Satellite-derived annual estimations of PM2.5 (air quality) in support of the Sustainable Development Goals 3 (Good Health & Well-Being) & 11 (Sustainable Cities and Communities)

Diana Guzmán Barraza, MSC Sustainable Energy Engineering,
Guzmán-Barraza Energy Engineering & Consulting, Mexico

Abstract

PM2.5 is particulate matter smaller than 2.5 microns of diameter, which is 20-28 times smaller than that of a human hair. Prolonged exposure to concentration levels above 10 Mg/m3 of this type of air pollution increases the risks of cardiovascular diseases by 95%, according to the World Health Organization (WHO). It also contributes to global warming, and as such, to climate change, which poses the largest threat to humanity in history.

In the spirit of collaborating with the international community to solve the climate crisis, this research was developed using my home country, Mexico, as a case study. It can be replicated for every country in the world. Figure 1 shows the annual mean estimates for PM2.5 concentration levels in the country, highlighting darker colors for areas with higher concentrations of this type of air pollution.

Notice that the region around the south east, Mexico City, and Monterrey show alarmingly dangerous high levels of concentration, which pose a huge threat to the health of locals. These regions are also were much of the country´s GDP is generated. Major oilfields are located in the southeast, while up north around Monterrey, the region is home to the leading cement, steel, glass, and beer industries, as well as plenty other industrial processes.

We must be aware of the sources of greenhouse gas emissions around human settlements, monitor the quality of the air we breathe, and address the urgency of implementing new climate adaptation & mitigation plans around the world. There is an acute relationship between climate change & health, and not taking action comes at a cost far higher than the upfront costs of addressing the needs for clean technologies.

This research supports the United Nations Sustainable Development Goal 3 (Good Health & Well-Being) & 11 (Sustainable Cities and Communities) - both of which specifically address air quality using PM2.5 concentration levels as an indicator. It was generated using the skills gained on my recent certified NASA training on creating air quality data sets derived from satellite observations. It is also my first surprise contribution, as a voluntary collaborative partner, to the Monterrey Metropolitan Area Air Quality (OCCAMM) Citizen Observatory.



Image

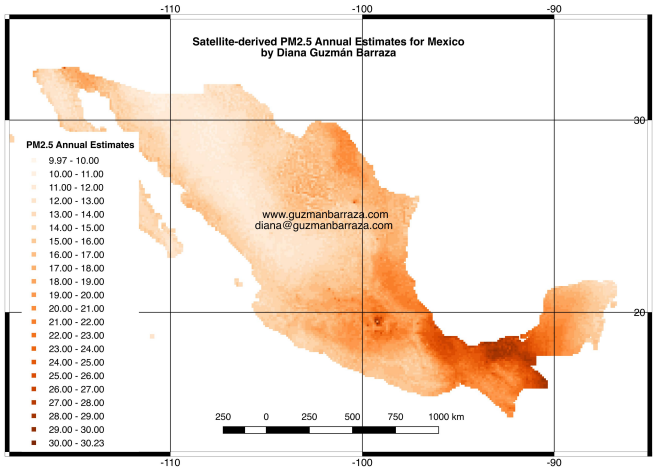


Figure 1. Satellite-derived PM2.5 Annual Concentration Estimates for Mexico in µg/m3

Recent Publications

1. Guzmán-Barraza D (2017) Satellite-derived map of annual estimations of PM2.5 in México.
2. Guzmán-Barraza D (2017) Satellite-derived map of annual estimations of PM2.5 in west African nations.
3. Guzmán-Barraza D. (2017) Sustainable construction trends. PRO Magazine 36: 64-65
4. Guzmán-Barraza D. (2016) United Nations Habitat III high-level event on financing urban development
5. Guzmán-Barraza D. (2014) The impact of material selection on initial and operational costs of Torre Libertad, a high-rise building in Monterrey, Mexico. University of Nottingham
6. Guzmán-Barraza D. (2007) Technical review of well intervention jack-up rig Franscisco de Miranda 111 in Lake Maracaibo, Venezuela. Schlumberger.

Biography

Guzmán-Barraza is a Sustainability and Climate Change Consultant and former Field Engineer in the Oil & Gas industry, whose work has had a positive impact on the urban development of Monterrey. She recently represented civil society on climate change topics in the United Nations in NYC, and in multiple international high-level events. She is also a collaborative partner of the UNFCCC, and of the Civil Society Partner Constituent Group of the United Nations General Assembly of Habitat III.

Guzmán-Barraza has received certified training on Climate Change topics by former Vice President of the USA Al Gore, NASA, UN Habitat, UNICEF, UNITAR, WHO, and UNCC:Learn, and is also among the world´s first generation certified by the World Bank as a regional-scale Greenhouse Gas Emissions Inventories Specialist. She holds a MSC degree in Sustainable Energy Engineering from the UK, a BSc degree in Industrial & Systems Engineering from Latin America´s most prominent higher institution -Tec de Monterrey-, and has been the recipient of multiple awards, scholarships, and commemorations.

Email: diana@guzmanbarraza.com

Notes/Comments