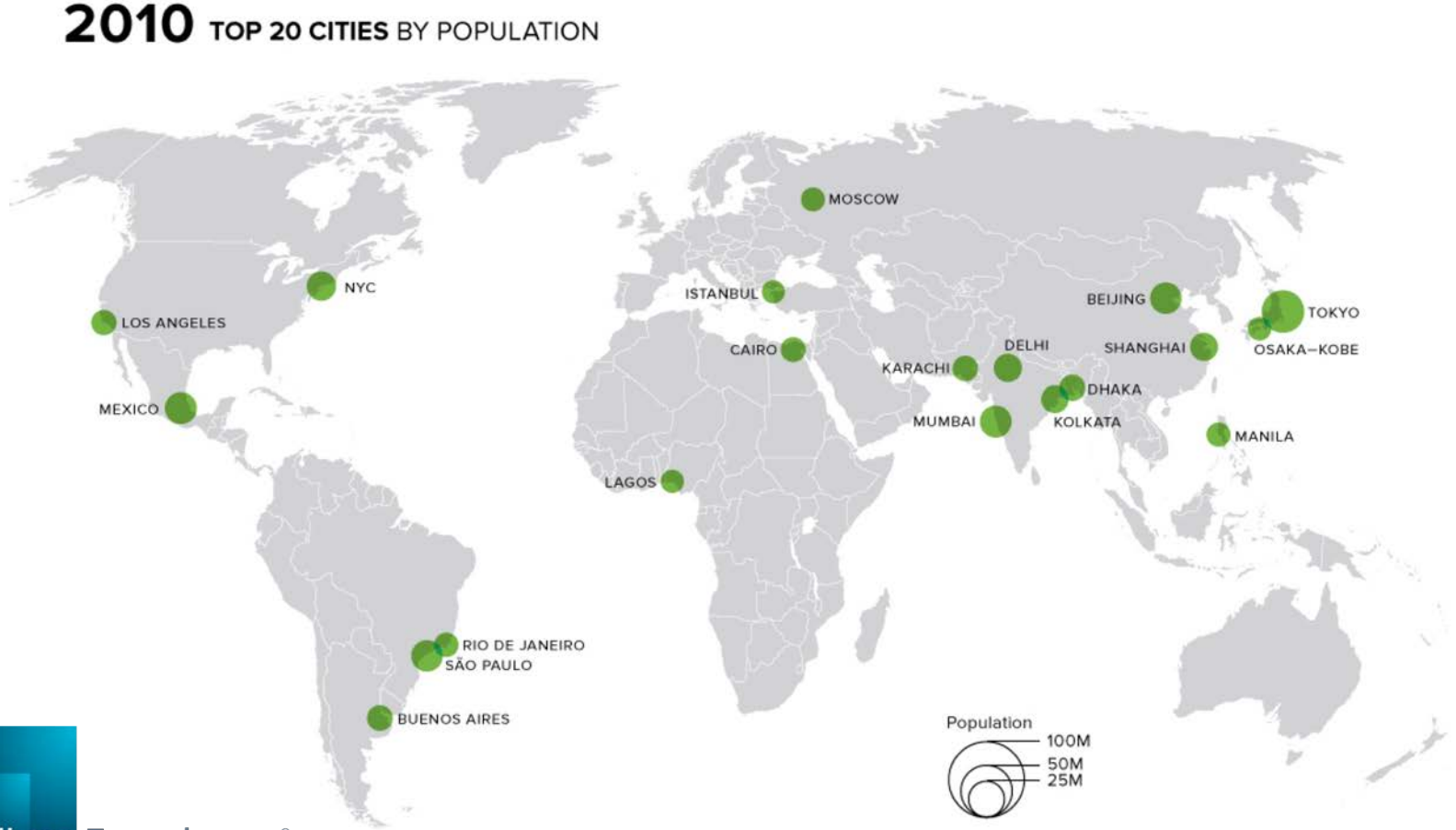
Health Impacts of Future Fossil Fuel Emissions in Africa

