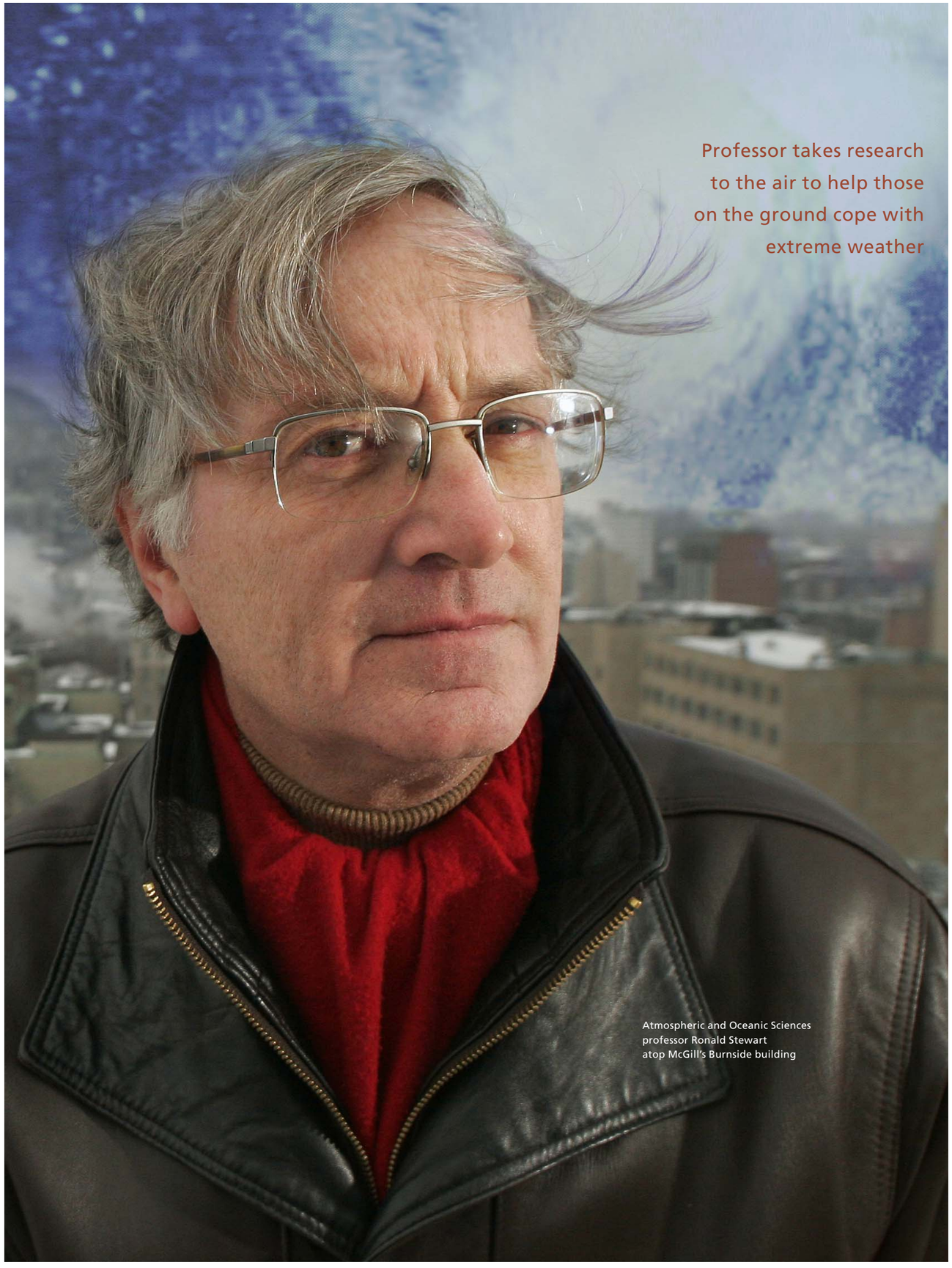

Professor takes research to the air to help those on the ground cope with extreme weather

Atmospheric and Oceanic Sciences professor Ronald Stewart atop McGill's Burnside building

Owen Egan

Weathering the STORM

By James Martin

Wings crippled by ice, a small plane drops from the sky over the Sierra Nevada mountains. A lightning strike forces a white-knuckle landing on the Magdalen Islands. Somewhere over the raging Atlantic Ocean, wet snow seizes an engine.

