Global efforts to mitigate climate change rely on moving away from 'business as usual', as pursuing the cheapest energy option in the short-term will lead to catastrophic environmental damage in the longer run. Furthermore, there is strong evidence that Chinese policy is already driving the market towards cleaner energy, largely because of popular demand for cleaner air, which cannot be met by keeping energy production dominated by abundant and cheap coal.

The policy impacts of this 'war on pollution' include targets for industrialized Chinese provinces to reduce their particulate matter (PM) 2.5 levels by 15–25% by 2017 (by 25% in Beijing)[3]; corresponding targets for coal consumption and heavy industry capacity reductions in key provinces; structural re-rating of coal prices and coal-related companies by financial markets; the Twelfth Five Year Plan (2011–2015) that contains strong measures to prevent economic growth at the expense of the environment[4]; China–US bilateral targets on carbon emissions[5]; and the promotion of the clean energy sector agreed at the Asia Pacific Economic Cooperation meeting in November 2014[6].

In the first four months of 2015, coal consumption declined by approximately 8% year-on-year, led by a precipitous fall in coal use in the power sector[7]. Chinese coal share prices from January 2014 to March 2015 kept pace with the Hang Seng index, while renewables' shares soared by 25 times that amount, largely as a result of the public response to the vastly popular, independent, documentary film, *Under the Dome* (the film has now been censored[8]). Furthermore, PM2.5 data suggest that air quality has significantly improved in 2015 compared with previous years, and not because of wind and humidity weather factors.

Given the immediate success of these policies, we believe it is inconceivable that China will not continue to drive the energy market towards cleaner fuels than coal, and hence we expect a far greater degree of gas for coal substitution than simulated by Orlov *et al.* Thus the actual reduction in carbon emissions resulting from the Russian gas deal will be essentially driven by policy decisions of the Chinese government. ❐

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Wenjie Dong[1]*, Wenping Yuan[1,2], Shuguang Liu[3], John Moore[4], Peijun Shi[1], Shengbo Feng[5], Jieming Chou[1], Xuefeng Cui[4] and Kejun Jiang[5].

[1]State Key Laboratory of Earth Surface Processes and Resource Ecology, Beijing Normal University, Beijing 100875/Zhuhai 519087, China. [2]State Key Laboratory of Cryospheric Sciences, Cold and Arid Regions Environmental and Engineering Research Institute, CAS, Lanzhou 730000, China. [3]State Engineering Laboratory of Southern Forestry Applied Ecology and Technology, Central South University of Forestry and Technology, Changsha, Hunan 410004, China. [4]College of Global Change and Earth System Science, Beijing Normal University, Beijing 100875, China. [5]Energy Research Institute, National Development and Reform Commission, Beijing 100038, China.
*e-mail: dongwj@bnu.edu.cn

CORRESPONDENCE:

Subnational socio-economic dataset availability

To the Editor — In their *Nature Climate Change* Commentary, Otto *et al.*[1] highlight the data divide between natural and social sciences. Where the former has successfully entered the cosmopolitan age (that is, data without borders), the production of socio-economic data is mostly framed according to national boundaries. The authors rightly point out the need for subnational socio-economic datasets and call for a "new paradigm in data gathering".

We agree with the authors, but note that access to detailed socio-economic data has improved steadily over the past 15 years thanks in part to multilateral donors, government bodies, and international alliances, such as CGIAR (a global agricultural research partnership of 15 research centres worldwide), increasingly investing in open data policies, cross-country standards, online catalogues, and data-visualization platforms. As of writing, 154 countries have online data portals with ample economic statistics at subnational level[2]. Scientists have established consortia and communities of practice to study the effects of climate change at scale with a strong focus on improving data standardization and interoperability across domains[3]. Spatially explicit, harmonized socio-economic data products are increasingly available to the public, such as population and poverty grids[4], microdata derived from national household surveys[5], and rasterized socio-demographic indicators[6]. While these products are often overlooked in the economic literature, they are well suited to the study of climate's impact on human geography across scales.

In their concluding remarks, Otto *et al.* call for "bottom-up and crowd data pooling initiatives" and point to household surveys as potentially rich sources of subnational socio-economic data. By overlaying spatially explicit socio-economic and health indicators on environmental and biophysical data layers, it is possible to investigate complex relationships between, for example, population and the environment across relevant geographical boundaries (watersheds, farming systems and climatic zones, for example). To illustrate such already ongoing analyses, we present a series of maps that integrate biophysical datasets with bottom-up data pooled from georeferenced household surveys (Fig. 1 and Supplementary Fig. 1a,b) with data openly sourced from HarvestChoice[6] and Demographic and

