Destruction of greenhouse gases over tropical Atlantic

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This image is of the Cape Verde Atmospheric Observatory, where instruments for monitoring the atmosphere are stationed. It has been operating for a year and the first year's data have shown vast ozone destruction across the tropical Atlantic. The instruments have also detected the reason for this loss. Credit: Dr Katie Read, University of York, UK.

Large amounts of ozone – around 50% more than predicted by the world's state-of-the-art climate models – are being destroyed in the lower atmosphere over the tropical Atlantic Ocean. Published today (26th June '08) in the scientific journal, *Nature*, this startling discovery was made by a team of scientists from the UK's National Centre for Atmospheric Science and Universities of York and Leeds. It has particular significance because ozone in the lower atmosphere acts as a greenhouse gas and its destruction also leads to the removal of the third most

abundant greenhouse gas; methane.

The findings come after analysing the first year of measurements from the new Cape Verde Atmospheric Observatory, recently set up by British, German and Cape Verdean scientists on the island of São Vicente in the tropical Atlantic. Alerted by these Observatory data, the scientists flew a research aircraft up into the atmosphere to make ozone measurements at different heights and more widely across the tropical Atlantic. The results mirrored those made at the Observatory, indicating major ozone loss in this remote area.

So, what's causing this loss? Instruments developed at the University of Leeds, and stationed at the Observatory, detected the presence of the chemicals bromine and iodine oxide over the ocean for this region. These chemicals, produced by sea spray and emissions from phytoplankton (microscopic plants in the ocean), attack the ozone, breaking it down. As the ozone is destroyed, a chemical is produced that attacks and destroys the greenhouse gas methane. Up until now it has been impossible to monitor the atmosphere of this remote region over time because of its physical inaccessibility. Including this new chemistry in climate models will provide far more accurate estimates of ozone and methane in the atmosphere and improve future climate predictions.

Professor Alastair Lewis, Director of Atmospheric Composition at the National Centre for Atmospheric Science and a lead scientist in this study, said: "At the moment this is a good news story – more ozone and methane being destroyed than we previously thought - but the tropical Atlantic cannot be taken for granted as a permanent 'sink' for ozone. The composition of the atmosphere is in fine balance here- it will only take a small increase in nitrogen oxides from fossil fuel combustion, carried here from Europe, West Africa or North America on the trade winds, to tip the balance from a sink to a source of ozone"

Professor John Plane, University of Leeds said: "This study provides a sharp reminder that to understand how the atmosphere really works, measurement and experiment are irreplaceable. The production of iodine and bromine mid-ocean implies that destruction of ozone over the oceans could be global".

Dr Lucy Carpenter, University of York and UK co-ordinator of the Observatory added: "This observatory is a terrific facility that will enable us to keep an eye on the chemical balance of the atmosphere and feed this information into global climate models to greatly improve predictions for this region in the future".

Source: The National Centre for Atmospheric Science