

# Foivos G. Karakostas

Ph.D. Geophysicist / Planetary Seismologist

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## Academic Positions

March 2019 - now: Post-Doctoral Associate, Department of Geology, University of Maryland

## Education

Ph.D. in Geophysics / Planetary Sciences, Université Paris Diderot - Institut de Physique du Globe de Paris, France, September 2018.

M.Sc. Earth, Environmental and Planetary Sciences - Specialty: Geophysics, Université Paris Diderot - Institut de Physique du Globe de Paris, France, July 2014.

B.S. Geology, Aristotle University of Thessaloniki, Greece, July 2010.

## Dissertations

Ph.D. Thesis (2018), "Analysis and modeling of meteor impact and airburst generated seismic waves on terrestrial planets with atmosphere." Supervisors: Philippe Lognonné, Carene Larmat

M.Sc. dissertation (2014), "Comparative shock waves analysis between Earth and Lunar meteor impacts." Supervisors: Philippe Lognonné, Katarina Miljković

Student internship (2012), "Study of the efficiency of a wind and thermal shield (WTS) for a Martian seismometer." Supervisor: Philippe Lognonné

B.S. dissertation (2010), "Seismic and tectonic characteristics of the Gulf of Corinth" Supervisor: Emmanuel Scordilis

## Research activity

1. Seismology focused on extraterrestrial seismology. Comparative analysis Earth, Mars, Moon.
2. Forward modeling of seismic waves using normal mode summation and spectral element method. Study of seismic wave excitation in solid Earth by meteoroid impacts, and their dispersion in the coupled atmosphere-solid planetary system.
3. Inversion of meteoroids as seismic sources. Investigation of shock wave propagation and generation. Nonlinear modeling.
4. Planetary crust exploration through investigation of the seismic attenuation.
5. Laboratory measurements of elastic properties of materials.

## Participation in research projects

InSight (Interior Exploration using Seismic Investigations, Geodesy and Heat Transport) – NASA, CNES, DLR

## Internships

July 2012 – June 2013: Characterization of the properties of Martian Simulant Soils (CERMES, ENPS, Champs-sur-Marne, France) for InSight mission (NASA, JPL, IPGP, DLR etc.)

July 2008: Seismological data analysis of the earthquake of NW Peloponnesus of June 8th, 2008 (EPPO – Earthquake Planning and Protection Organization, Athens, Greece)

## Other experience

Contributor at review panels of research project proposals (NASA)

Installation of seismographic networks

Participated in topographic measurements

Conference organisation:

Institut de Physique du Globe de Paris PhD Congress, 2015

## Visits and cooperation

Los Alamos National Laboratory, Los Alamos, NM, USA - November, 2015, May - August, 2016

NASA Jet Propulsion Laboratory, Pasadena, CA, USA - May - June, 2014

Black Forest Observatory, Schiltach, Germany - July 2012, July, 2014

École Nationale des Ponts et Chaussées, Champs-sur-Marne, France - July, 2012 - July, 2013

## Teaching experience

Practice for “Field Geophysics”, B.S. degree in “Geology (Geophysics Track)”, Department of Geology, University of Maryland, College Park, MD (2019)

Practice for “Comparative Planetology”, MSc of “Earth Sciences, Environment and Planets”, Institut de Physique du Globe de Paris, Université Paris Diderot (2017)

Practice for “Oscillations of Planets and Stars”, MSc of “Earth Sciences, Environment and Planets”, Institut de Physique du Globe de Paris, Université Paris Diderot (2017)

Exercises for “Physics for Geosciences: Atmosphere, Ocean, Climate”, B.S. of “Earth Sciences, Environment and Planets”, Université Paris Diderot (2017)

## Skills

### IT

Forward modeling synthetic seismogram softwares (Spectral Element Method, Normal Modes Summation)

Seismic data processing software (ObsPy)