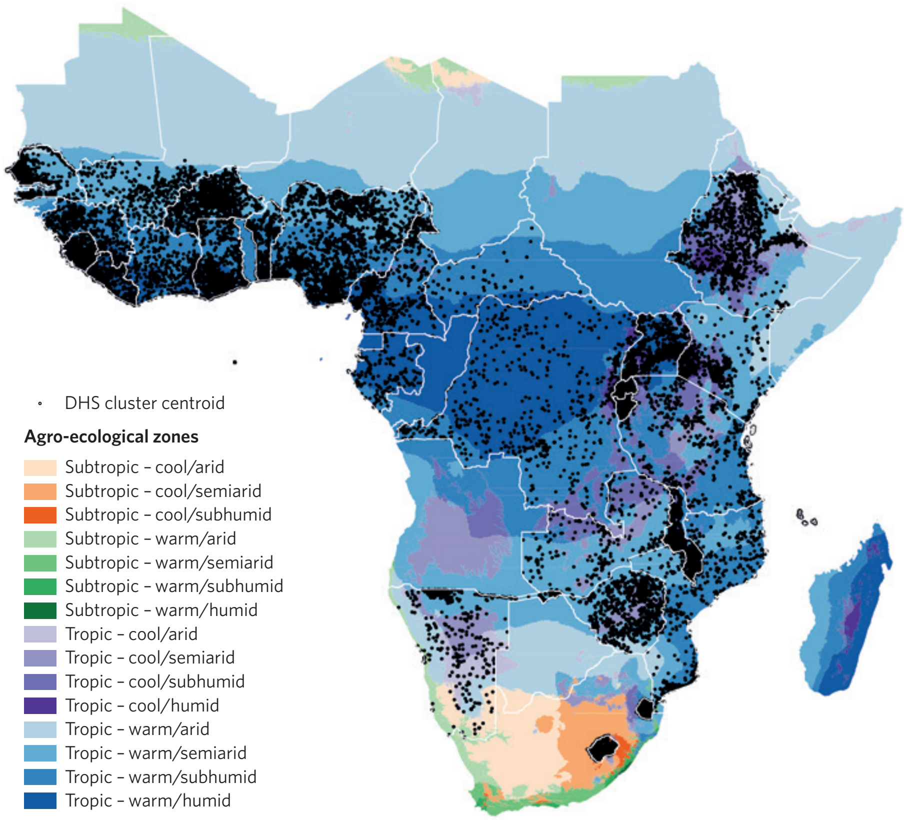

Figure 1 | Subnational Demographic and Health Surveys (DHS) data showing centroids of DHS clusters overlaid on Agro-ecological Zones.

Health Surveys (DHS)[7]. The first map (Fig. 1) illustrates the spatial distribution of DHS clusters overlaid on Agro-Ecological Zones (AEZs) in Sub-Saharan Africa. Supplementary Fig. 1a zooms in for a more detailed look at Nigeria and neighbouring countries and shows the prevalence of wasting among children under five. Finally, the spatial relationship between prevalence of wasting and AEZ shown in Supplementary Fig. 1b is confirmed by the first-order stochastic dominance depicted in Supplementary Fig. 1c. Overall, results show that early childhood wasting is significantly more prevalent in the arid and semi-arid zones of Sub-Saharan Africa. These types of granular dataset, especially those harmonized on high-resolution global grids, have already been used and will be increasingly used in economic and biophysical modelling analyses that explore future consequences of climate change scenarios[8,9]. More work surely needs to be done to address the world's key challenges of food insecurity and climate change, but the paradigm shift is alive and kicking already. ❐

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Additional information

Supplementary information is available in the online version of the paper.

Carlo Azzarri, Melanie Bacou, Cindy M. Cox, Zhe Guo and Jawoo Koo*
International Food Policy Research Institute, 2033 K Street, NW Washington, DC 20006-1002, USA.
*e-mail: j.koo@cgiar.org

CORRESPONDENCE:

Ocean temperatures chronicle the ongoing warming of Earth

To the Editor — The global ocean has absorbed 93% of the extra heat trapped by the Earth since 1970[1] and the rate of change in ocean heat content is a good estimate of the radiation imbalance at the top of the atmosphere[2]. Previously we reported[3] a robust warming rate over the Earth's area of 0.5–0.7 W m^{-2} during 2006–2014 using the global ocean data from the Argo array and three contrasting mapping methods: an optimal interpolation (OI), reduced space optimal interpolation (RSOI) and robust parametric fit (RPF). We have extended these analyses over the additional 23 months of data from Argo to probe ocean heat content evolution through to November 2015.

Owing to its immense heat capacity, the global ocean is the fly-wheel of the climate system, absorbing, redistributing and storing heat on long timescales and over great distances. On the global average, ocean temperatures are less volatile than land temperatures, which can swing wildly from year to year (Fig. 1a). In 2015, global average ocean surface temperature was driven by the tropical Pacific to a new record high associated with the current El Niño (Fig. 1a). While the surface ocean both warms and cools in synchronization