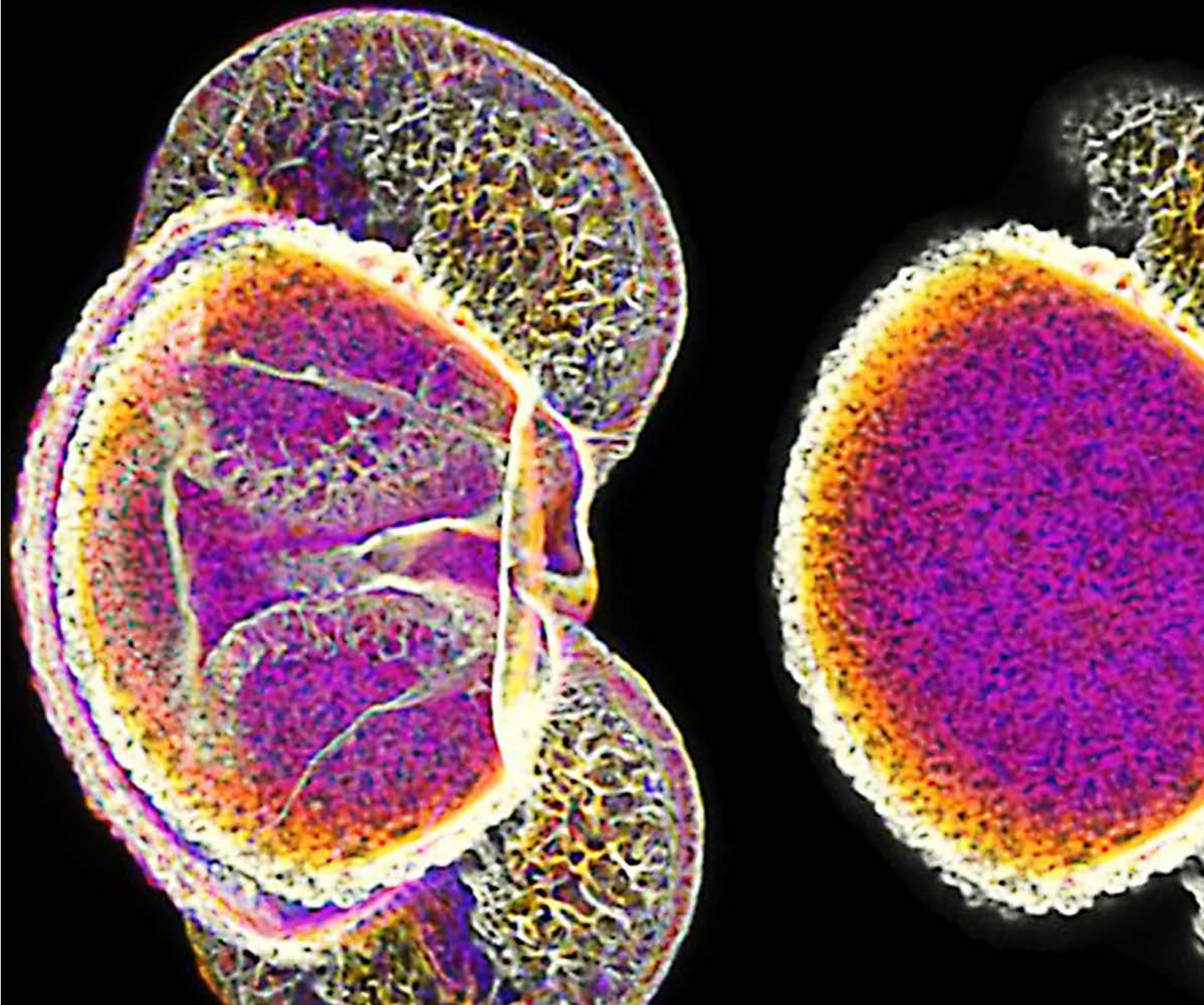


GRADUATE SCHOOL

Doctoral Research Highlights 2019



Climate change and future air travel –

ROUGH OR SMOOTH?



Many of us have experienced turbulence on a flight – the seatbelt sign flashes on, the aircraft starts to lurch unpredictably, and we cling on to the armrests while trying to act like we aren't perturbed in the slightest.

No one enjoys even mild turbulence, but what does climate change mean for turbulence levels in the future?

Simon Lee studied this very area during his integrated master's degree in Meteorology and Climate (MMet). His research resulted in a paper being published in *Nature* in August 2019. Simon has discovered that since 1979, the vertical west-to-east wind shear (the change in wind speed with height) of the jet stream has increased by around 15% as a result of climate change. Simon explains: "This is an important result because vertical wind shear is a key driver of clear-air turbulence, a major aviation

hazard. Our findings support climate model projections of increased turbulence." The study provides the first observation-based evidence to support previous University of Reading research that human-induced climate change will make severe turbulence up to three times more common by 2050–80.

Simon's research indicates that airline passengers can expect a much bumpier ride in future if climate change continues at the current rate. His study shows for the first time that, while the temperature difference between the Earth's poles and the equator is narrowing at ground level because of climate change, the opposite is happening at around 34,000 feet – a typical aeroplane cruising altitude.

What does this mean for the aviation industry?

Tens of thousands of planes encounter severe turbulence every year, with an estimated cost to the global aviation sector of

up to one billion dollars annually, through flight delays, injuries to cabin crew and passengers, and structural damage to aircraft. Simon's findings have serious implications for airlines, as passengers and crew would face a bigger risk of injury. "Indications of a stronger jet stream in the future would also affect airlines by increasing flight times from Europe towards the US and speeding up flights the other way."

In August 2019, Simon published an article entitled "*Increased shear in the North Atlantic upper-level jet stream over the past four decades*" in the journal *Nature*, co-authored by Professor Paul Williams and Dr Thomas Frame from the Department of Meteorology.

SIMON LEE IS CONTINUING HIS METEOROLOGICAL RESEARCH AT READING AT PHD LEVEL, AND HAS PUBLISHED SEVERAL PAPERS ON HOW THE STRATOSPHERE INFLUENCES THE WEATHER WE EXPERIENCE AND OUR ABILITY TO FORECAST IT.

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