A Global Analysis of Urban Extreme Heat Exposure Trajectories

GEO Health Community of Practice
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Thank you!

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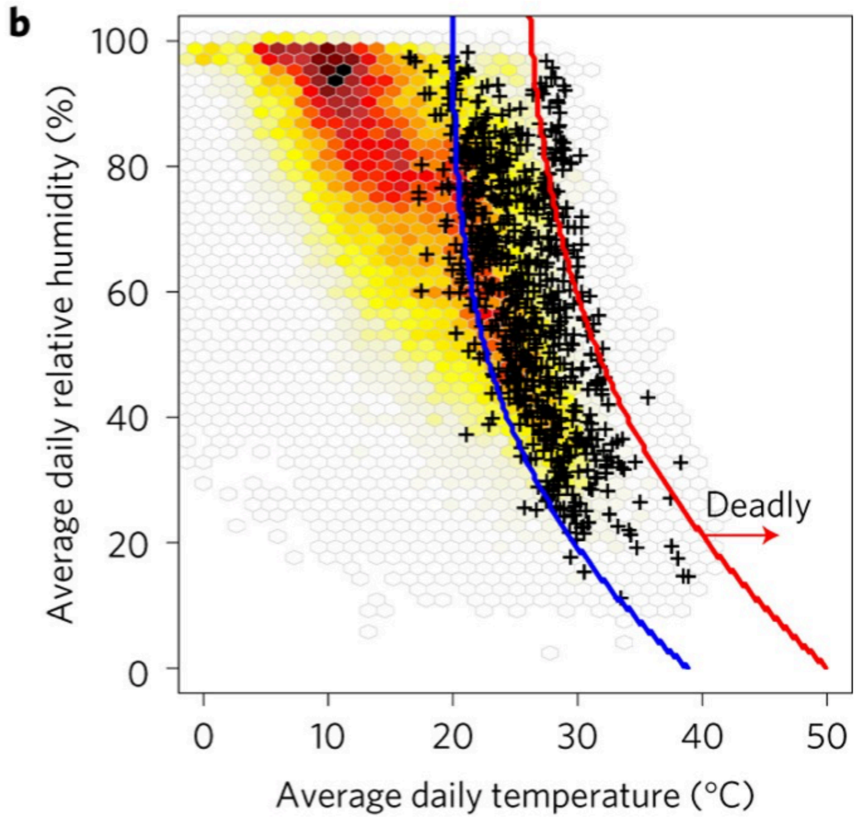
World Bank 2019; UN-DESA 2018

…and nearly all will live in regions where climate change is increasing the frequency, duration & intensity of extreme heat events.

