

## Image: Upsala glacier retreat

November 5 2013, by M. Justin Wilkinson

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Credit: NASA

This photograph by an astronaut on the International Space Station highlights the snout of the Upsala Glacier ( $49.88^{\circ}\text{S}$ ,  $73.3^{\circ}\text{W}$ ) on the Argentine side of the North Patagonian Icefield. Ice flow in this glacier comes from the north (right in this rotated image). Dark lines of rocky debris (moraine) within the ice give a sense of the slow ice flow from right to left.

A smaller, side glacier joins Upsala at the present-day ice front—the

wall from which masses of ice periodically collapse into Lago (Lake) Argentino. In this image, the 2.7 kilometer-wide ice front casts a thin, dark shadow. The surface of Lago Argentino is whitened by a mass of debris from a recent collapse of the ice wall. Larger icebergs appear as white dots on the [lake](#) surface at image left.

Remotely sensed data, including astronaut images, have recorded the position of the ice front over the years. A comparison of this October 2013 image with older data (January 2004 and January 2001, as well as October 2009) indicates that the ice front has moved backwards—upstream—about 3 kilometers (2 miles). This retreat is believed by scientists to indicate climate warming in this part of South America. The warming not only causes the ice mass to retreat, but also to thin. A study of 63 [glaciers](#) by Rignot et al has shown that this is a general trend in Patagonia.

The water color in Lago Argentino is related to the glacier flow. The lake receives most of the ice from the glacier and thus receives most of the "rock flour"—rocks ground to white powder by the [ice](#) scraping against the rock floor of the valley. Glacial flour turns the lake a gray-green hue in this image. The darker blue of the smaller lakes (image bottom) indicates that they are receiving much less rock flour.

This image was taken on Oct. 2, 2013, with a Nikon D3 digital camera using a 300 millimeter lens, and is provided by the ISS Crew Earth Observations experiment and Image Science & Analysis Laboratory, Johnson Space Center. It has been cropped and enhanced to improve contrast, and lens artifacts have been removed.

**More information:** View the annotated version of this image at NASA's Earth Observatory website:  
[earthobservatory.nasa.gov/IOTD/view.php?id=82300](http://earthobservatory.nasa.gov/IOTD/view.php?id=82300)

Provided by NASA

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