Strengthening monitoring to better inform policy action

1st Air Sensor International Conference

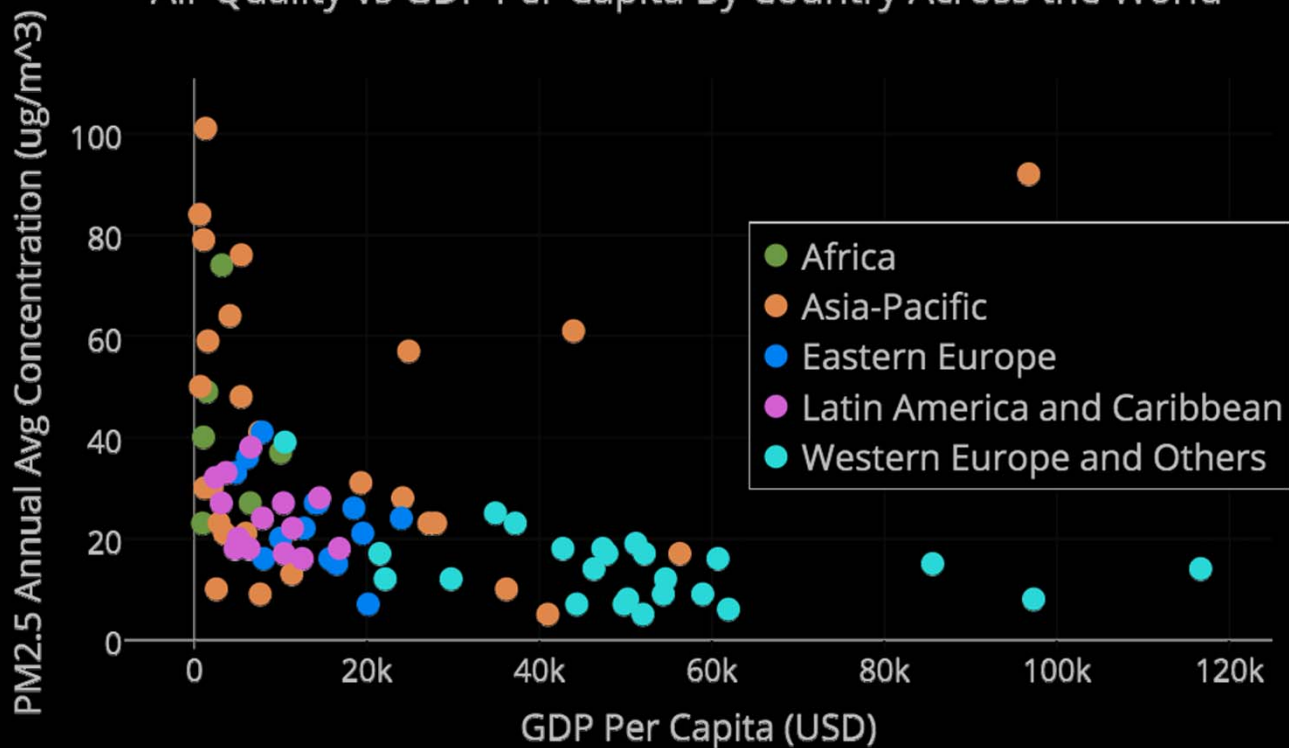**Oakland Ca, 12-14 September 2018**

Sean.Khan@un.org

'You two need to go inside and get some fresh air.'