with Rachel Silvern, Alina Vodonos, Loretta Mickley, and Joel Schwartz

By 2100, 13 of the 20 largest cities will be in Africa



The Wallace Foundation®

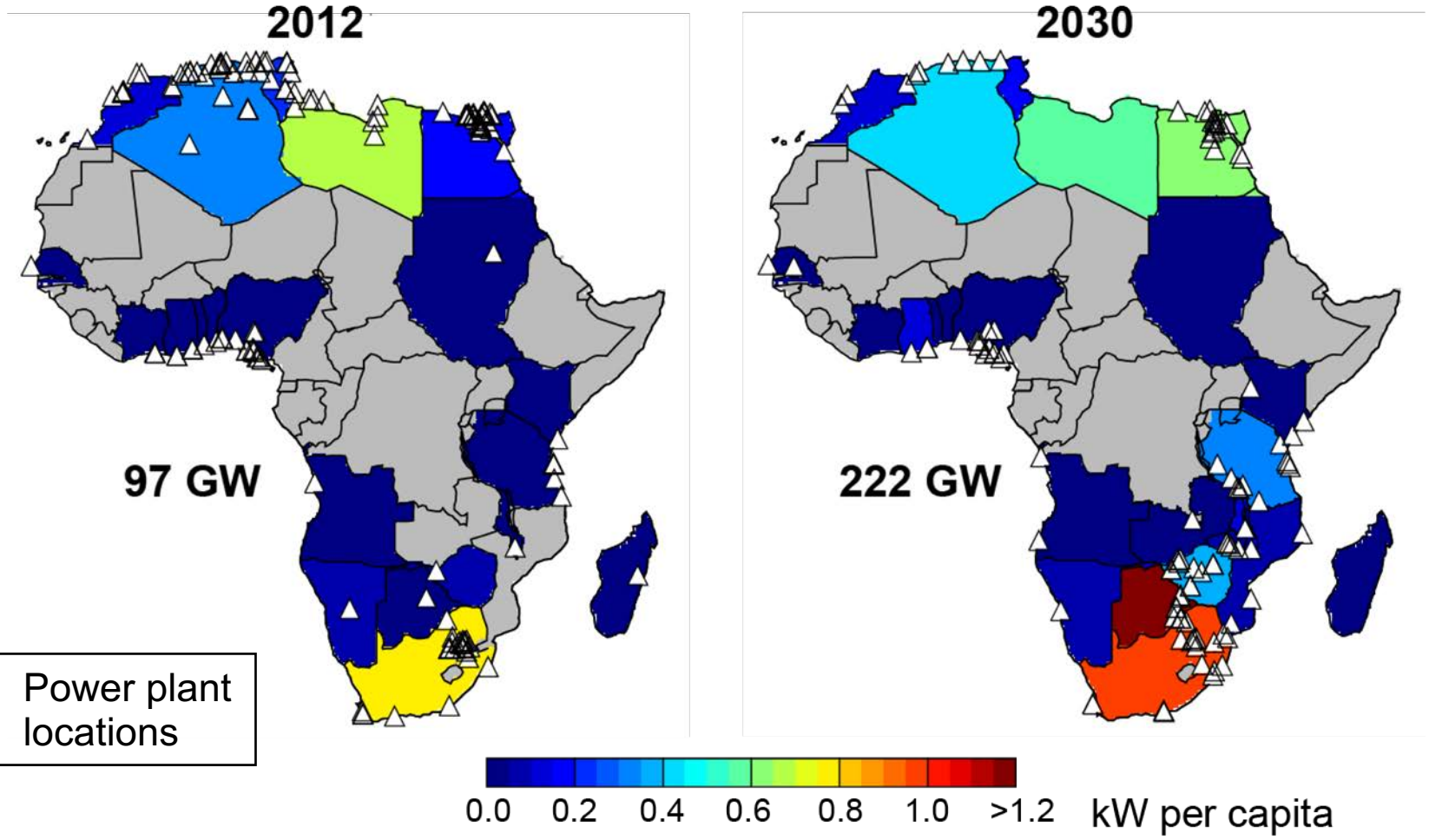
