REMOTE SENSING & CLIMATE ACTION

How can Satellite-Derived Data Sets Support the United Nations Sustainable Development Goals?

I. Introduction

The United Nations Sustainable Development Goals on Good Health & Well-Being (SDG 3) and on Sustainable Cities & Communities (SDG 11) use the concentration levels of PM₂.₅ in the air over human settlements as an indicator of progress, due to its direct correlation to detrimental health incidences among populations exposed to high levels of air pollution, with the eldest and youngest being most vulnerable. In 2016, 91% of the world population did not have access to clean air, as defined by the World Health Organization’s (WHO) guidelines on air quality. During the same year, outdoor air pollution caused 4.2 million premature deaths. Many regions of the world lack air quality monitors on ground, or have very few of them, thus not a substitute for ground measurements. Existing NASA remote sensing data sets & tools can be used to estimate plenty of environmental indicators to identify potentially hazardous areas. Insights gained can and must be used to raise awareness among influencers and stakeholders in order to detone conversations around health & air quality, and this way lead the community forward on the road to a sustainable future.

II. Tools

Maps of Mexico, Burkina Faso, and Nigeria were developed using the following tools & methods:

- Advanced NASA Applied Remote Sensing Training (ARSET)
- QGIS Geospatial Software
- World Health Organization’s 2014 data sets, based on NASA Instruments & Missions Aquas, MISR, MODIS, Terra, and CALIPSO.

III. Results:

PM₂.₅ Satellite-Derived Annual Estimates (μg/m³)

IV. Discussion

- Images 1, 2 & 3 show that in most of Mexico, Burkina Faso, and Nigeria, respectively, the annual concentration levels of PM₂.₅ exceed the safe limit -established by the WHO to be 10μg/m². In Mexico, the south east region in the vicinity of the Gulf of Mexico -where the oil & gas industry is prominent- shows dangerous levels of PM₂.₅.
- In central Nigeria, the region in the vicinity of Kaduna stands out for its alarmingly high levels of PM₂.₅ while the northern areas of both Mexico and Burkina Faso are most affected by PM₁₀, possibly due to their proximity to the Himalaya. 
- Air quality is influenced by climate, and generally worsened by climate change. Climate change alters atmospheric chemistry and removal processes such as ventilation, dilution, and precipitation- which in general, worsens air quality.
- By providing insight on air quality, the results shown on Images 1, 2 & 3 went on to support global climate leaders to engage stakeholders and influencers, raise awareness, and reduce greenhouse gas emissions to clean the air around their communities, protect the health of loved ones, and contribute towards solving the global climate crisis. This way, SDGs 3, 11, 13, and 17, on health, communities, climate action, and partnerships are directly supported.

V. Conclusions

Data retrieved from NASA instruments and missions greatly supports actions required to achieve the UN SDGs, giving insight on common interests to multiple stakeholders and influencers. Enriching data sets are yet to be fully tapped into. Further public awareness of relevant trainings & tools would increase environmental applications, which would in turn support continuation of funds for such missions and tools.

VI. References