Unequal access to clean air

1 out of **9** deaths are due to air pollution

Air Quality vs GDP Per Capita By Country Across the World

WHO 2016 OAP Database + World Bank Data
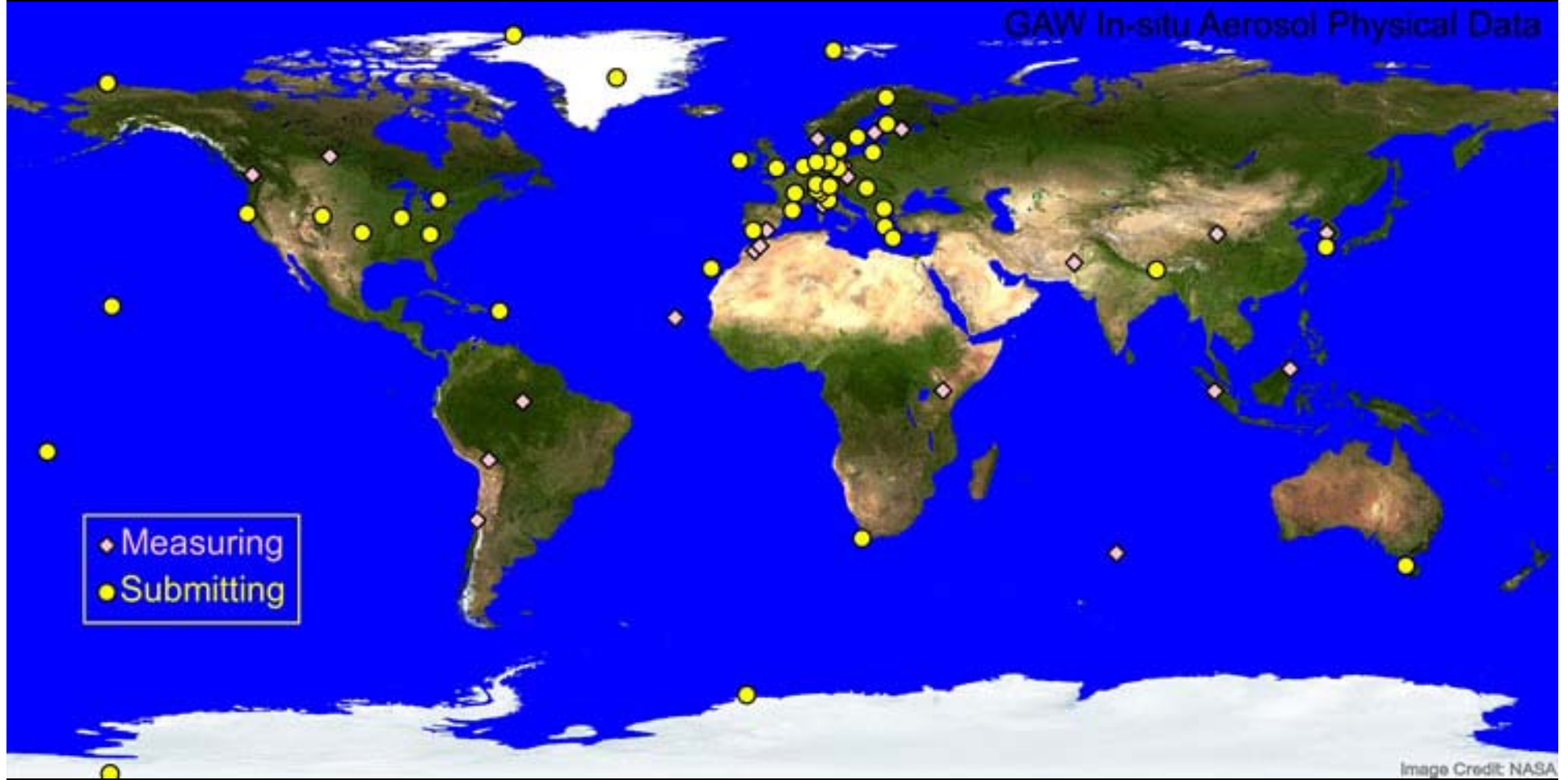
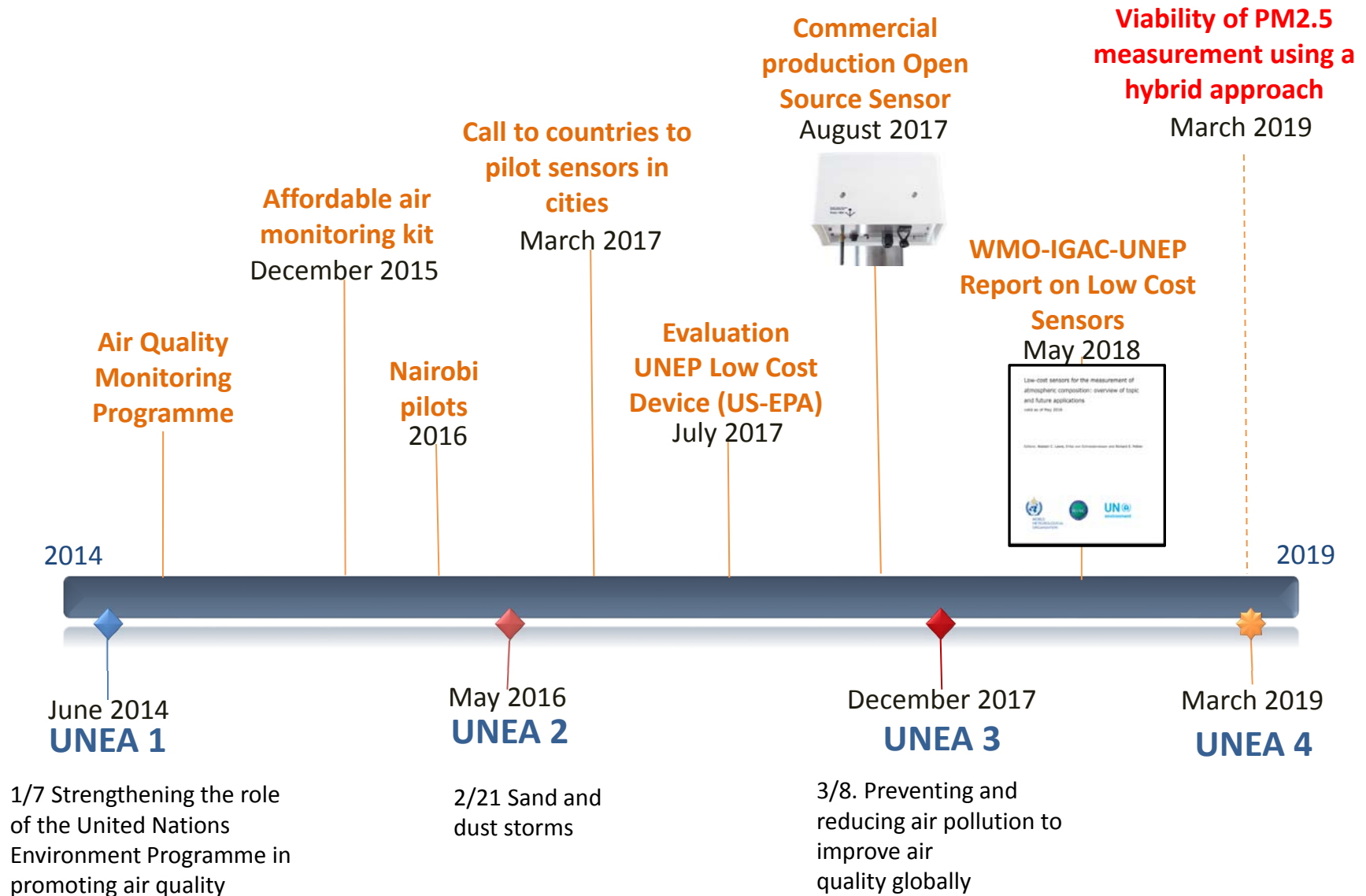GAW In-situ Aerosol Physical Data

