

## Position Description

### 1. General Information

<b>Name of the position</b>	<b>Climatic extremes in Antarctica</b>
<b>Foreseen date of enrolment</b>	1 October 2024
<b>Position is funded by</b>	<ul style="list-style-type: none"> <li>• COFUND, Marie Skłodowska-Curie Actions (MSCA), Horizon Europe, European Union</li> <li>• Université Grenoble Alpes (UGA)</li> <li>• University of Tasmania (UTAS)</li> </ul>
<b>Research Host</b>	Université Grenoble Alpes
<b>PhD awarding institutions</b>	Université Grenoble Alpes & University of Tasmania
<b>Locations</b>	Primary: Grenoble, France Secondary: Hobart, Australia
<b>Supervisors</b>	Vincent Favier (UGA), Sonya Fiddes and Tessa Vance (UTAS)
<b>Group of discipline</b>	Climatology, Climatology, water Isotopes, ice cores

### 2. Research topics (only one of these projects will be funded)

#### Project 1: *Investigation of Atmospheric River signals in East Antarctic coastal ice cores*

The Indian Ocean sector of the Southern Hemisphere mid-latitudes is a known region of mid-latitude blocking high pressure systems. These blocking high pressure systems can interact with low pressure systems, impeding their progress from west to east, and funnelling moisture and heat in meridional patterns that can affect both the East Antarctic region (with implications for surface mass balance) and Australasian climate and weather. At times, the intensity of the blocks means atmospheric rivers of intense heat and moisture form and are directed to high latitudes and interact with East Antarctica. However, extreme meteorological conditions can occur which are not related to ARs and thus do not fit within the relatively narrow definition of an AR.

This project seeks to specifically assess (a) what are the local and synoptic scale meteorological conditions during these (non-AR) events, (b) does local meteorological data from manned and automatic weather observing platforms record their passage, duration and intensity. (c) what are the large-scale circulation features and physical processes (cyclogenesis, RW propagation, tropical-extratropical interactions ...) generating these events? The findings from this project will be critical to understanding the causes the impacts of extreme events in Antarctica.



This project has received funding from the European Union's Horizon Europe research and innovation programme under the Marie Skłodowska-Curie grant agreement N° 101081465

**Supervisors:** Vincent Favier (UGA), Sonya Fiddes (UTAS), Tessa Vance (UTAS) & Yan Ropert-Coudert (IPEV)

**Research Fields:** Climatology, Climatology, water Isotopes, ice cores

**Project 2: *Role of Indian Ocean tropical/extratropical variability in the generation of extreme events impacting the East Antarctic coastal regions***

The Indian Ocean spans tropical to polar latitudes and is one of the most poorly understood regions in the world in terms of atmospheric circulation. Meteorological and climate information from large swathes of the region are only covered remotely by reanalysis products, which have relatively poor performance prior to the satellite era in 1979. What is known is that cyclogenesis in the Southern Hemisphere mid-latitudes (~30-60S) is particularly intense in the Indian Ocean sector. However, the way Indian Ocean cyclogenesis interacts with downstream blocking high pressure systems is not as well understood. Many recent studies have described the influence of atmospheric rivers on extreme precipitation in Antarctica, however, the definition and/or classification of mid to high latitude ARs in the SH is too narrowly defined to capture all the synoptic scale extreme events that result from interaction between LP and HP systems in the southern Indian Ocean. It is likely many meteorological extremes (for example, extremes of surface temperature or precipitation) occur across East Antarctica that are currently poorly studied as they fall outside of the definition of an atmospheric river.

This project seeks to specifically explore whether this region of intense cyclogenesis provides a direct synoptic link between the tropical and polar regions of the Indian Ocean and specifically whether this link has changed over time by examining climate signals preserved in ice core records from the Indian Ocean sector of East Antarctica. Are there climate signals preserved in already collected ice core records that indicate past variability in any tropical/extratropical linkages in the Indian Ocean? Do these records preserve not only variability, but can we derive estimates of past changes in extreme events such as tropical to polar moisture transport, more intense or more frequent mid-latitude cyclogenesis, or past changes in the connection or lack of connection between the tropical and polar Indian Ocean. The findings from this project will be critical to understanding past variability in the Indian Ocean.

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**Research Fields:** Climatology, Climatology, water Isotopes, ice cores

**Project 3: *Analysis of local to synoptic weather conditions during dry to extremely dry events impacting the surface characteristics of East Antarctic firn in the French and Australian sectors.***

Antarctica is a desert where precipitation is mainly due to extreme moisture circulations originating from the mid-latitudes and generated by blockings over the Indian Ocean sector of the southern hemisphere. However, several large blockings extending far into the interior of the continent have also been described as important drivers for relatively long periods without precipitation. Low precipitations are frequently associated with weak winds over the high domes of Antarctica and can result in changes, for instance, in surface grain size, but also lead to reduce snow storage on the continent. At the same time, at lower elevations, strong winds occurring during periods of low precipitation can also produce erosion and large sublimation to surface snow, generating thin ice layers. This project seeks to specifically assess (a) what the local and synoptic scale weather conditions are during these events, (b) whether the surface snowpack can exhibit isotopic signatures of these events (c) whether these events can be recorded in past climate archives such as the Law Dome and Mount Brown South ice cores.

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### 3. Employment Benefits and Conditions

The Université Grenoble Alpes offers a 36-months full-time work contract (with the option to extend up to a maximum of 42 months). There is a probation period of 2 months and the total working hours per week is 36h40.

The remuneration, in line with the European Commission rules for Marie Skłodowska-Curie grant holders, will consist of a gross annual salary of 28,647 EUR. Of this amount, the estimated net salary to be perceived by the Researcher is 1,918 EUR per month. However, the definite amount to be received by the Researcher is subject to national tax legislation.

#### Benefits include

- Becoming a Marie Skłodowska-Curie fellow and be invited to join the Marie Curie Alumni Association.
- Access to all the necessary facilities and laboratories at Université Grenoble Alpes and University of Tasmania, including GRICAD computational facilities.
- Tuition fees exemption at both PhD awarding institutions.
- Yearly travel allowance to cover flights and accommodation for participating in AUFRANDE events.
- 10,000 EUR allowance to cover flights and living expenses for up to 12 months in Australia.
- 45 days paid holiday leave.
- Sick leave.
- Parental leave.

### 4. PhD enrolment

Successful candidates for this position will be enrolled by the following institutions and must comply with their specific entry requirements, in addition to AUFRANDE's conditions.

Applicants must hold a diploma in a relevant discipline conferring the degree of master at the end of a training programme establishing the aptitude for research. The training program must include a research component equivalent to 25% of a two-year Masters Coursework degree with a thesis component grade of at least Distinction grade.

Applicants must demonstrate an English language proficiency equivalent to an overall IELTS score above 7 and no band below 6.5. Note that the test needs to be completed no more than two years before enrolment. For more information about the tests accepted and scores required, visit:

<https://www.utas.edu.au/research/degrees/what-is-a-research-degree>



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### **More information on Université Grenoble Alpes' requirements**

Applicants holding a foreign diploma should request an exemption from the Master's degree when applying.

Visit the website: <https://doctorat.univ-grenoble-alpes.fr/preparing-a-phd/doctorate-enrolment/apply-and-register-in-doctoral-school-890537.kjsp?RH=1611137559271>

### **More information on the University of Tasmania's requirements**

Visit the website: <https://www.utas.edu.au/policy/procedures>



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