60° S, oceans exist at all longitudes; the climatic high frequency of storms at that latitude is reflected in the rising air in the Ferrell Cell (the region near 60 S) of the general circulation. Consequently, this region contains both maritime clouds and storms, in which cloud glaciation occurs and frequently leads to precipitation. Thus, the uncertainty of results that Sarmiento and Gruber find in the region near 60° S is probably partially due to weather patterns leading to chemical reduction and removal of carbon dioxide in precipitation.

Before reading the article, we believed that the atmospheric reactions to remove CO_2 could not compare in magnitude to the estimated oceanic and terrestrial sinks. Inclusion of atmospheric reactions that chemically reduce CO_2 in mixed clouds, followed by removal of the resulting products in precipitation, might advance the modeling technique presented in Sarmiento and Gruber's article.

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In their article, Jorge Sarmiento and Nicolas Gruber emphasize a premise that carbon dioxide is the most prominent greenhouse gas causing global warming. In contrast, NASA, in a newspaper article two months earlier (*New York Times*, 31 May 2002, p. A16), stated that water vapor is the "dominant natural heat-trapping gas." Telemetry that NASA installed recently on the satellite Aqua is intended for making a worldwide study of water vapor.[1] We already know from previous satellite measurements summarized by B. J. Mason[2] that, on average, more than 50% of Earth's surface is covered by clouds.

Both CO_2 and water vapor are considered from a historical perspective by Spencer R. Weart in PHYSICS TODAY, January 1997, page 34. Experimental spectroscopic studies of infrared absorption in laboratory air cells are cited; the most recent of those studies go back to 1911. John Tyndall made spectroscopic studies in 1861 on air mixtures and concluded that water vapor was a factor of 10 stronger than CO_2 in its IR absorption.

Our purpose here is to encourage revisiting and modernizing those early experiments using modern spectrographic methods to investigate a range of gas mixtures, radiation wavelengths, pressures, and temperatures. This activity would provide IR absorption coefficients having a higher confidence level. Such scientific data will help investigators and funding agencies evaluate where money is best spent to understand global warming.

References

1. For more information on the Aqua mission, see http://aqua.nasa.gov.
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