



## **IEAGHG Information Paper; 2013-IP21: 2013-IP21; Ozone hole and Global Warming linked**

I have recently read an article on a new study that seems to challenge a theory that I held previously with regard to global warming and the ozone hole. The study actually opens an issue that I was unaware was directly connected i.e. that the ozone layer, in particular the thinning of that layer impacts on global warming. A recent paper in Geophysical Research Letters presents the results of a recent study that indicates that the thinning of the atmosphere's ozone layer could be contributing to warming of the planet.

A team of atmospheric scientists at Columbia University in New York, USA modelled the weather dynamics around the ozone hole above the Antarctic. They calculated the knock-on effects of ozone depletion on cloud cover, and ultimately on radiative forcing — the balance of solar and thermal radiation absorbed, reflected or emitted by the planet and its atmosphere.

Previous research by an atmospheric scientist at the University of Leeds, UK, and his collaborators attributed a slight cooling effect to the ozone hole. But the latest study, which focused on the Antarctic summer between December and February, found that there may be a warming effect instead.

The team's models predicted a shift in the southern-hemisphere jet stream — the high-altitude air currents flowing around Antarctica — as a result of ozone depletion. This produced a change in the cloud distribution, with clouds moving towards the South Pole, where they are less effective at reflecting solar radiation.

The result was that the effects on the Earth's net energy balance were opposite to what had been calculated before. Kevin Grise one of the scientists involved in the new study commented that "A negative radiative forcing is what you'd expect when the ozone is depleted, but our research shows that there is a positive net radiative effect during the Antarctic summer,"

The extra net energy absorbed by the Earth would be 0.25 watts per square metre, or roughly a tenth of the greenhouse effect attributed to CO<sub>2</sub>, Grise says. The result could be a small but non-negligible contribution to global temperature rise.

Commenting on the work, Prof Forster from Leeds University who was one of the Coordinating Lead Authors of the IPCC 4<sup>th</sup> Assessment report that assessed the earlier research said "I think it's an interesting piece of research. They are talking about a new mechanism in the world of ozone and climate change." "There's quite a lot of work to be done to pin down the mechanism, but it does sound reasonable."

The study published in Geophysical Research Letters can be found at: <http://onlinelibrary.wiley.com/doi/10.1002/grl.50675/abstract>.

A link is also available to Chapter 2 of the 4th Assessment Report for those interested. <http://www.ipcc.ch/pdf/assessment-report/ar4/wg1/ar4-wg1-chapter2.pdf>

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