

# Benoît Seignovert

ASTROPHYSICIST · RESEARCH ENGINEER · DATA SCIENTIST

Laboratory of Planetology and Geodynamics (LPG), Nantes, FR

📧 benoit.seignovert.fr

## Employment

### Laboratory of Planetology and Geodynamics (LPG)

CNRS RESEARCH ENGINEER

Nantes, France

Nov. 2020 - Oct. 2021

- Development of **coverage analysis** tool for ESA-JUICE mission, under contract with ESA.

### Jet Propulsion Laboratory (NASA/JPL-Caltech)

POST-DOCTORAL RESEARCHER

Pasadena, CA USA

Oct. 2018 - Oct. 2020

- Mapping of Titan's specular reflexions during the Cassini mission.
- Analysis of lossy compression on hyperspectral datasets for outer-planets exploration.
- Characterization of Titan's clouds and haze structure

### Laboratory of Planetology and Geodynamics (LPG)

RESEARCH ENGINEER / POST-DOCTORAL RESEARCHER

Nantes, France

Jan. - Sept. 2018

- Development of the **Cassini VIMS Data Portal**, a web interface for the calibrated Cassini-VIMS dataset.

### Group of Molecular and Atmospheric Spectroscopy (GMSA)

RESEARCH ENGINEER

Reims, France

Oct. - Dec. 2017

- Development of analysis tools for the Cassini-ISS instrument.

## Education

### University of Reims Champagne-Ardenne

DOCTOR OF PHILOSOPHY (ASTRONOMY & ASTROPHYSICS)

Reims, France

2014 - 2017

- Thesis title: **Analysis of Titan's Detached Haze Layer with Cassini-ISS instrument**
- Supervisors: Pr. Pascal RANNOU and Dr. Panayotis LAVAS

### École Normale Supérieure of Lyon

BACHELOR AND MASTER DEGREE IN EARTH AND PLANETARY SCIENCE (WITH HONOURS)

Lyon, France

2011 - 2014

## Research Internships

### Cassini high resolution navigation with star catalogues

SUPERVISOR: ROBERT A. WEST

JPL, Pasadena, USA

Mar. - Apr. 2017

- Full calibration and deconvolution of ISS data
- Star navigation with the Tycho & GAIA catalogues

### Modeling radar response of Linear Dunes and Mega-Yardangs on Earth and Titan

SUPERVISOR: PHILIPPE PAILLOU

LAB, Bordeaux, France

Jan. - Jul. 2014

- Cassini and TerraSAR-X radar image analysis
- SRTM and GDEM data processing
- Radar backscattering modeling

### Cassini VIMS image processing on Titan

SUPERVISOR: CHRISTOPHE SOTIN

JPL, Pasadena, USA

May - Aug. 2013

- Hyperspectral infrared image processing
- Image navigation and mapping
- Gravitational fields analysis

### Analysis on stable tungsten isotopes in iron meteorites

SUPERVISORS: BRETON THOMAS & QUITTÉ GHYLAINE

ÉNSL, Lyon, France

Jan. - Apr. 2013

- Iron meteorites sampling
- Isotopic chemistry extraction
- ICP mass spectrometry

## First-author publications:

- 2 HAZE SEASONAL VARIATIONS OF TITAN'S UPPER ATMOSPHERE DURING THE CASSINI MISSION 2021  
Seignovert B., Rannou P., West R.A. & Vinatier S. Astrophysical Journal
- 1 AEROSOLS OPTICAL PROPERTIES IN TITAN'S DETACHED HAZE LAYER BEFORE THE EQUINOX 2017  
Seignovert B., Rannou P., Lavvas P., Cours T. & West R.A. Icarus

## Second-author publications:

- 3 TITAN'S DETACHED HAZE SEASONAL CYCLE 2018  
West, R.A., Seignovert B., Rannou P., Dumont Ph., Turtle, P., Perry J., Roy M. & Ovanessian A. Nature Astronomy
- 2 TRANSPARENCY OF 2  $\mu$ m WINDOW OF TITAN'S ATMOSPHERE 2017  
Rannou P., Seignovert B., Le Mouélic S., Maltagliati L. & Sotin C. Planetary and Space Science
- 1 RADAR SCATTERING OF LINEAR DUNES AND MEGA-YARDANGS: APPLICATION TO TITAN 2016  
Paillou Ph., Seignovert B., Radebaugh J. & Wall S. Icarus