Eloise Marais

UNIVERSITY OF LEICESTER

6 May 2019

Planned Expansion in Fossil Fueled Power Plants

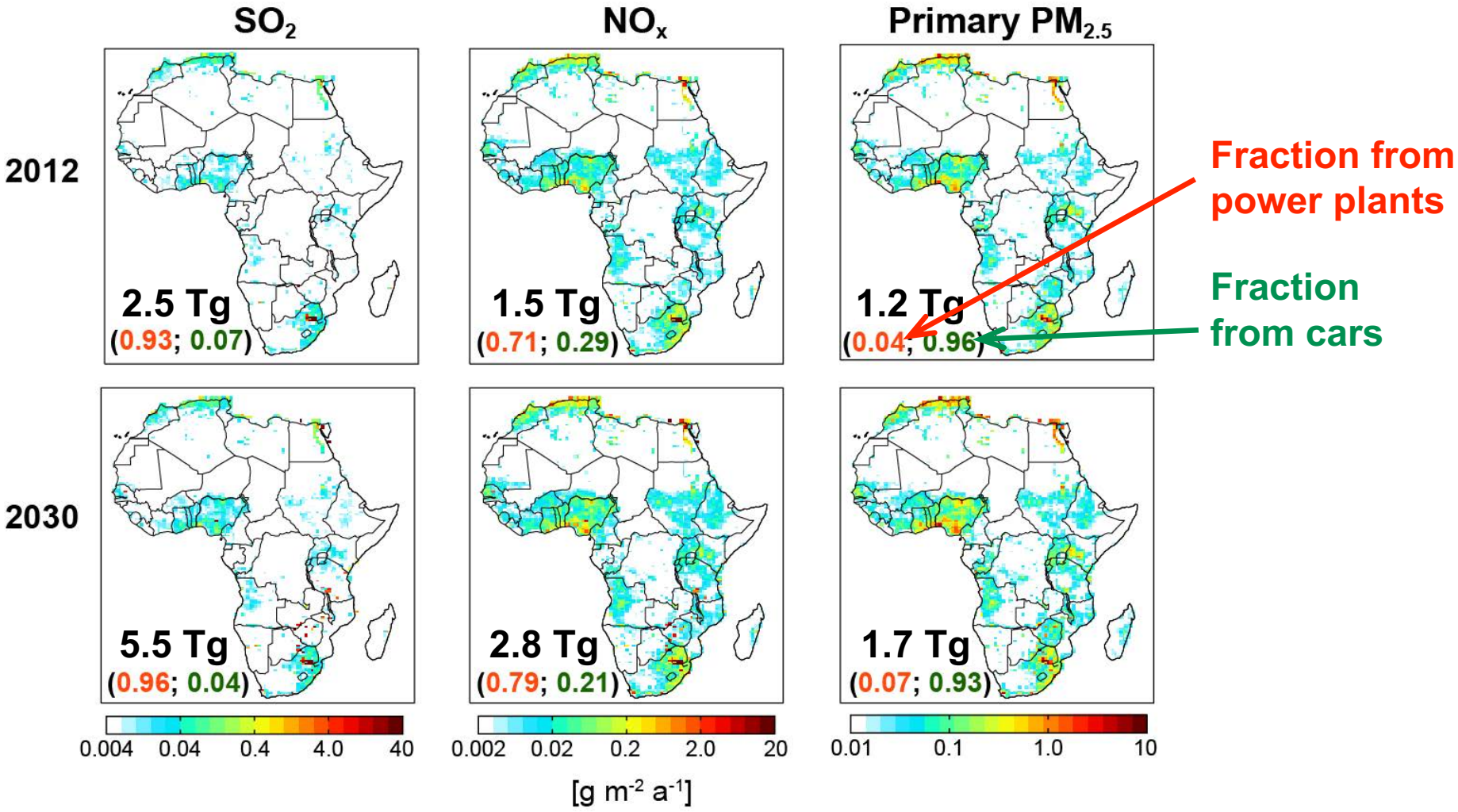
Total and per capita generating capacity from fossil fuels



