- Financial Engineering and Risk Management
 - Columbia University / Coursera. License FXEZZC4TV85K
- Coursera Mentor Community and Training Course (in Financial Engineering)
 - Coursera. License 7257XPFES28N

Certified Courses – Data Science

- Specialization: Mastering Software Development in R
 - The R Programming Environment
 - Johns Hopkins University / Coursera. License SVH2TZJUW5U6
 - Advanced R Programming
 - Johns Hopkins University / Coursera. License UNWN6GNT9XNN
 - Building R Packages
 - Johns Hopkins University / Coursera. License V3SM2HP7UVHW
 - Building Data Visualization Tools
 - Johns Hopkins University / Coursera. License LPLMTL7W6P82

- Specialization: Data Science
 - The Data Scientist's Toolbox
 - Johns Hopkins University / Coursera. License 3NE9KQL5K3XG
 - R Programming
 - Johns Hopkins University / Coursera. License KSVXWCQ7MGCG
 - Getting and Cleaning Data
 - Johns Hopkins University / Coursera. License P3WEF4RW2FGR

- Machine Learning
 - Stanford University / Coursera. License EFSMLMDDXFYG