Programming languages: Matlab, Python, Fortran, Shell

### Languages

Greek – Native

English – Professional Proficiency

French – Professional Proficiency

Italian – Elementary level

Spanish – Elementary level

## Publications

### Peer Review Journals

1. Daubar, I. J., Lognonné, P., Teanby, N. A., Collins, G. S., Clinton, J., Stähler, S., Spiga, A., **Karakostas, F.**, Ceylan, S., Malin, M., McEwen, A. S., Maguire, R., Charalambous, C., Onodera, K., Lucas, A., Rolland, L., Vaubaillon, J., Kawamura, T., Böse, M., Horleston, A., van Driel, M., Stevanović, J., Miljković, K., Fernando, B., Huang, Q., Giardini, D., Larmat, C. S., Leng, K., Rajšić, A., Schmerr, N., Wójcicka, N., Pike, T., Wookey, J., Rodriguez, S., Garcia, R., Banks, M. E., Margerin, L., Posiolova, L., Banerdt, B. (2020) “A New Crater Near InSight: Implications for Seismic Impact Detectability on Mars”. *Journal of Geophysical Research: Planets*, 125, doi: 10.1029/2020JE006382
2. Giardini, D., Lognonné, P., Banerdt, W. B., Pike, W. T., Christensen, U., Ceylan, S., Clinton, J. F., van Driel, M., Stähler, S. C., Böse, M., Garcia, R. F., Khan, A., Panning, M., Perrin, C., Banfield, D., Beucler, E., Charalambous, C., Euchner, F., Horleston, A., Jacob, A., Kawamura, T., Kedar, S., Mainsant, G., Scholz, J.-R., Smrekar, S. E., Spiga, A., Agard, C., Antonangeli, D., Barkaoui, S., Barrett, E., Combes, P., Conejero, V., Daubar, I., Drilleau, M., Ferrier, C., Gabsi, T., Gudkova, T., Hurst, K., **Karakostas, F.**, King, S., Knapmeyer, M., Knapmeyer-Endrun, B., Llorca-Cejudo, R., Lucas, A., Luno, L., Margerin, L., McClean, J. B., Mimoun, D., Murdoch, N., Nimmo, F., Nonon, M., Pardo, C., Rivoldini, A., Rodriguez Manfredi, J. A., Samuel, H., Schimmel, M., Stott, A. E., Stutzmann, E., Teanby, N., Warren, T., Weber, R. C., Wicczorek, M., Yana, C. (2020). “The Seismicity of Mars”. *Nat. Geosci.*, doi:10.1038/s41561-020-0539-8
3. Daubar, I., Lognonné, P., Teanby, N.A., Miljković, K., Stevanović, J., Vaubaillon, J., Kenda, B., Kawamura, T., Clinton, J., Lucas, A., Drilleau, M., Yana, C., Collins, G.S., Banfield, D., Golombek, M., Kedar, S., Schmerr, N., Garcia, R., Rodriguez, S., Gudkova, T., May, S., Banks, M., Maki, J., Sansom, E., **Karakostas, F.**, Panning, M., Fuji, N., Wookey, J., van Driel, M., Lemmon, M., Ansan, V., Böse, M., Stähler, S., Kanamori, H., Richardson, J., Smrekar, S., Banerdt, W.B (2018), “Impact-Seismic Investigations of the InSight Mission”. *Space Sci. Rev.*, 214:132, doi: 10.1007/s11214-018-0562-x
4. **Karakostas, F.**, Rakoto, V., Lognonné, P., Larmat, C., Daubar, I., Miljković, K., (2018). “Inversion of meteor Rayleigh waves on Earth and modeling of air coupled Rayleigh waves on Mars”. *Space Sci. Rev.*, 214:127, doi: 10.1007/s11214-018-0566-6