◆ Measuring
● Submitting

Image Credit: NASA

"Insanity: doing the same thing over and over again and expecting different results."**– Albert Einstein**

Resolutions and Progress

Commercial production Open Source Sensor
August 2017

Viability of PM2.5 measurement using a hybrid approach
March 2019

Call to countries to pilot sensors in cities
March 2017

Affordable air monitoring kit
December 2015

WMO-IGAC-UNEP Report on Low Cost Sensors
May 2018

Air Quality Monitoring Programme

Nairobi pilots
2016

Evaluation UNEP Low Cost Device (US-EPA)
July 2017

2014

2019

June 2014
UNEA 1

1/7 Strengthening the role of the United Nations Environment Programme in promoting air quality

May 2016
UNEA 2

2/21 Sand and dust storms

December 2017
UNEA 3

3/8. Preventing and reducing air pollution to improve air quality globally

March 2019
UNEA 4

The Strategy

Enhance Capacity to Monitor AQ

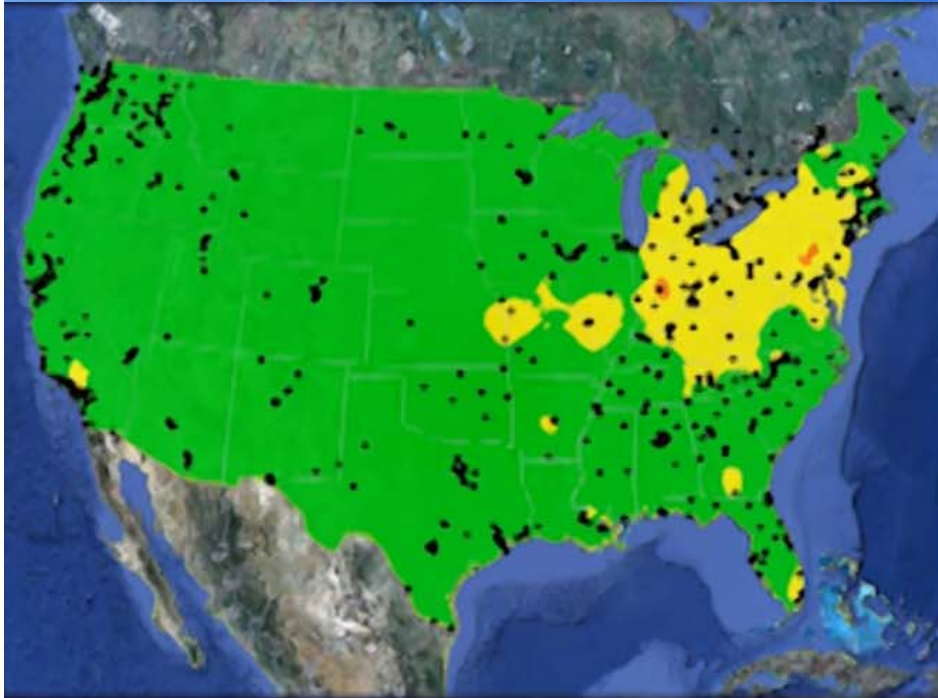**Ease the burden of Network Management**

