

Ozone: Climate change boosts ultraviolet risk for high latitudes

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This undated photo, released by the International Polar Foundation, shows Belgium's Princess Elisabeth base in Antarctica. By century's end, UV levels in Antarctica could rise by up to 20 percent at seasonal peaks while average exposure in northern Scandinavia, Siberia and northern Canada could fall by almost a tenth.

(PhysOrg.com) -- Physicists at the University of Toronto have discovered that changes in the Earth's ozone layer due to climate change will reduce the amount of ultraviolet (UV) radiation in northern high latitude regions such as Siberia, Scandinavia and northern Canada. Other regions of the Earth, such as the tropics and Antarctica, will instead face increasing levels of UV radiation.

"Climate change is an established fact, but scientists are only just beginning to understand its regional manifestations," says Michaela Hegglin, a postdoctoral fellow in the Department of Physics, and the lead author of the study published this month in *Nature Geoscience*.

Using a sophisticated computer model, Hegglin and U of T physicist Theodore Shepherd determined that 21st-century climate change will alter atmospheric circulation, increasing the flux of ozone from the upper to the lower atmosphere and shifting the distribution of ozone within the upper atmosphere. The result will be a change in the

amount of UV radiation reaching the Earth's surface which varies dramatically between regions: e.g. up to a 20 per cent increase in UV radiation over southern high latitudes during spring and summer, and a nine per cent decrease in UV radiation over northern high latitudes, by the end of the century.

While the effects of increased UV have been widely studied because of the problem of ozone depletion, decreased UV could have adverse effects too, e.g. on vitamin D production for people in regions with limited sunlight such as the northern high latitudes.

"Both human and ecosystem health are affected by air quality and by UV radiation," says Shepherd.

"While there has been much research on the impact of climate change on air quality, our work shows that this research needs to include the effect of changes in stratospheric ozone. And while there has been much research on the impact of ozone depletion on UV radiation and its impacts on human and ecosystem health, the notion that climate change could also affect UV radiation has not previously been considered. This adds to the list of potential impacts of climate change, and is especially important for Canada as northern high latitudes are particularly affected."

Provided by University of Toronto

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