## N-author publications:

- 13 TITAN'S GLOBAL RADIANT ENERGY BUDGET DURING THE CASSINI EPOCH (2004-2017) in press  
Creedy, E.C., Li L., Jiang X., West R.A., Fry P.M., Nixon C.A., Kenyon M.E., Seignovert B. GRL
- 12 EUROPA CLIPPER PREPARATORY PHOTOMETRY TO CONSTRAIN SURFACE PROPERTIES 2021  
Dhingra R.D., Buratti B.J. & Seignovert B. Planetary Science Journal
- 11 TITAN: EARTH-LIKE ON THE OUTSIDE, OCEAN WORLD ON THE INSIDE 2021  
MacKenzie S. and 32 colleagues Planetary Science Journal
- 10 COMPRESSION ALGORITHMS FOR BIG DATA IN PLANETARY AND EXOPLANETARY MISSIONS 2021  
Xie H., West R.A., Seignovert B., Jewell J., Kurth W. & Averkam T. JATIS
- 9 DISTRIBUTION AND INTENSITY OF WATER ICE SIGNATURE IN SOUTH XANADU AND TUI REGIO 2021  
Coutelier M., Cordier D., Seignovert B. & Rannou P. Icarus
- 8 SUN GLITTER ON TITAN'S KRACKEN MARE: EVIDENCE FOR TIDAL CURRENTS AND WIND WAVES 2020  
Heslar M., Barnes J., Soderblom J., Dhingra R., Seignovert B. & Sotin C. Planetary Science Journal
- 7 TEMPERATURE AND CHEMICAL SPECIES DISTRIBUTIONS IN THE STRATOSPHERE AND MESOSPHERE OF TITAN FROM MID-NORTHERN SPRING TO EARLY SUMMER 2020  
Vinatier, S., Mathé, C., Bézard, B., Vasant d'Ollone, J., Lebonnois, S., Dauphin, C., Seignovert, B., Sylvestre, M., Teanby, N.A., Achterberg, R.K., Flasar, F.M., Goriunov, N., Jennings, D.E., Mamoutkine, A. & Guandique, E. Astronomy & Astrophysics
- 6 INVESTIGATING LUNAR BOULDERS AT THE APOLLO 17 LANDING SITE USING PHOTOGRAMMETRY AND VIRTUAL REALITY 2020  
Le Mouélic S., Enguehard P., Schmitt H.H., Caravaca G., Seignovert B., Mangold N., Combe J-Ph. & Civet F. Remote sensing
- 5 PHOTOMETRICALLY-CORRECTED GLOBAL INFRARED MOSAICS OF ENCELADUS: NEW IMPLICATIONS FOR ITS SPECTRAL DIVERSITY AND GEOLOGICAL ACTIVITY 2020  
Robidel R., Le Mouélic S., Tobie G., Massé M., Seignovert B., Sotin C. Icarus
- 4 SPICEYPY: A PYTHONIC WRAPPER FOR THE SPICE TOOLKIT 2020  
Annex A.M., Pearson B., Seignovert B., Carcich B.T., Eichhorn H., Mapel J.A., Freiherr von Forstner J.L., McAuliffe J., del Rio J.D., Berry K.L., Aye K.M., Steffo M., de Val-Borro M., Kulamani S. & Murakami S. JOSS
- 3 THE 3.4  $\mu$ m ABSORPTION OF THE TITAN'S STRATOSPHERE: CONTRIBUTION OF ETHANE, PROPANE, BUTANE AND COMPLEX HYDROGENATED ORGANICS 2020  
Cours T., Cordier D., Seignovert B., Maltagliati L. & Biennier L. Icarus
- 2 THE CASSINI VIMS ARCHIVE OF TITAN: FROM BROWSE PRODUCTS TO GLOBAL INFRARED COLOR MAPS 2019  
Le Mouélic S., Cornet T., Rodriguez S., Sotin C., Seignovert B., Barnes J.W., Brown R.H., Baines K.H., Buratti B.J., Clark R.N., Nicholson Ph.D., Lasue J. & Soderblom J. Icarus
- 1 MAPPING POLAR ATMOSPHERIC FEATURES ON TITAN WITH VIMS: FROM THE DISSIPATION OF THE NORTHERN CLOUD TO THE ONSET OF A SOUTHERN POLAR VORTEX 2018  
Le Mouélic S., Rodriguez S., Robidel R., Rousseau B., Seignovert B., Sotin C., Barnes J.W., Brown R.H., Baines K.H., Buratti B.J., Clark R.N., Nicholson Ph.D., Rannou P. & Cornet T. Icarus

