

# 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/ESA)

RESEARCH ENGINEER

Nantes, France

Nov. 2020 - Oct. 2021

- Development of coverage analysis tool for ESA-JUICE mission.

### 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:

- 3 MAPPING VIMS SPECULAR REFLECTIONS ON TITAN'S SURFACE DURING THE CASSINI MISSION in prep.  
*Seignovert B., Sotin C., Seignovert B., Lawrence K.J. & Heslar M.*
- 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  $\mu\text{m}$  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:

- 12 EUROPA CLIPPER PREPARATORY PHOTOMETRY TO CONSTRAIN SURFACE PROPERTIES in press  
*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 KRAKEN 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., Goriuss, 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  $\mu\text{m}$  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

---

## 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

---

## 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

---

## 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

---

## Citizenship

French

## Birth year

1990 (31 years old)

## Languages

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

## Driving

California Class C/French B/European licence