Temperature, Humidity, & Mortality



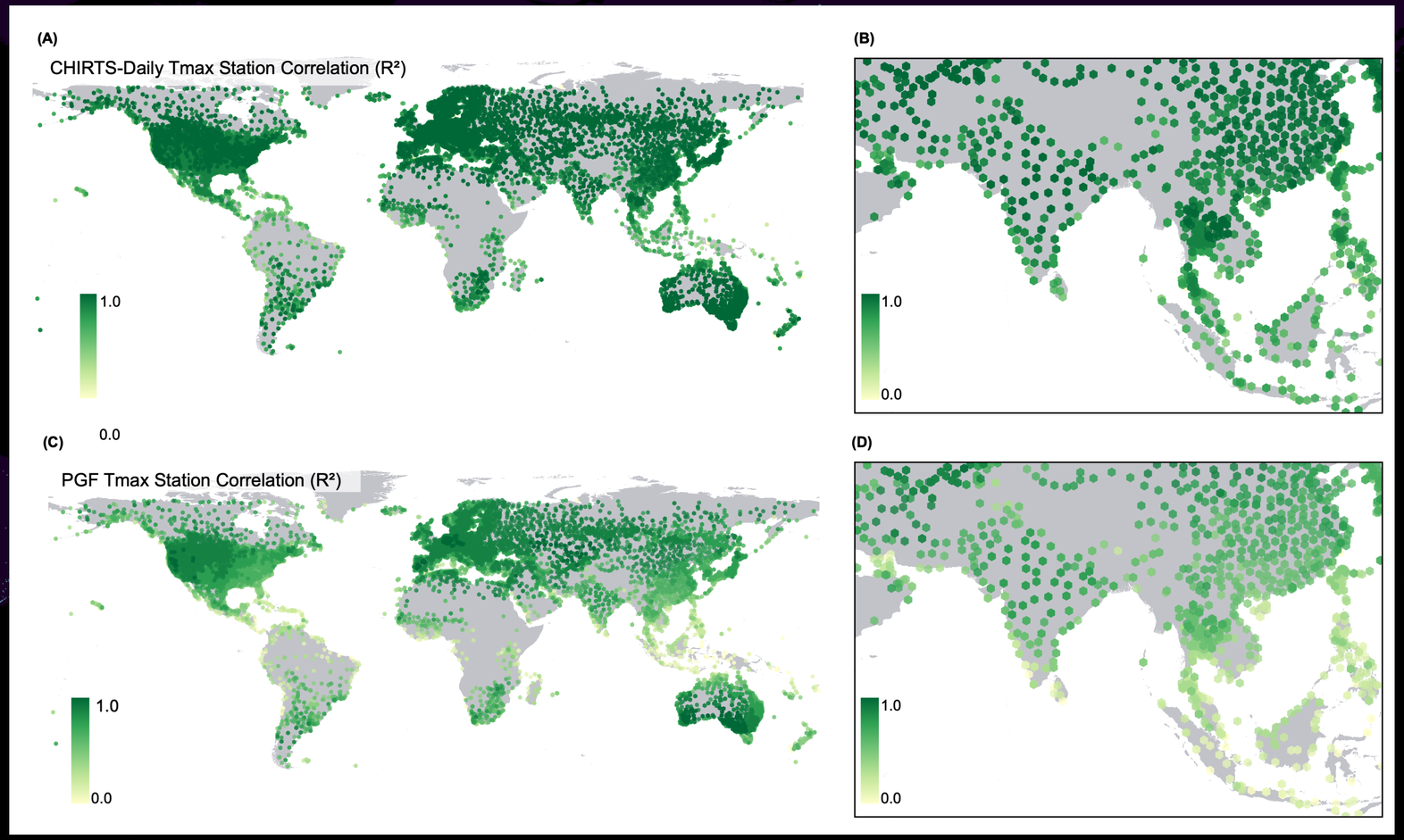
Mora *et al.* 2017

Raymond et al. 2020; Coffel et al. 2017; Mattews et al. 2017; Meehl et al. 2004

Globally, how has urban population exposure to extreme heat changed? Where? Why?

New Data, New Opportunities - CHIRTS-daily

- High-resolution (0.05°) daily temperature maximum and minimum (and relative humidity) record 1983 - 2016
- $CHIRTS_{max}$ monthly combines geostationary satellite thermal infrared observations with a set of ~15,000 stations observations
- CHIRTS-daily is produced by bias adjusting ERA5 climate reanalysis
- Most accurate daily T_{max} record in rapidly urbanizing, data-sparse regions



