IAF SYMPOSIUM ON INTEGRATED APPLICATIONS (B5)
Integrated Applications End-to-End Solutions (2)

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USE OF SATELLITE AND REMOTE SENSING DATA TO MONITOR ENVIRONMENTAL POLLUTANTS AND AIR POLLUTION IN THE U.A.E, SAUDI ARABIA AND THE MIDDLE EAST

Abstract

The World Health Organization (WHO) reports that air pollution is "world's largest single environmental health risk" and leads to increased morbidity and mortality from various illnesses including ischemic heart disease, stroke, lung cancer, chronic obstructive pulmonary disease (COPD), type 2 diabetes, and others. Most of the air pollution related deaths are related to exposure to fine particulate matter (PM2.5). An estimated 6.7 million people prematurely died in 2019 due to exposure to air pollution, with ambient/outdoor air pollution resulting in 4.2 million premature deaths. Nayebare et al (2017) stated that PM2.5 is considered the most dangerous atmospheric pollutant due to its health effects.

Air pollution is an issue around the world. In 2019, 99The Gulf region has been no exception with much higher than the WHO air quality guideline levels. IQ Air estimate that PM2.5 concentration in the U.A.E. were around 7.2 times the WHO annual air quality guideline value in 2021, while the Kingdom of Saudi Arabia's (KSA) PM2.5 concentrations were 6.5 times more than the WHO guidelines. Other Gulf Cooperating Countries (GCC) Qatar, Bahrain, Kuwait and Oman had high levels as well.

A Greenpeace report stated that air pollution in the Middle East was causing 65,000 deaths annually. Rojas-Rueda and colleagues (2021) states that they estimate exposure to PM2.5 in KSA caused 8536 deaths and 315,200 lost years of healthy life. It represented an estimated 9Gibson and colleague (2013) estimated that there were 651 attributable deaths due to ambient air pollution in the UAE.

The need for monitor air quality and environmental pollutants is vital and can help formulate recommendations such as recommendations provided by Canada's Air Quality Health Index (AQHI). We investigated the use of satellites and remote sensing data to monitor key environmental pollutants.

Our findings indicate several existing satellites have the ability to track the effects of climate change and track various environmental pollutants such as carbon dioxide, methane, particulate matter, carbon monoxide, nitrous oxide, ozone, and sulphur dioxide. A report from the International Space University also found the cost effectiveness of using satellites for monitoring air and environmental pollutants. The findings also recommend that the use of satellites and remote sensing data in combination with ground based monitoring would be beneficial in monitoring environmental pollutant in the Middle East.