## Seminars & Conference Talks

2021	<b>5th Planetary Data Workshop (PDW)</b>	<i>Virtual Conference</i>
2020	<b>American Geophysical Union (AGU)</b>	<i>Virtual Conference</i>
	<b>European Planetary Science Congress (EPSC)</b>	<i>Virtual Conference</i>
	<b>Titan Through Time</b> , <i>cancelled</i>	<i>Boulder, USA</i>
	<b>51th Lunar and Planetary Science Conference (LPSC)</b> , <i>cancelled</i>	<i>The Woodlands, USA</i>
2019	<b>American Geophysical Union (AGU)</b>	<i>San Francisco, USA</i>
	<b>Titan Surface Meeting - Titan after Cassini Huygens</b>	<i>Madrid, Spain</i>
	<b>European Planetary Science Congress (EPSC)</b>	<i>Geneva, Switzerland</i>
	<b>50th Lunar and Planetary Science Conference (LPSC)</b>	<i>The Woodlands, USA</i>
	<b>NASA Astrobiology Institute workshop (NAI)</b>	<i>Pasadena, USA</i>
2018	<b>European Planetary Science Congress (EPSC)</b>	<i>Berlin, Germany</i>
	<b>Committee on Space Research (COSPAR)</b>	<i>Pasadena, USA</i>
	<b>European Geosciences Union (EGU)</b>	<i>Vienna, Austria</i>
2017	<b>European Planetary Science Congress (EPSC)</b>	<i>Riga, Latvia</i>
	<b>European Geosciences Union (EGU)</b>	<i>Vienna, Austria</i>
	<b>48th Lunar and Planetary Science Conference (LPSC)</b>	<i>Houston, USA</i>
2016	<b>Division for Planetary Science (DPS)</b>	<i>Pasadena, USA</i>
	<b>Titan Surface Meeting (TSW)</b>	<i>Paris, France</i>
	<b>Titan Aeronomy and Climate workshop (TAC)</b>	<i>Reims, France</i>
2015	<b>European Planetary Science Congress (EPSC)</b>	<i>Nantes, France</i>
2014	<b>Reunion des Sciences de la Terre (RST)</b>	<i>Pau, France</i>
	<b>Workshop on the Habitability of Icy Worlds</b>	<i>Pasadena, USA</i>
2013	<b>American Geophysical Union (AGU)</b>	<i>San Francisco, USA</i>
	<b>European Geological Union (EGU)</b>	<i>Vienna, France</i>
2012	<b>Annual Meteoritical Society Meeting (MetSoc)</b>	<i>Cairns, Australia</i>

## Training

### Summer schools

Jun. 2015	<b>Spec-Atmos</b> , CNRS	<i>Fréjus, France</i>
Jul. 2014	<b>Space missions for geophysics of the terrestrial planets</b> , ESA/FFG/CNES	<i>Alpbach, Austria</i>

### Field works

Oct. 2012	<b>Stratigraphy analysis of sedimentary basin</b>	<i>Blieux, France</i>
Oct. 2012	<b>Geomorphology in ophiolitic context</b>	<i>Mt Chenaillet, France</i>
May 2012	<b>Sedimentology, Metamorphism and Volcanism</b>	<i>Tournon &amp; Puy de Sancy, France</i>
Apr. 2012	<b>Marine Seismology</b>	<i>Nice, France</i>
2011	<b>Initiation to geology field work / Geology Mapping</b> , 2 weeks	<i>Le Mas/Cucugnan, France</i>