5. Fayon, L., Knapmeyer-Endrun, B., Lognonné, P., Bierwirth, M., Kramer, A., Delage, P., **Karakostas, F.**, Kedar, S., Murdoch, N., Garcia, R., Verdier, N., Tillier, S., Pike, W.T., Hurst, K., Schmelzbach, C., Banerdt, W.B. (2018). "A numerical model of the SEIS leveling system transfer matrix and resonances: application to SEIS rotational seismology and dynamic ground interaction". *Space Sci. Rev.*, 214:127, doi:10.1007/s11214-018-0555-9
6. Delage, P., **Karakostas, F.**, Dhemaied, A., Belmokhtar, M., Lognonné, P., Golombek, M., De Laure, E., Hurst, K., Dupla, J.-C., Keddar, S., Cui, Y.-J., Banerdt, B. (2017). "An Investigation of the Mechanical Properties of Some Martian Regolith Simulants with Respect to the Surface Properties at the InSight Mission Landing Site", *Space Sci. Rev.*, pp 1-23, doi: 10.1007/s11214-017-0339-7
7. Lognonné, P., **Karakostas, F.**, Rolland, L., Nishikawa, Y. (2016). "Modeling of atmospheric-coupled Rayleigh waves on planets with atmosphere: From Earth observation to Mars and Venus perspectives", *J. Acoust. Soc. Am.* 140 (2), pp 1447-1468, doi: 10.1121/1.4960788

### Conference proceedings

1. **Karakostas, F.**, Schmerr, N., Bailey, S. H., DellaGiustina, D., Habib, N., Bray, V., Pettit, E., Dahl, P., Quinn, T., Marusiak, A. G., Avenson, B., Wagner, N., Brodbeck, J. I. (2020). "Seismic Investigation of a Meteoroid Airburst in Greenland, as a Terrestrial Analog for Icy Regions with an Atmosphere in the Solar System". *51st Lunar and Planetary Science Conference*, 2120
2. **Karakostas, F.**, Lognonné, P., Larmat, C., Schmerr, N. (2019). "A Martian impact full rayleigh waveform inversion technique for 1D identification of crustal structure", *50th Lunar and Planetary Science Conference*, 1530.
3. Schmerr, N.C., Kawamura, T., Margerin, L., van Driel, M., Garcia, R., **Karakostas, F.**, Tauzin, B., Lognonné, P. (2019). "Measuring the scattering and attenuation of seismic waves in Mars with the InSight seismometers", *50th Lunar and Planetary Science Conference*, 1644.
4. Miljković, K., Collins, G.S., Rajšić, A., Wojcicka, N., Neidhart, T., **Karakostas, F.**, Teanby, N.A., Daubar, I.J., Lognonné, P., Wiczeorek, M.A., and the InSight team (2019). "Numerical investigation of impact-induced seismic signal in Martian crust", *50th Lunar and Planetary Science Conference*, 1503.
5. Wójcicka, N., Collins, G.S., Bastow, I., Miljković, K., Teanby, N.A., **Karakostas, F.**, Lognonné, P., and the InSight team (2019). "Investigating the relationship between the seismic efficiency and seismic moment and impactor properties on Mars", *50th Lunar and Planetary Science Conference*, 2633.
6. Daubar, I. J., Lognonné, P., Teanby, N. A., Miljkovic, K., Kawamura, T., Stevanović, J., Vaubailon, J., Clinton, J., Golombek, M. P., Banfield, D., Lucas, A., Drilleau, M., van Driel, M., Collins, G. S., Gudkova, T., Rodriguez, S., Fuji, N., Kedar, S., Yana, C., Maki, J., Banks, M., Panning, M., Garcia, R. F., Sansom, E., May, S., Wookey, J., Schmerr, N., Lemmon, M., Kenda, B., Böse, M., Ansan, V., Kanamori, H., **Karakostas, F.**, Banerdt, W. B., Smrekar, S. (2018). "Impact-Seismic Investigations Planned for the InSight Mission". *49th Lunar and Planetary Science Conference*, 1743
7. Miljković, K., Sansom, E.K., Daubar, I.J., **Karakostas, F.**, Lognonné, P. (2016). "Fate of meteoroid impacts on Mars detectable by the InSight mission". *47th Lunar and Planetary Science Conference*, 1768
8. Daubar, I.J., Golombek, M.P., McEwen A.S., Byrne, S., Kreslevsky, M., Schmerr, N.C., Banks, M.E., Lognonné, P., Kawamura, T., **Karakostas, F.** (2015). "Measurement of the current martian cratering size frequency distribution, predictions for and expected improvements from InSight". *46th Lunar and Planetary Science Conference*, 2468.

