AIR POLLUTION

Wildfire threats

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Smoke from wildfires is an important source of air pollution, posing a substantial risk to human health due to high emissions of fine particulate matter (PM2.5). In many locations, the frequency and extent of wildfires — and thereby PM2.5 emissions — is anticipated to increase with human-induced warming, threatening the mitigation potential of air quality policies which aim to reduce anthropogenic emissions. Using vegetation–fire and chemical transport model simulations, Wolfgang Knorr from Lund University, Sweden, and colleagues investigate whether changing wildfire emissions impact the feasibility of meeting World Health Organisation (WHO) air quality targets.

In most regions of the globe, they find that stringent efforts to curtail anthropogenic emissions will be able to constrain pollution levels to those suggested by the WHO (10 μg m^{-3}), regardless of future changes in wildfires. During the fire season, however, these changes can have a discernible impact, pushing PM2.5 concentrations above critical health-relevant thresholds even under rigorous anthropogenic reduction scenarios. This is particularly true in regions such as sub-Saharan Africa and South-East Asia, despite projections of decreasing population growth. Thus, future wildfire activity represents a significant hazard to regional human health. *GS*

GEOENGINEERING

Perceived controllability

Global Environ. Change **45,** 194–202 (2017)

Scientists and engineers are beginning to assess the feasibility of geoengineering interventions, such as removing CO_2 from the atmosphere, to complement emissions reductions to moderate climate change. Because these efforts rely on new and unfamiliar technology they have attracted public scrutiny. However, it is not clear what factors determine whether the public perceive geoengineering experiments as acceptable, and what they would consider effective governance.

Rob Bellamy from the University of Oxford, UK, and colleagues conducted deliberative workshops in which participants engaged in informed discussion on geoengineering experiments and how they should be governed. Workshops emphasised either reaching a majority-held decision, a unitary group decision, or promoting individual viewpoints. Although participants in each workshop ultimately converged on a distinct set of preferences, a core theme across workshops was perceived controllability, reflected in a combination of expressed concerns about level of containment, uncertainty of outcomes, reversibility of environmental impacts, and scientific purity or intent. These results suggest that public acceptance of geoengineering research and governance depends on multiple dimensions of controllability that go beyond technical considerations such as experiment scale or location. *JR*

HEALTH IMPACTS

Plant protein changes

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MACMILLAN

Climate change threatens food security and additionally the nutritional values of crops may be altered with the changing climate. Around 76% of the global population receives most of their daily protein intake from plants so decreases in crop protein content, as is predicted with elevated CO_2, could lead to protein deficiencies.

Danielle Medek of Harvard T. H. Chan School of Public Health, Boston, USA, and Waitemata District Health Board, Auckland, New Zealand, and co-workers investigate the risk of potential dietary protein deficiencies in 2050 related to increased CO_2 emissions. Meta-analysis of the published literature established the effect of elevated CO_2 on edible crop protein levels, finding decreases of 7–14% for rice, wheat and barley and 6% for potatoes. This information was combined with global food availability data to determine dietary protein intake and estimate those at risk of deficiency.

The authors conclude that 18 countries may see an over 5% reduction in dietary protein. This could place an additional 1.6% of the global population — almost 150 million people — at risk of protein deficiency. Regions with large numbers newly at risk include India, South Asia and sub-Saharan Africa. *BW*

CLIMATE DYNAMICS

Tropics to stratosphere

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Sudden Stratospheric Warming (SSW) events — a rapid heating of the upper Artic atmosphere — occur roughly 6 times per decade and strongly influence the weather of the Northern Hemisphere. Recently it has been shown that they are impacted by the Madden–Julian Oscillation (MJO), a dominant mode of tropical intraseasonal variability that describes the eastward propagation of large-scale convection. With anthropogenic warming, it is anticipated that MJO activity will increase, but it is unknown to what extent this will affect SSWs. Wanying Kang and Eli Tziperman from Harvard University, USA, investigate the SSW response to a strengthening of the MJO using both idealised and realistic climate model simulations.

In both models, the authors find that the frequency of SSW events significantly increases in response to enhanced MJO activity, the change of which is dependent on the amplitude of the MJO strengthening. As a result, average Arctic stratosphere temperatures also increase. Two mechanisms are found to be responsible for these changes: direct poleward and upward propagation of transient MJO-forced waves, and enhanced stationary waves in response to this propogation. Such an MJO-driven increase in SSW events may consequently impact tropospheric jet stream location and extreme weather in the Northern Hemisphere. *GS*

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