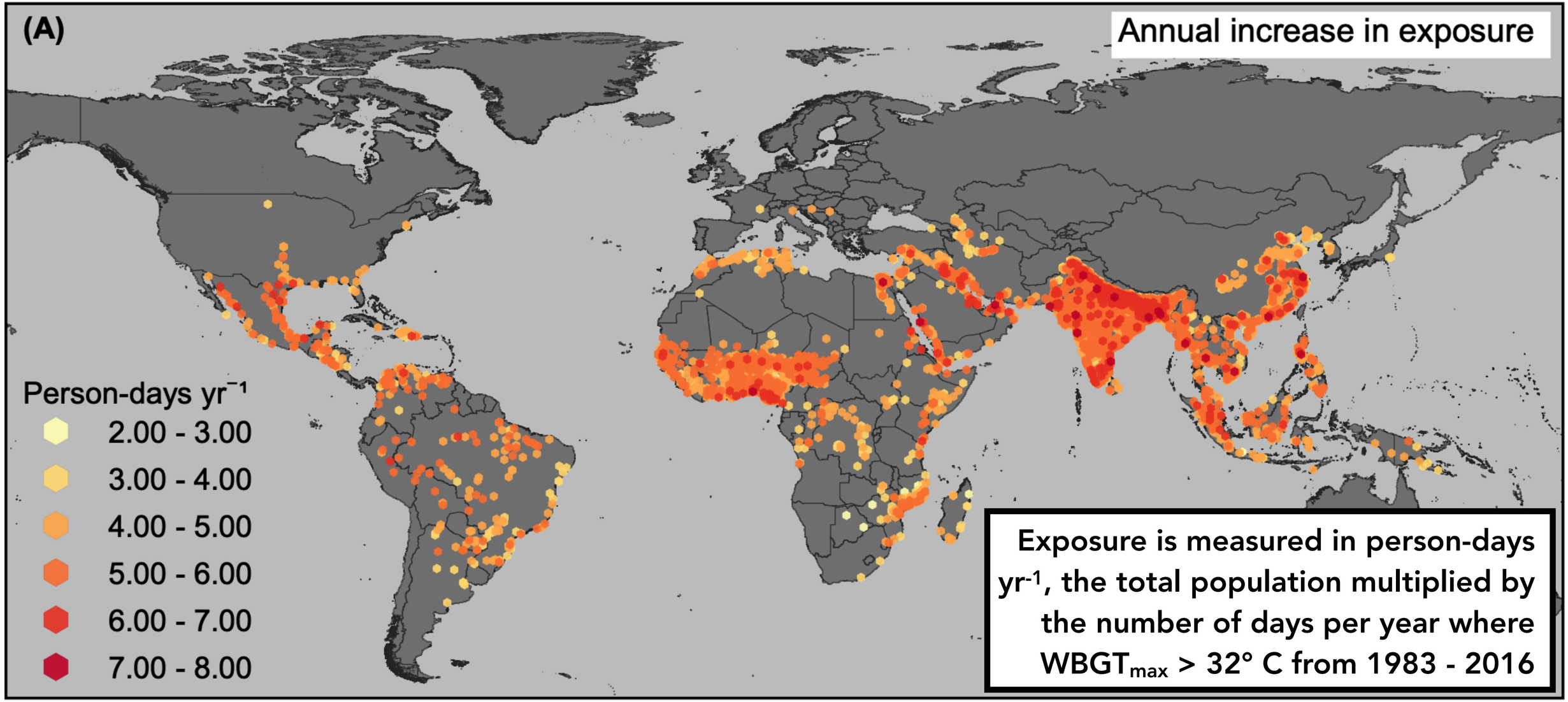
Verdin et al. 2020

New Data, New Opportunities

— Global Human Settlement Layer Urban Center Data Base: GPWv4 + 30,000 Landsat Scenes + Spatial Smoothing
— Population estimates benchmarked at 1975, 1990, 2000, & 2015 for ~13,000 urban settlements