Hairy situations, to be sure, and Dr. Ronald Stewart survived them all. In fact, the Professor of Atmospheric and Oceanic Sciences is the veteran of over 1,000 flight-hours in stormy weather. "But it's not about thrillseeking," he's quick to clarify. "It's about science."

As the NSERC Industrial Research Chair in Extreme Weather, Stewart wants to learn the "missing physics" behind the catastrophic weather events that cause untold misfortune — even if it means taking a Convair CV-580 into the heart of a raging storm. The "flying laboratory," owned by the National Research Council, lets Stewart and his team customize their flightpath as a storm evolves, enabling them to capture real-time temperature, wind and moisture data that's simply unknowable from a fixed position on the ground.

In addition to projects that will take him to Iqaluit in 2007 to examine changing weather patterns in Canada's North, Stewart is working with the Institute for Catastrophic Loss Reduction (ICLR), a research centre spearheaded by Canadian property and casualty insurers, to study the astrophysical mechanisms of precipitation. Their reasoning is simple: Increase understanding and you increase prediction accuracy. Increase prediction accuracy and you give people more warning to protect themselves, and their property, from harm. Decrease destruction and you decrease insurance pay-outs, a $5-billion lesson the insurance industry learned all to well with the catastrophic Ice Storm of 1998.

The kicker? Slight deviations in atmosphere temperature or moisture would've prevented all that freezing rain—and loss.

"It very easily could have been an ice pellet event instead," he muses, "which isn't a trivial thing, but the devastation wouldn't have been nearly that of the Ice Storm."

By bringing scientific observation to forecasting, which is currently driven by statistical modelling, Stewart hopes to allow accurate predictions of freezing precipitation, as well as what percentage will take the form of freezing rain, ice pellets or wet snow. Such information would help, say, Transport Canada more efficiently select the fluids used to de-ice airplane wings. (Not all fluids are equal: Ice pellets, for example, severely dilute freezing rain de-icers). "It would save money," says Stewart, "but it would also save lives."

The only thing worse than too much precipitation is not enough of it. A former Manitoba farmboy, Stewart calls the 1999-2005 prairie drought, which cost billions of dollars in lost crop production and immeasurable psychological devastation, "possibly the worst natural disaster Canada has ever had." The phenomenon was particularly bewildering because there was as much moisture in the atmosphere as in non-drought years - it just wasn't making its way to the ground. As co-founder of the new Drought Research Initiative network, he's working with various agencies (including Canadian Wildlife Service, Alberta Environment and Saskatchewan Hydro), to unmask the physical features of that recent event, and better understand drought mechanics in general.

Last summer, forecasters were calling for yet another drought season …right up until floods ravaged southern Alberta. "Will there be flooding this year?" Stewart asks. "Flip a coin. That's about where we're at right now." Improved predictions could allow farmers to plant drought-resistant crops (wheat, for example, instead of canola) and hydro companies better manage dammed resources. Mental-health experts also feel that simply understanding the meteorological reasons behind a drought may help families cope with the emotional fallout of decimated livelihoods.

"I'm just a physicist trying to understand how things work," he adds. "Call it a tipping point or a threshold, but we're trying to zero in on the preciseness of what makes one condition—whether that's ice pellets or drought—occur and not another," says Stewart.

"We're not trying to solve all the worlds' problems, we're just trying to add insight that will make communities less vulnerable and more resilient."