Air pollution plays bigger role in global rainfall changes

January 29 2016

Air pollution is playing a bigger role in changing global rainfall than previously thought, new research from the University of Reading suggests.

Ozone is a naturally-forming gas in our atmosphere, but human activity has caused ozone to increase in the lower atmosphere (a component of air pollution, from causes such as vehicle exhausts and other industrial and agricultural activities) and decrease in the stratosphere (ozone depletion - due to historic emissions of CFC gases used in refrigeration and air conditioning).

It has long been understood that these ozone changes, as well as affecting human health, also contribute to climate change. This is in addition to the effect of human emissions of carbon dioxide, which is the major driver of climate change over recent decades.

Previous work has shown that the ozone changes have caused a warming effect about 20% of that due to carbon dioxide. In this new work, detailed calculations indicate the global rainfall changes due to ozone over the past century could be more than half those due to changes in carbon dioxide. This is because of differences in the way ozone absorbs sunlight and infrared energy emitted by the Earth and its atmosphere, compared to carbon dioxide.

Lead researcher, Dr Claire MacIntosh, from the University's Department of Meteorology, said: "Our new results emphasize another aspect of how air pollution and climate change are interlinked. We find that the main impact on global rainfall comes from changes in ozone due to air pollution, rather than from ozone depletion in the stratosphere".

Professor Keith Shine, a co-author of the research, said: "Scientists are learning more about the different factors causing changes in global rainfall. In time, this research will also contribute to a better understanding of regional rainfall shifts. Until then, we can draw no link between these new results and individual events, such as the recent extreme rainfall and floods in parts of the UK."

The study is published in the American Geophysical Union's journal *Geophysical Research Letters*.

More information: C. R. Macintosh et al. Contrasting fast precipitation responses to tropospheric and stratospheric ozone forcing, *Geophysical Research Letters* (2016). DOI: 10.1002/2015GL067231

Provided by University of Reading