Automate Visualization & Analysis

Complimented with Sensor Technology

Leveraging Cloud based platforms

Browser based Analysis and modeling

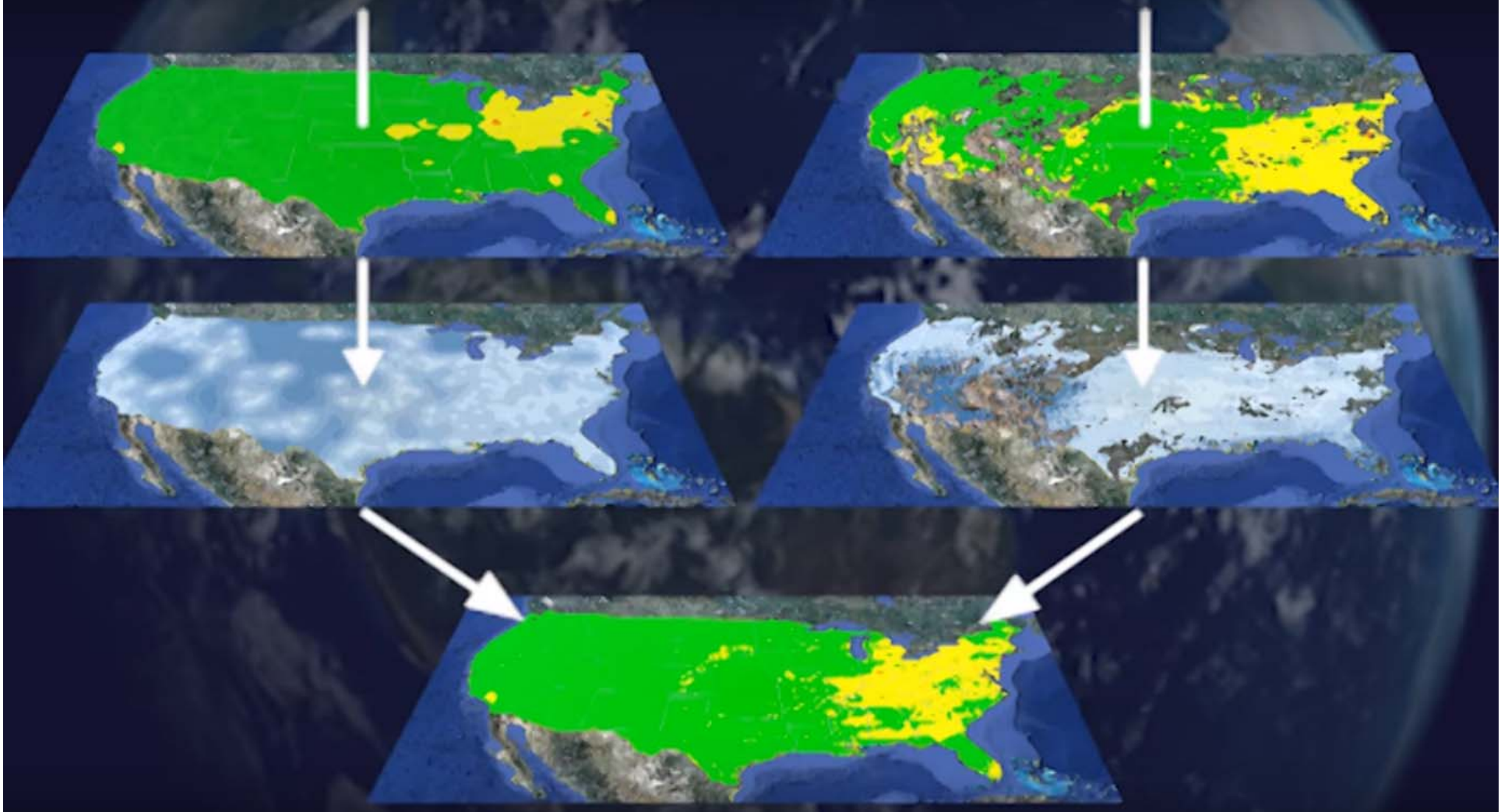# Leveraging Satellite technology

Ground Observations   Satellite Estimates
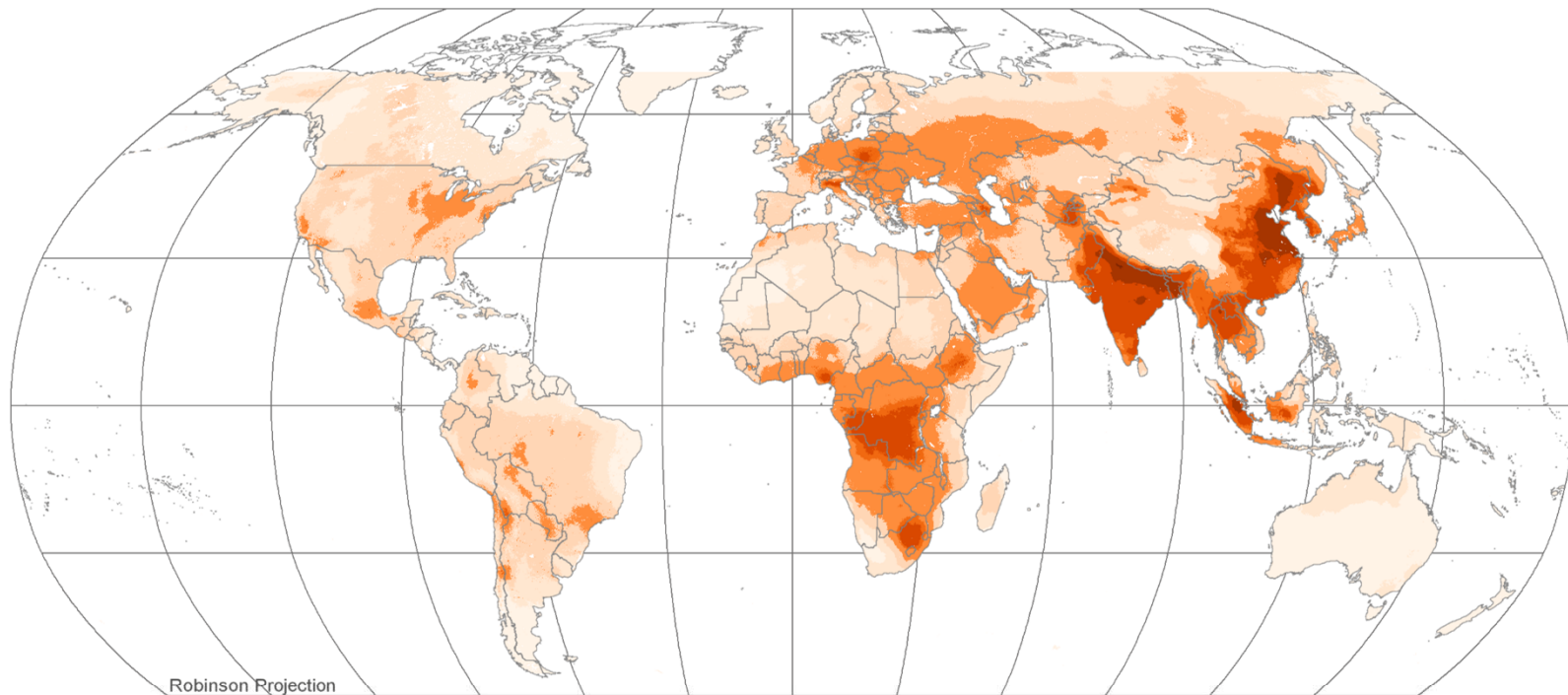
Source US-EPA

…completing the picture with ground data
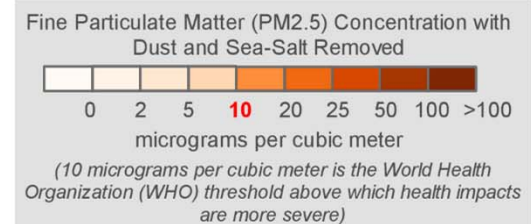

Source US-EPA (2010)

What if….

Global Annual PM2.5 Grids from MODIS, MISR and SeaWiFS Aerosol Optical Depth (AOD) with GWR, 2015
Satellite-Derived Environmental Indicators