## Honors & Awards

2018 – 2020	<b>Postdoctoral Scholarship</b> , Jet Propulsion Laboratory	<i>Pasadena, CA, USA</i>
2014 – 2017	<b>Doctor of Philosophy Scholarship</b> , French Ministry of Research	<i>Reims, France</i>
2014	<b>ESA summer school Alpbach grant</b> , CNES	<i>Alpbach, Austria</i>
2013	<b>EXPLORA travel grant for international interns</b> , Rhône-Alpes region	<i>Pasadena, USA</i>

## Outreach

2020	<b>Enceladus in Infrared</b>	<i>Astronomical Picture Of the Day</i>
	<b>Enceladus in the Infrared - PIA 24023</b>	<i>NASA JPL Photo Journal</i>
2018	<b>Titan comme vous ne l'avez jamais vu</b>	<i>Ciel &amp; Espace</i>
	<b>Seeing Titan</b>	<i>Astronomical Picture Of the Day</i>
	<b>Seeing Titan with Infrared Eyes - PIA 21923</b>	<i>NASA JPL Photo Journal</i>
2015	<b>Airburst over Chelyabinsk and small impactors</b>	<i>GSMA Journal Club</i>
2014	<b>La chute de la météorite de Tcheliabinsk (Russie) du 15 février 2013, un an après</b>	<i>Planet Terre</i>

# Leadership & Community Service

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## Open source projects

900+ CONTRIBUTIONS IN 2018, 1,200+ IN 2019, 400+ IN 2020.

## Python modules

10 PACKAGES.

## ESA/JUICE moon-coverage tool

MAIN DEVELOPER.

## Pole Surface Planétaires

ADMIN & MEMBER.

## PyVIMS toolbox

FOUNDER & MAIN DEVELOPER.

## Cassini VIMS Data Portal

DESIGNER & WEBMASTER: [vims.univ-nantes.fr](https://vims.univ-nantes.fr)

## Fireball Recovery and InterPlanetary Observation Network (FRIPON)

MEMBER & LOCAL TECHNICAL SUPPORT

## Astro-Café Parisien

MEMBER

## Titan Aeronomy & Climate workshop

CO-ORGANIZER & WEBMASTER: [planeto.univ-reims.fr/tac](https://planeto.univ-reims.fr/tac)

## ÉNS Lyon Astro club – têteENSI'air

PRESIDENT & WEBMASTER: [bde.ens-lyon.fr/clubs/astro](https://bde.ens-lyon.fr/clubs/astro)

*Github*

2015-2021

*PyPI / Conda*

2018-2021

*Gitlab / ESA DataLabs*

2020-2021

*Github*

2021

*Github / Blender*

2018-2021

*Nantes, France*

2018-2019

*Reims, France*

2016-2017

*Paris, France*

2016-2017

*Reims, France*

2016

*Lyon, France*

2011-2014

# Skills

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## Programming

Python, Fortran, C, Matlab, Julia, Bash, T<sub>E</sub>X

## Data analysis

NAIF-SPICE, USGS-ISIS, QGIS/ArcGIS, IDL/ENVI

## Web-Frontend

HTML5, CSS, JS (React/Vue/Three/D3), Sphinx, Swagger

## Web-Backend

PHP (Symfony/ApiPlatform), Django/Flask, nodeJS, Golang

## Database

SQLite, MySQL

## Management

Git (PR/CI/CD), Docker, Composer/Yarn/NPM, Webpack/Gulp, Apache/Nginx

## Photography

Lightroom, Photoshop, Inkscape, PTGui

## Virtual Reality

Povray, ThreeJS, Unity, Blender

## Video

DaVinci Resolve

# Activities

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## Astronomy

Nightscape to deep field observation and survey

## Photography

Digital / B&W film capture and processing: [photos.seignovert.fr](https://photos.seignovert.fr)

## Sports

Walking/Hiking/Trekking, Skiing, Climbing, Mountain biking

## Music

Flutist, Oboist, Rock band bassist

# Other

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## Citizenship

French

## Birth year

1990 (31 years old)

## Languages

French (native), English, Russian, German, Ancient Greek

## Driving

California Class C/French B/European licence