

Kitesurfing the White Wilderness for Polar Science

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ESA Applications Observing the Earth CryoSat [1]



ESA's ice mission: CryoSat satellite ©ESA



Kite surfing for science ©Justin Packshaw

In an astonishing feat of endurance, explorers Justin Packshaw and Jamie Facer Childs are on their way through a 3600-km kitesurf trek that takes them across the desolate heart of Antarctica. They are not pushing their physical and mental limits to the brink, facing howling gales and temperatures of -55°C just for the sake of adventure. They are gathering information to help scientists better understand how the body responds to extremes and taking unique measurements of their ice environment that will help complement ESA's CryoSat mission to better understand how this giant ice sheet is evolving in response to climate change.



Novolazarevskaya research Station ©ESA

Each hauling a 200-kg sledge and travelling on foot or on skis pulled by kites, Justin and Jamie set out in November 2021 from the Novolazarevskaya research station on their 80-day 'Chasing the Light' expedition to cross Antarctica from coast to coast.

The station can be seen in the image on the left, which was captured from space by the Copernicus Sentinel-2 mission.

On the way, they are collecting data that will give scientists new insight into environmental conditions in the middle of Antarctica. As well as the temperature and wind readings, the team will supply measurements of the snow that covers the ice sheet.

Environmental satellites in space, such as ESA's CryoSat provide a synoptic view of how climate change is affecting the world's ice.

CryoSat transmits radar pulses from 720 km above Earth's surface and uses the return pulses from the surface to measure changes in the height of the ice. The differences in the height and coverage of the ice over time, reveals how much ice is being lost.

Since it was launched in 2010, CryoSat has been returning precision data across the whole planet to within two degrees of the South Pole. Justin and Jamie's measurements, however, can be thought of as pinpricks of environmental information spread along the expedition route. So how does Justin's expedition fit in and help ESA?

Malcolm Davidson, Head of ESA's Earth Observation Campaigns Section, explained, "To generate the best possible maps of the Antarctic ice sheet and to understand how it is responding to climate change, scientists need additional information to that being provided by CryoSat.

"Information about snow and ice conditions at the surface are needed to correctly interpret the radar echoes the satellite receives from the ice surface and transform them into measures of ice height.

While ESA goes to great lengths to validate CryoSat's data, the measurements of snow and ice conditions that Justin is taking along his expedition route are unique. We simply don't have such measurements for much of his route – so, in short, they will be very helpful in improving the reliability and accuracy of the trends measured by our CryoSat mission."

The team is also working with NASA and Stanford University to use the expedition for human and biological research. This involves taking measurements of their own bodies to study, for example, isolation, microbiology and immunology – ultimately contributing studies into future human space exploration.

Chasing the Light expedition route:



So far, the team has been subjected to 150 km/hr winds, -55°C temperatures and whiteouts hindering progress a little so that they have lost a few days having to hold up in their tents and also rethink their route slightly.

The map (left), which is a digital elevation map of Antarctica based on data from CryoSat, has been overlaid with the GPS track of the expedition. It shows the team's position on 15 December 2021 having travelled 1083 km since they set off on 12 November from the Novolazarevskaya research station.

"One learns to roll with the punches down here so, we used these days to mend some kit and ourselves. In total, we have not been able to travel for nine days, but obviously still needed to eat. If we kept heading to the Pole of Inaccessibility, which is a considerable dogleg in our planned route, we would not have enough food" Justin says.



Pulling sledges for science ©Justin Packshaw

“We decided that it is prudent and safer to head directly to the Geographic South Pole and if we are careful with our food and fuel, this is achievable.”

Speaking on 14 December, Justin added, “The wind has been between 40 and 50 km per hour and we have been flying our 9 m kites, which pulled us along with gusto. Boy, the power these puppies can produce is incredible.

“The terrain was erratic, super icy and difficult and yet they just pulled us straight through without a care! We on the other hand were rattled senseless! All that aside, we're in good form and will just keep playing the cards we're dealt. A Royal Flush would be nice.”

The expedition ended successfully on January 8, 2022 (Day 57),

Justin Packshaw and Jamie Facer Childs reached the Amundsen-Scott base located on the geographical South Pole after 57 days.

The final jubilant two blogs from Justin Packshaw are enclosed for completeness:

Day 57 Arrival 08/01/22

"I write this from the bottom of the world! Whoop whoop.

We arrived a few hours ago and the ALE team here could not have given us a better reception after 57 days it was very surreal to see other people and we had to re-ignite our social skills which had been somewhat dormant!

We started our day to quite a stiff breeze and bad visibility but there was nothing going to stop us finishing today, so we set off into it all and four hours later out of a very cloudy vista loomed the Amundsen-Scott base and for the first time the reality of our chapter coming to an end washed over us. Bloody hell we had actually done it! Relief, jubilation, disbelief and pure joy washed over us! Man oh man what a couple of months we had just been through. It was going to take a bit of time to comprehend it all to be fair.

On arriving we dropped our kites and Jamie and I hugged each other with the full knowledge of what an extraordinary experience we had just been catapulted along. What a phenomenal teammate he has been and I could not have done this journey with anyone as capable or easy to travel with.

A legend indeed this one.

The team here took us into their warm mess hall and we were suddenly sitting down with a full plate stacked with two steaks, eggs etc. etc. Heaven! We were ravenous for normal food and wolfed it down. Now sorting our kit out, and will soon hit the sack as we're properly tired. We are thrilled to be safely here and for this epic journey to be rolling to an end. Life is good...

Justin Packshaw

Day 58 Final Update 09/01/22

"Well we are fed, watered and have had a little time to decompress from the ordeals of this epic journey we have just completed. We are still reeling from the fact that our goal has been obtained and we can relax and do not have to steel ourselves to the brutality of having to operate in this harsh land, to be honest. I cannot lie, in that, it has been hard graft and grit has been our constant companion but equally it has been so rewarding working as a tight, efficient team throughout and the fact that we have done in as sustainably as possible. We have done so much research along the way for NASA, ESA, Stanford University and UCFL around Climate Change, our physiology and psychology, which has been fascinating.

The results are going to be super interesting and hopefully will make a difference and help somewhere along the line. Adventure is such a brilliant thing to step into, whatever it might be, little or big, challenging or not, physical or mental, the outcome will always have you growing, learning and walking a tad taller. Ours certainly has. To have seen this majestic land in all its variety of moods and powers has been an extraordinary privilege - our bodies are pretty battered from the experience, but it's been a privilege no less!

As this chapter is coming to an end and we slowly start making our way North and home to our loved ones, I want to thank all our sponsors, especially HP, who are such a stellar organization and have been a total joy to work alongside; Joro-Experiences for pulling the whole expedition together so brilliantly and methodically; our research partners, our kit suppliers, our many advisors (especially Dave Swayer-Parker, who's a Don) and everyone else who has seen us right and safely on our way, especially our families and friends. Heroes all.

This is going to be our last post but if anyone is interested in the results from all the research please just drop us a line. It's been one hell of a ride and thank you for supporting us. Onwards..."
Justin Packshaw

References:

[1] ESA European Space Agency Weekly Digest Bulletin

https://www.esa.int/Applications/Observing_the_Earth/CryoSat/Kitesurfing_the_white_wilderness_for_polar_science

[2] Blog <https://www.chasingthelight2021.com/> Sponsored by HP

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