## In preparation

1. **Karakostas, F.**, Schmerr, N., Bailey, S. H., DellaGiustina, D., Habib, N., Bray, V., Pettit, E., Dahl, P., Quinn, T., Marusiak, A. G., Avenson, B., Wagner, N., Brodbeck, J. I. (2020). "Ice shelf structure inversion through investigation of seismic and infrasound waves generated by a meteoroid airburst, on July 25, 2018".
2. **Karakostas, F.**, Schmerr, N., Maguire, R., Kim, D., Huang, Q., Lognonné, P., Giardini, D., Banerdt, B. et al. (2020). "Seismic Attenuation of Martian Interior through Coda Wave Analysis".

## Conferences and other communication

### Talks

#### 2020

July 22, 2020 – InSight science team meeting, virtual – "S-coda waves analysis of the InSight marsquakes, for the investigation of the seismic attenuation of Martian interior."

April 1, 2020 - Carnegie Institution LPSC virtual session – "Seismic investigation of a meteoroid airburst in Greenland, as a terrestrial analog for icy regions with an atmosphere in the solar system" (YouTube link: <https://youtu.be/PL959ZbRPSc?t=4070>)

February 24, 2020 - InSight science team meeting, Nice France – "Seismic Attenuation of the Martian Interior from coda wave analysis."

#### 2019

June 19, 2019 - InSight science team meeting, Paris, France – "Impact surface waves modeling for InSight operations."

May 7, 2019 – UMD Geophysics Group Seminars – "Inversion and modeling of Rayleigh waves generated by meteoroid events on planets with atmosphere."

#### 2018

November 5, 2018 – French InSight Day, Paris, France – "Inversion of impact Rayleigh waves on Earth and modeling of air-coupled Rayleigh waves on Mars."

September 27, 2018 – InSight science team meeting, Graz, Austria – "Inversion of Rayleigh meteor waves on Earth and modeling on Mars."

#### 2017

June 29, 2017 – IGP/AIM joint seminars, Paris, France – "Modeling of atmospheric Rayleigh waves generated on Earth and Mars."

April 4, 2017 – InSight science team meeting, Oxford, UK – "Modeling of Rayleigh waves generated by meteor impacts on Mars."

March 17, 2017 – Institut de Physique du Globe PhD Congress, Paris, France – "Modeling of meteor impact airbursts on Earth and Mars: comparative analysis"

**2016**

December 5, 2016 – InSight MSS-MQS meeting, Paris, France – “Atmospheric Events: Meteor Impacts”.

August 26, 2016 – National and Kapodistrian University of Athens, Department of Geology invited talk, Athens, Greece – “Modeling of meteor impact airbursts on Earth and Mars: comparative analysis.” (*in Greek*)

July 26, 2016 – Los Alamos National Laboratory, Center for Space and Earth Science seminars, Los Alamos, NM, USA – “Modeling of meteor impact airbursts on Earth and Mars: comparative analysis.”

May 24, 2016 – InSight science team meeting, Toulouse, France – “Inversion of seismic sources of atmospheric impacts on Earth and modeling on Mars.”

May 3, 2016 – InSight MSS-MQS meeting, ETH, Zurich, Switzerland – “Inversion of seismic sources of atmospheric impacts on Earth and modeling on Mars.”

March 18, 2016 – Institut de Physique du Globe PhD Congress, Paris, France – “Inversion of the Chelyabinsk seismic surface waves and comparative constraints on the generation of seismic waves by atmospheric impacts on Earth and Mars.”

February 11, 2016 – IGP/AIM joint seminars, Paris, France – “Inversion of meteor impact sources and analysis of the surface and shock waves generated by them.”

**2015**

December 3, 2015 – Los Alamos National Laboratory, Los Alamos, NM, USA – “Inversion of meteor impact sources and analysis of the surface and shock waves generated by them.”

**Posters****2020**

July 8, 2020 – NASA Science Exploration Forum (virtual meeting) – “Investigation of seismic and infrasound waves, generated by an airburst near Qaanaaq, Greenland”.

February 25, 2020 – InSight science team meeting, Nice, France – “Seismic Attenuation of the Martian Interior from coda wave analysis.”