Generating capacity increases by almost 130%, population by 54%

[Marais et al., *submitted,* ES&T, 2019]

Emissions from Vehicles and Power Plants

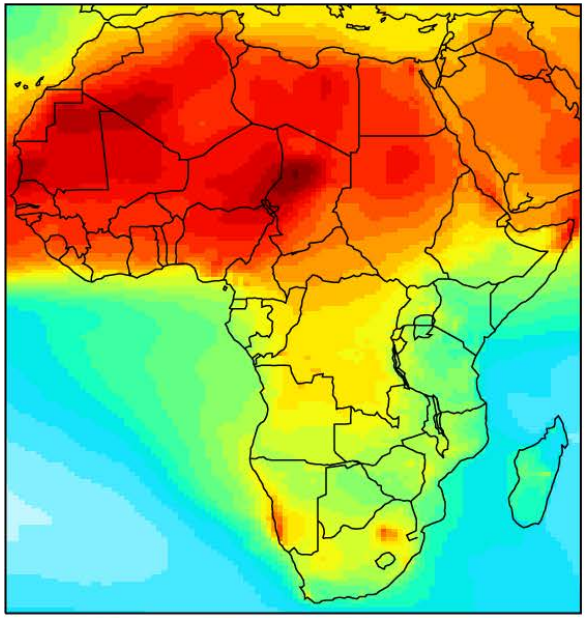


Vehicle emissions are from DICE-Africa for 2012 and scaled by population growth for emissions in 2030

Emissions of SO_2 and NO_x double from 2012 to 2030

Impact on Air Quality (Annual Mean $PM_{2.5}$)

