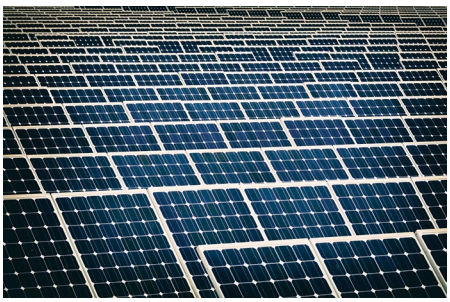
RENEWABLE ENERGY

Come rain or shine

ACS Nano **12**, 2893–2899 (2018)



Credit: Ken Welsh / Alamy Stock Photo

Solar cells suffer from reduced performance on cloudy days, leading to intermittent energy supply in all but the sunniest of locations. This poses a challenge to the expansion of the solar sector. To improve power generation in cloudy areas there have been attempts to integrate solar cells with triboelectric nanogenerators (TENGs) that harvest power from raindrops. Integration has proved difficult in practice, however, because the TENG device — which sits above the solar cell — intercepts sunlight, reducing solar cell performance to an unacceptable degree.

Yuqiang Liu and Na Sun from Soochow University, China, and colleagues solved this problem by using a mutual function electrode film layer for the solar and TENG components. This integrated system is able to convert solar and raindrop energy into electrical power without significant antagonism between the two components, combining the advantages of the high current output level of the solar cell and the high voltage output level of the TENG. This innovation provides a means to collect energy from the environment under different weather conditions and may in due course find application in wet regions that are less suited to conventional solar arrays. *AB*

https://doi.org/10.1038/s41558-018-0165-2

NATURAL DISASTERS

Unequal exposure

Environ. Dev. Econ. http://doi.org/cm9p (2018)

Credit: Dinodia Photos / Alamy Stock Photo

The frequency, intensity and spatial distribution of natural disasters, including floods and droughts, are expected to change in the future due to climate change. Understanding the vulnerability of poor people to natural disasters in both the present and future is crucial to managing this risk.

Hessel Winsemius from Deltares and Vrije University Amsterdam, The Netherlands, and colleagues provide a new global assessment of the extent to which poor people are disproportionately exposed to river floods and droughts. The authors construct a poverty exposure bias measure — the fraction of poor people exposed to floods and droughts compared to the fraction of all people exposed in a country — by combining georeferenced household survey data with hydrological riverine flood and drought maps for 52 countries. Historically, they find that in most countries, poor people are overexposed to droughts and urban floods, but not rural floods. Under a high-emissions climate change scenario, they find that overall future exposure increases, but there is no change in the exposure bias.

Data limitations make local-level disparities difficult to capture, but the current findings advocate for more attention to income-sensitive disaster risk management. *AY*

https://doi.org/10.1038/s41558-018-0166-1

CRYOSPHERIC SCIENCE

Disappearing Andean snow

Cryosphere http://doi.org/cm9q (2018)

Snow melt in the Andes is critical for water supply across Argentina, Bolivia, Chile and Peru, motivating analyses of snowpack variability for the development of water management strategies, particularly in light of anthropogenic climate warming. However, understanding of snowpack changes has been hampered by a sparse observational network. Freddy Saavedra from the Universidad de Playa Ancha, Chile, and colleagues use remote sensing data to investigate changes in mountain snowline elevation and snow persistence across a large swathe of the Andes (8–36° S) between 2000 and 2016.

It is found that regions south of 29° S have seen 2–5 fewer days of snow cover per year, raising the snowline by 10–30 m annually. These changes are largest in the winter seasonal snow zone, particularly in the eastern Andes, and are attributed to reductions in annual mean precipitation and increasing temperatures. North of 29° S, however, snow modifications are minimal, primarily due to low climatological coverage. Further work is required to determine whether such short-term perturbations reflect long-term trends, but the results illustrate the need for continued snow monitoring to inform future water planning. *GS*

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MARINE CARBON CYCLE

Taking a closer look

Glob. Biogeochem. Cycles http://doi.org/cm9r (2018)

Carbon export in the ocean is linked to plankton productivity in the surface waters, yet ocean models are typically run at too coarse a resolution to capture mesoscale (10–100 km) ocean circulation. Circulation at this scale influences nutrient transport and plankton, so estimates from lower-resolution simulations may not accurately capture export production.

To address this issue, Cheryl Harrison of the National Center for Atmospheric Research and the University of Colorado, Boulder, USA, and co-authors use simulations at different resolutions, eddy-resolving (0.1°) and non-eddy-resolving (1°), in the Community Earth system Model. They find that the higher-resolution simulation shows a small (<2%) decrease when considering global export production, however at local scales there is a large ±50% variation due to regional effects.

In areas where off-shelf transport of nutrients drives productivity, improved representation of coastal jets, which block this transport, and turbulence results in lower export. In contrast, export is increased in the subantarctic due to a deeper and narrower mixed layer, capturing more nutrients that fuel higher production. These large regional differences that result from mesoscale circulation should be considered when calculating carbon export and budgets. *BW*

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