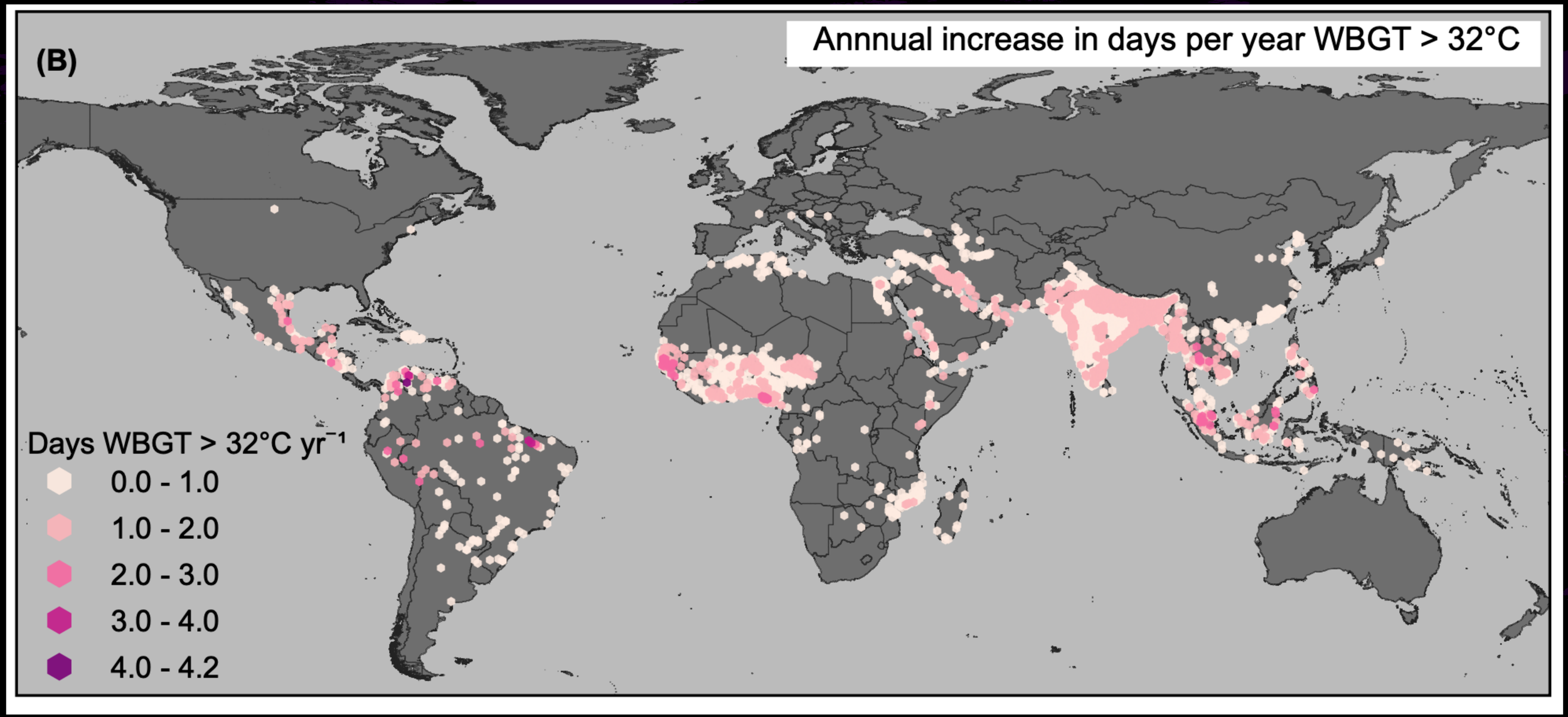
Florczyk et al. 2019

Annual Rate of Increase in Urban Extreme Heat Exposure 1983 - 2016



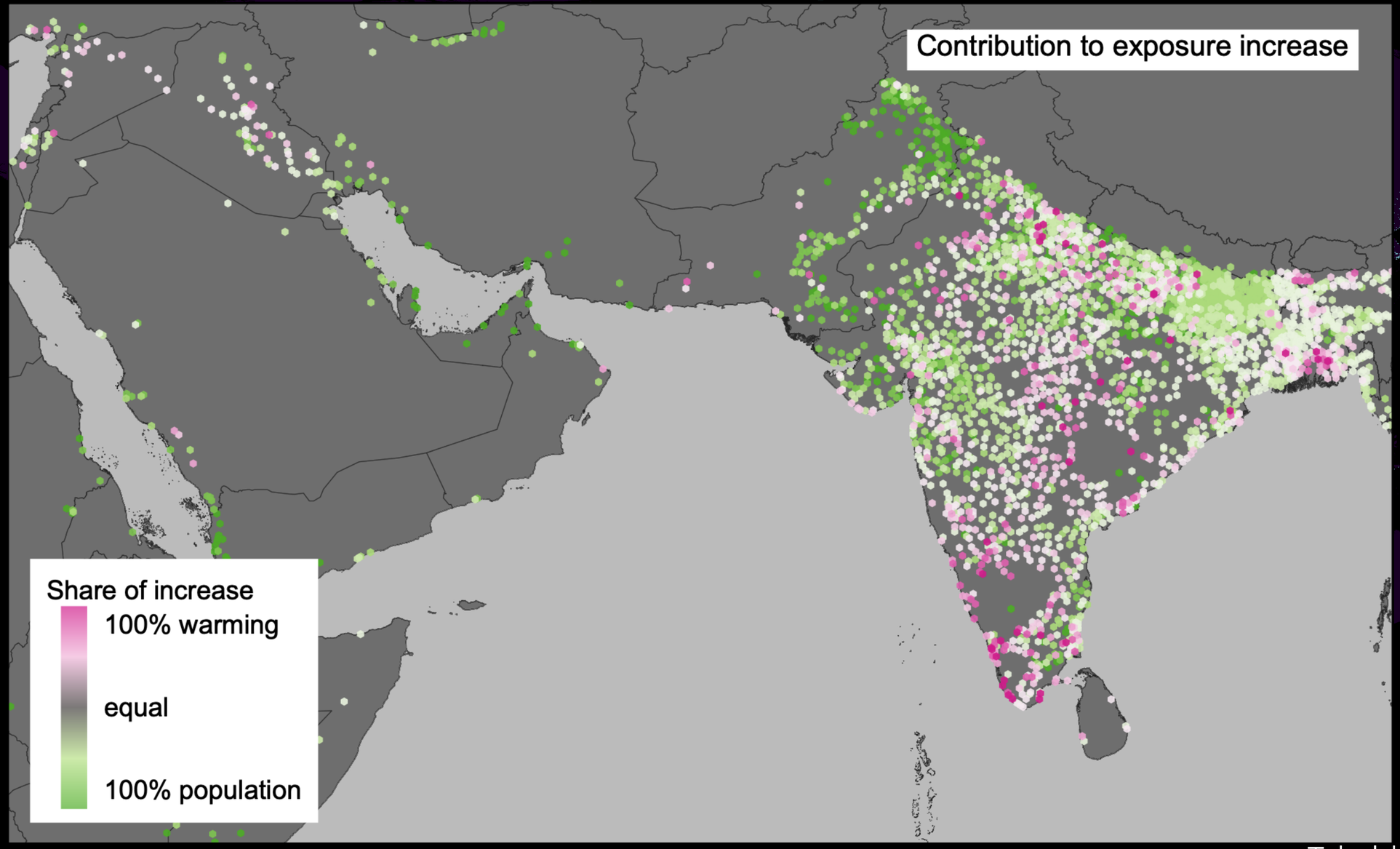
Tuholske *et al*. In Press.

