



Habitability in the Solar System and beyond

GeoPlanet Thematic school, Nov. 28 – Dec. 2, 2022
*Laboratoire de Planétologie & Géosciences,
Nantes Université*

Erasmus + GeoPlaNet Strategic Partnership - <https://geoplanet-sp.eu/>



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	Monday 28 nov.	Tuesday 29 nov.	Wednesday 30 nov.	Thursday 1 dec.	Friday 2 dec.
Chair	Christophe Sotin	Laetitia Le Deit	Susan Conway	Gabriel Tobie	Gaël Choblet
AM 1 8:30 - 10:00	09:00 - 10:00 Welcome breakfast & registration	08:30 – 10:00 Organic matter on ancient Mars Caroline Freissinet	08:30 – 10:00 ExoMars Jorge Vago	08:30 – 10:00 Structure and composition of icy worlds Olivier Bollengier	08:30 – 10:00 Outer solar system exploration: ESA/NASA Olivier Grasset
	10:00 - 10:45 Introduction & group project presentation				
10:00 - 10:30		Coffee break	Coffee break	Coffee break	Coffee break
AM 2 10:30 - 12:00	10:45 - 12:15 Planetary habitability Charles Cockell (visio)	10:30 – 12:00 Emergence of life on Earth Puri Lopez (visio)	10:30 – 12:00 VR/Group project	10:30 – 12:00 Hydrothermal systems in Icy Worlds Yasuhito Sekine	10:30 – 12:00 Group project
Lunch 12:00 - 14:00	12:15 - 14:00 Lunch break	12:00 - 12 :30 Picnic 12 :30 - Field Trip Piriac/Penestin	12:00 - 14:00 Lunch break	12:00 - 13:00 Lunch break	12:00 - 14:00 Lunch break
				13:00- 15:00	
PM 1 14 :00 - 15:30	14:00 – 15:30 Aqueous environments on Early Mars Nicolas Mangold	Field Trip Piriac/Penestin	14:00 – 15:30 VR/Group project	Exoplanet Atmosphere Recipes Edwin Kite*	14:00 - 16:00 Group project presentation/evaluation
PM 2 16:00 - 17:30	16:00 – 17:30 Current habitability on Mars Frances Westall (visio)	Field Trip Piriac/Penestin	16:00 – 17:30 VR/Group project	16:00 – 17:30 VR/Group project	Closure
Evening	Poster presentation Welcome party	19:00 - Social event <i>Les Filles du Marronnier</i> restaurant, Nantes		19:00 - Conference, Museum Nantes "Les océans cachés des lunes de Jupiter et Saturne" Christophe Sotin**	

Conferences organised on Thursday 1/12 :

***Edwin Kite's conference « Exoplanet Atmosphere Recipes » is open to all students and staff of the Faculté des Sciences et Techniques de Nantes Université.**

Prof. Edwin Kite is a planetary scientist from the University of Chicago who studies the evolution of rocky planets. Rocky planets retain traces of the evolution of their fluid envelopes over the long timescales that Earth's fossil record teaches us are necessary for the evolution of complex life.

Exoplanet Atmosphere Recipes

JWST will enrich our understanding of the atmospheres of sub-Neptunes and super-Earths, including potentially habitable worlds. I will discuss what determines which exoplanets retain atmospheres and oceans, and how exoplanet atmosphere compositions are shaped by elemental fractionation. Key processes that can shape habitable-exoplanet atmospheres include impact erosion, XUV-driven atmosphere loss, planetesimal contamination, and atmosphere-magma exchange. I will discuss sub-Neptunes, terrestrial exoplanets, and the worlds in between.

- Thursday Dec. 1, 13 :00, [Amphithéâtre Pasteur](#), Campus Sciences, Nantes Université.

**** Christophe Sotin's conference « Les océans cachés des lunes de Jupiter et de Saturne »** is a Multiplier event of the Erasmus + Strategic Partnership GeoPlaNet project. It is aimed at a broad audience in the region of Nantes. **The conference is given in French.**

Christophe Sotin is a professor at the Laboratoire de Planétologie et Géosciences de Nantes. He was hired by NASA Jet Propulsion Laboratory / Caltech in 2007 where he became the Chief Scientist for Solar System Exploration during the period 2012-2020. Back in Nantes in January 2021, he applies tools developed for the study of the Earth to interpret data acquired by space mission that have explored planets (Mars and Venus), satellites (Europa, Ganymede, Titan, Enceladus) and dwarf planets (Ceres) and to model the interior structure of exoplanets.

The hidden oceans of the moons of Jupiter and Saturn / Les océans cachés des lunes de Jupiter et de Saturne

The Galileo space mission around Jupiter and the Cassini mission around Saturn have revealed the presence of oceans under the icy crust of some of their moons. The conference will summarise the state of our knowledge on the subject on the eve of the launch of several missions dedicated to the investigation of these extraterrestrial oceans.

- Thursday Dec. 1, 19 :00, Muséum d'Histoire Naturelle, 12 rue Voltaire 44000 Nantes, [See on google map](#)

How to go to the Museum ?

The easiest way is to take the tram, line 2 at Morrhonnière to Commerce. Then walk about 10 mn to Rue Voltaire.

The screenshot shows a mobile navigation app interface. At the top, the destination is "Muséum D'Histoire Naturelle (N)". Below the destination, there is a dropdown menu set to "Partir maintenant" and a "Plus" button. A green "Rechercher" button is prominently displayed. Below the search bar, there are three circular icons representing different transport modes: a tram (selected), a bicycle, and a pedestrian. The app displays two route options:

- Route 1:** Walking (167 m, 02 min) to **Chemin de la Houssinière** at 12:14, then taking **Tram Line 2** to **Morrhonnière - Petit Port** at 12:17, and finally walking (766 m, 09 min) to **Rue Voltaire** at 12:41. The total duration is 27 minutes.
- Route 2:** Walking (766 m, 09 min) to **Morrhonnière - Petit Port** at 12:16, then taking **Tram Line 26** to **Commerce** at 12:41. The total duration is 24 minutes.

The right side of the screen shows a detailed view of the selected route (Route 1). It starts with a walking segment from 12:14 to 12:17 at **Chemin de la Houssinière**. A red vertical line indicates the tram journey on **Line 2** from **Morrhonnière - Petit Port** to **Commerce**, with a duration of approximately 14 minutes. The final segment is a walk from 12:31 to 12:41 at **Rue Voltaire**.