Robinson Projection

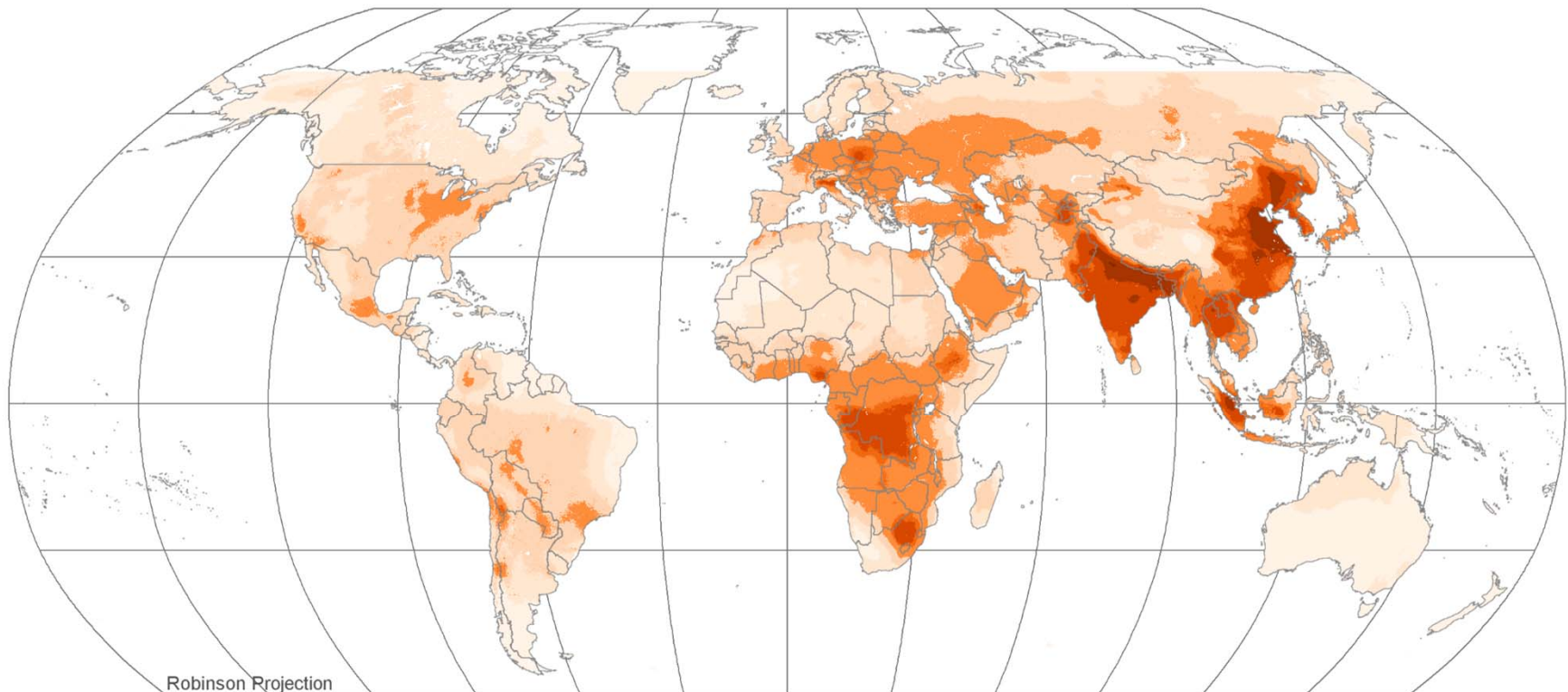Map Credit: CIESIN Columbia University, March 2018.

The Global Annual PM2.5 Grids from MODIS, MISR and SeaWiFS Aerosol Optical Depth (AOD) with GWR, 1998–2016 consist of annual concentrations (micrograms per cubic meter) of ground-level fine particulate matter (PM2.5), with dust and sea-salt removed. This data set combines AOD retrievals from multiple satellite instruments including NASA's Moderate Resolution Imaging Spectroradiometer (MODIS), Multi-angle Imaging SpectroRadiometer (MISR), and the Sea-Viewing Wide Field-of-View Sensor (SeaWiFS). The GEOS-Chem chemical transport model is used to relate this total column measure of aerosol to near-surface PM2.5 concentration. Geographically Weighted Regression (GWR) is used with global ground-based measurements to predict and adjust for the residual PM2.5 bias per grid cell in the initial satellite-derived values. The spatial resolution of the data is 0.01 degrees. This map represents concentrations of ground-level fine particulate matter, with dust and sea-salt removed in the year 2015.

Fine Particulate Matter (PM2.5) Concentration with Dust and Sea-Salt Removed

0 2 5 **10** 20 25 50 100 >100
micrograms per cubic meter

(10 micrograms per cubic meter is the World Health Organization (WHO) threshold above which health impacts are more severe)

What if ....

Global Annual PM2.5 Grids from MODIS, MISR and SeaWiFS Aerosol Optical Depth (AOD) with GWR, 2015

Satellite-Derived Environmental Indicators

Robinson Projection

Map Credit: CIESIN Columbia University, March 2018.

Pulling it together … Data / Science / Policy

- +30 countries/cities requesting to participate in an initial pilot study on sensor devices

- This year at least 5 pilot countries targeted around the world

- Air quality and health assessment in 6 countries underway (Benin, Ethiopia, Botswana, Mongolia, Sri Lanka and Thailand)

- Develop a country package to ease capacity building and promote autonomy (i.e. IoT, automation, common platform, guidelines, etc)

- Early 2019 test the viability of hybrid monitoring approach for Africa

- Late 2019 extend coverage to Asia

UN
environment

Thank you

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