Increase in days per year $WBGT_{max}$ > 32 °C



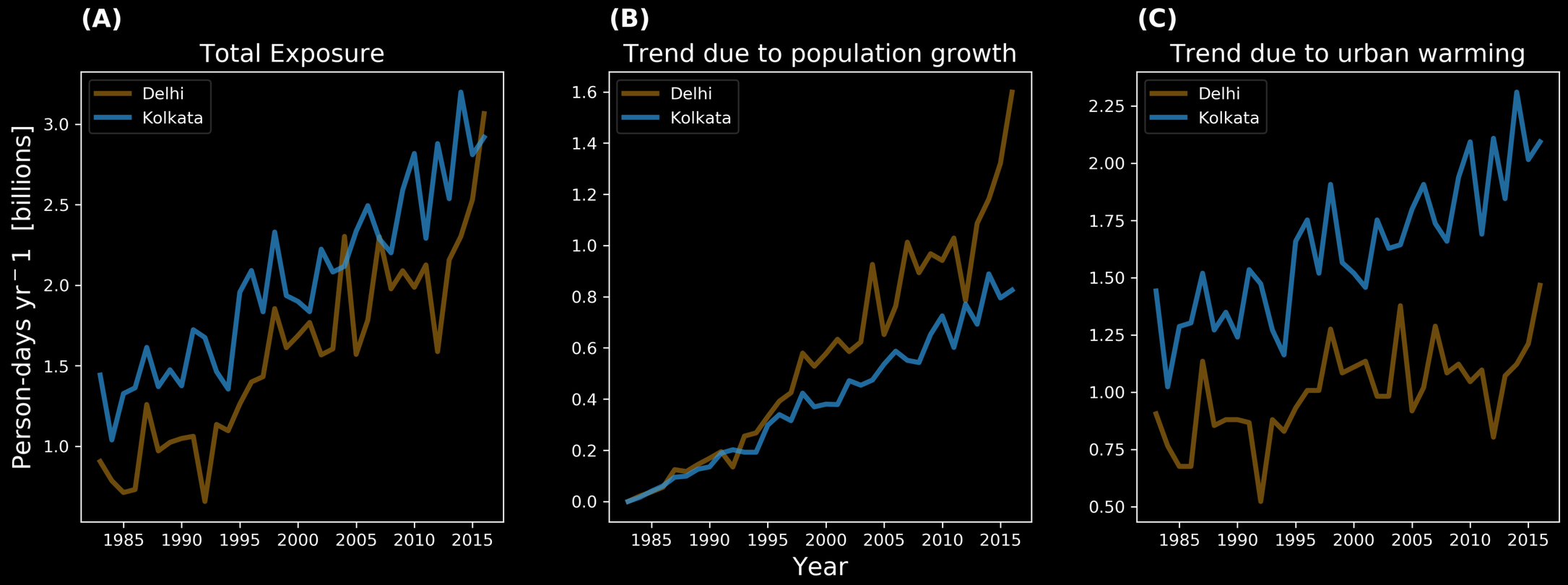
Tuholske *et al*. In Press.

Urban Warming vs. Population Growth



Tuholske *et al*. In Press.

Geography Matters



Delhi & Kolkata have very similar exposure trajectories, but total urban warming contributed to only 24% of Delhi's exposure trajectories compared to 50% in Kolkata.

Tuholske *et al.* In Press.