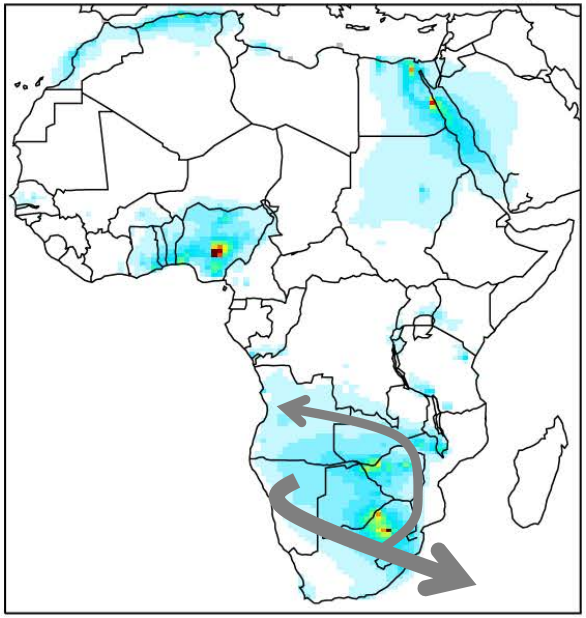
$PM_{2.5}$ in 2012



0.40 4.00 40.0 400

μg m^{-3}

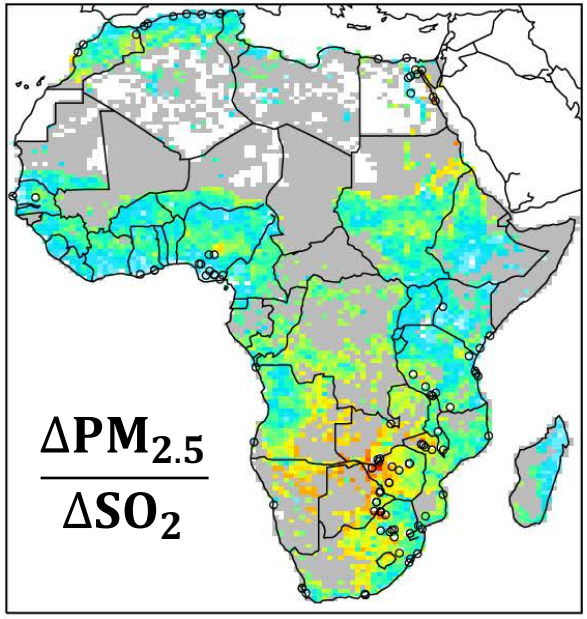
2030 minus 2012 $PM_{2.5}$



0 2 4 6 8 10

μg m^{-3}

Sensitivity of $PM_{2.5}$ to SO_2 emissions



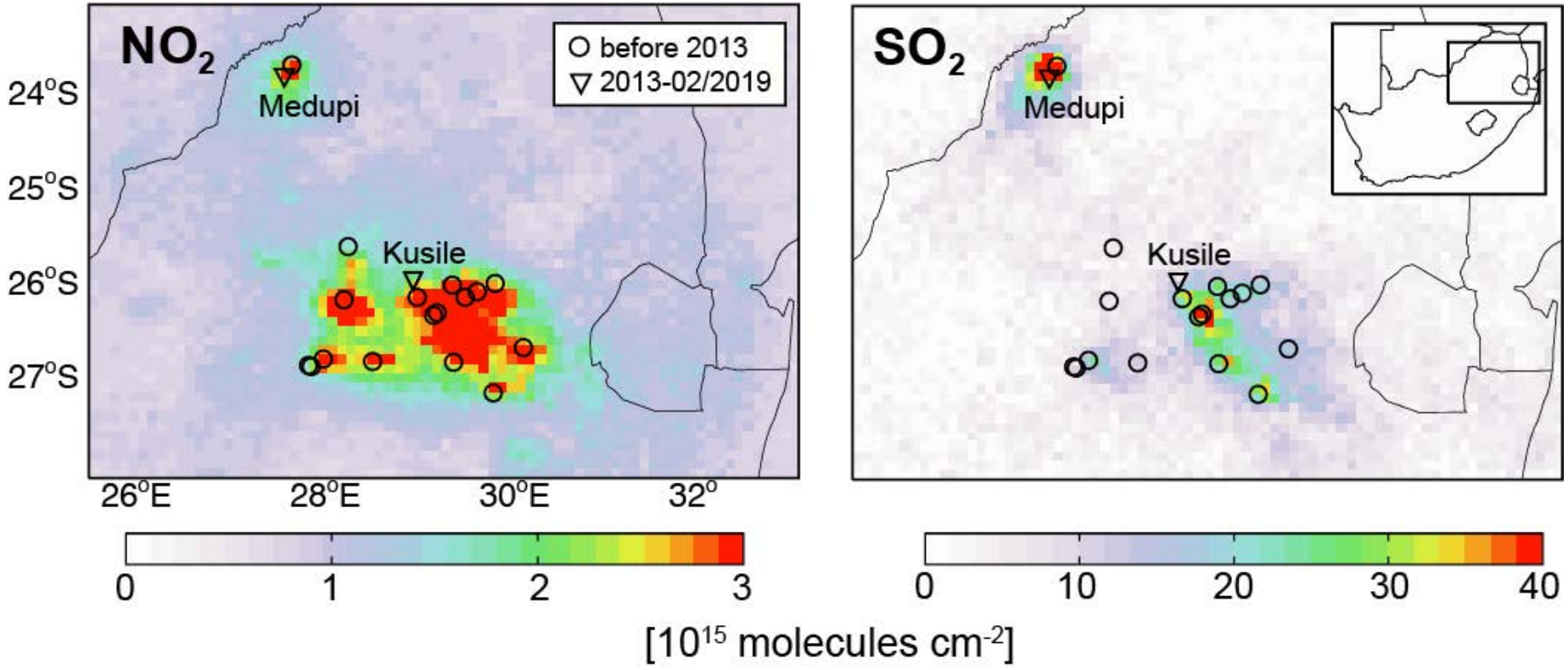
0.004 0.04 0.4 4.0 40

μg m^{-3} $PM_{2.5}$ per Mg SO_2

$PM_{2.5}$ concentrations obtained from GEOS-Chem at high resolution nested over the African continent

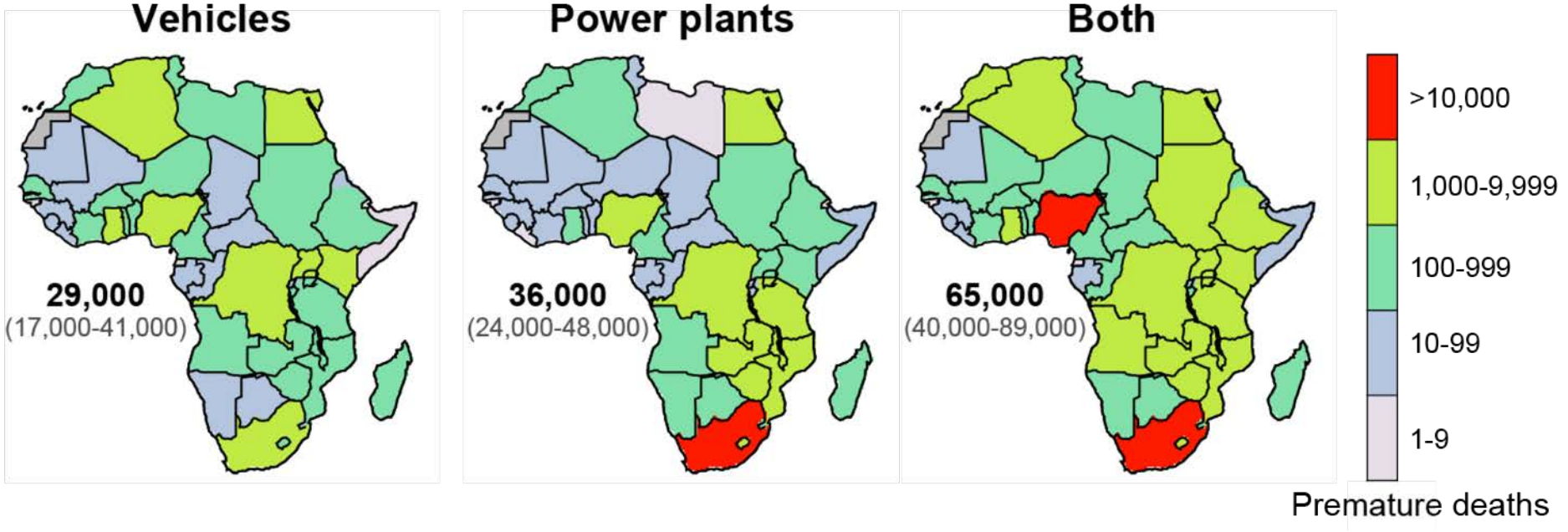
Air Quality Degradation Evident from Space

Sentinel-5P/TROPOMI NO_2 and SO_2 for Dec 2018 to Feb 2019 over the South African Highveld



Enhancements in NO_2 and SO_2 from the recently commissioned Medupi power plant

Deaths attributable to exposure to $PM_{2.5}$ from future fossil fuel use



Total premature deaths in Africa from exposure to fossil fuel $PM_{2.5}$: **65,000**

Far fewer than from exposure to $PM_{2.5}$ from windblown dust (~800,000), but future expansion in fossil fuel $PM_{2.5}$ could be avoided.