**2019**

December 12, 2019 – AGU Fall Meeting, San Francisco, CA, USA – “Constraints for the Martian meteoroid impact seismic signals through modeling based on comparison of Terrestrial, Lunar and Martian data.”

October 22, 2019 – InSight science team meeting, Los Angeles, CA, USA – “Update on Martian impacts modeling, after almost one year of Martian seismic data recordings.”

March 19, 2019 – Lunar and Planetary Science Conference, The Woodlands, TX, USA – “A Martian impact full rayleigh waveform inversion technique for 1D identification of crustal structure.”

**2018**

December 14, 2018 – AGU Fall Meeting, Washington, DC, USA – “Inversion of meteor Rayleigh waves on Earth and modeling of air coupled Rayleigh waves on Mars.”

May 6, 2018 – InSight Science Team Meeting, Buellton, CA, USA – “Source inversion of Chelyabinsk and perspective for inversion of Mars airburst”

## 2017

November 28, 2017 – French InSight Day, Paris, France – “Modeling of meteor impact airbursts on Earth and Mars: comparative analysis.”

## 2016

December 13, 2016 – AGU Fall Meeting, San Francisco, CA, USA – “Modeling of meteor impact airbursts on Earth and Mars: comparative analysis.”

September 13, 2016 – International School of Space Science, L'Aquila, Italy – “Modeling of meteor impact airbursts on Earth and Mars: comparative analysis.”

## 2015

December 14, 2015 – AGU Fall Meeting, San Francisco, CA, USA – “Inversion of the Chelyabinsk seismic surface waves and comparative constraints on the generation of seismic waves by atmospheric impacts on Earth and Mars.”

October 13, 2015 – French seismologic and geodetic network (RESIF) meeting. La Grande Motte, France – “Inversion of the Chelyabinsk seismic surface waves and comparative constraints on the generation of seismic waves by atmospheric impacts on Earth and Mars.”

October 6, 2015 – InSight science team meeting, Zurich, Switzerland – “Inversion of the Chelyabinsk seismic surface waves and comparative constraints on the generation of seismic waves by atmospheric impacts on Earth and Mars.”

June 1, 2015 – Seismic Experiment of Internal Structure (SEIS) meeting. Fez, Morocco – “Shock waves analysis and inversion of seismic sources generated by meteor impacts on telluric bodies.”

March 23, 2015 – Institut de Physique du Globe PhD Congress, Paris, France – “Shock waves analysis and inversion of seismic sources generated by meteor impacts on telluric bodies.”

## 2014

November 20, 2014 – Structure and dynamics of Earth like planets, Workshop at College de France, Paris, France – “Comparative shock waves analysis between Earth and Lunar meteor impacts.”

October 26, 2014 – LabEx UnivEarths Fall School, Florence, Italy – “Comparative shock waves analysis between Earth and Lunar meteor impacts.”

## Scientific associations membership

Member of the American Geophysical Union

Member of Society of Exploration Geophysicists

Member of EuroPlanet Society - Southeastern Europe Hub

Member of the Geotechnical Chamber of Greece

Member of Association of Greek Geologists

## **Administrative experience**

Student deputy at the Doctoral School of Institut de Physique du Globe de Paris, (2015-2017)

Student deputy at the Senate of the Aristotle University of Thessaloniki, (2007-2009)

Student deputy at the Administrative Council of the Department of Geology, Aristotle University of Thessaloniki, (2006-2009)

Student deputy at the General Assembly of the Department of Geology, Aristotle University of Thessaloniki, (2006-2009)

Secretary of the Department of Geology Students' Union, Aristotle University of Thessaloniki, (2006-2007)

## **Social activity**

Member of the Hellenic Community of Paris and Suburbs (2012-2018)

Member of "Teenagers Parliament" (Program of the Ministry of Education of Greece) (2003)

## **Other interests**

Sports: Rugby Union, amateur level championship in France and the USA. Association Football, amateur level championship in Greece, France and the USA.

Musician, ex-member of the Municipal Band of Kalamaria, Thessaloniki, worked as free-lancer musician.

Last updated: July 31, 2020

F. Karakostas

