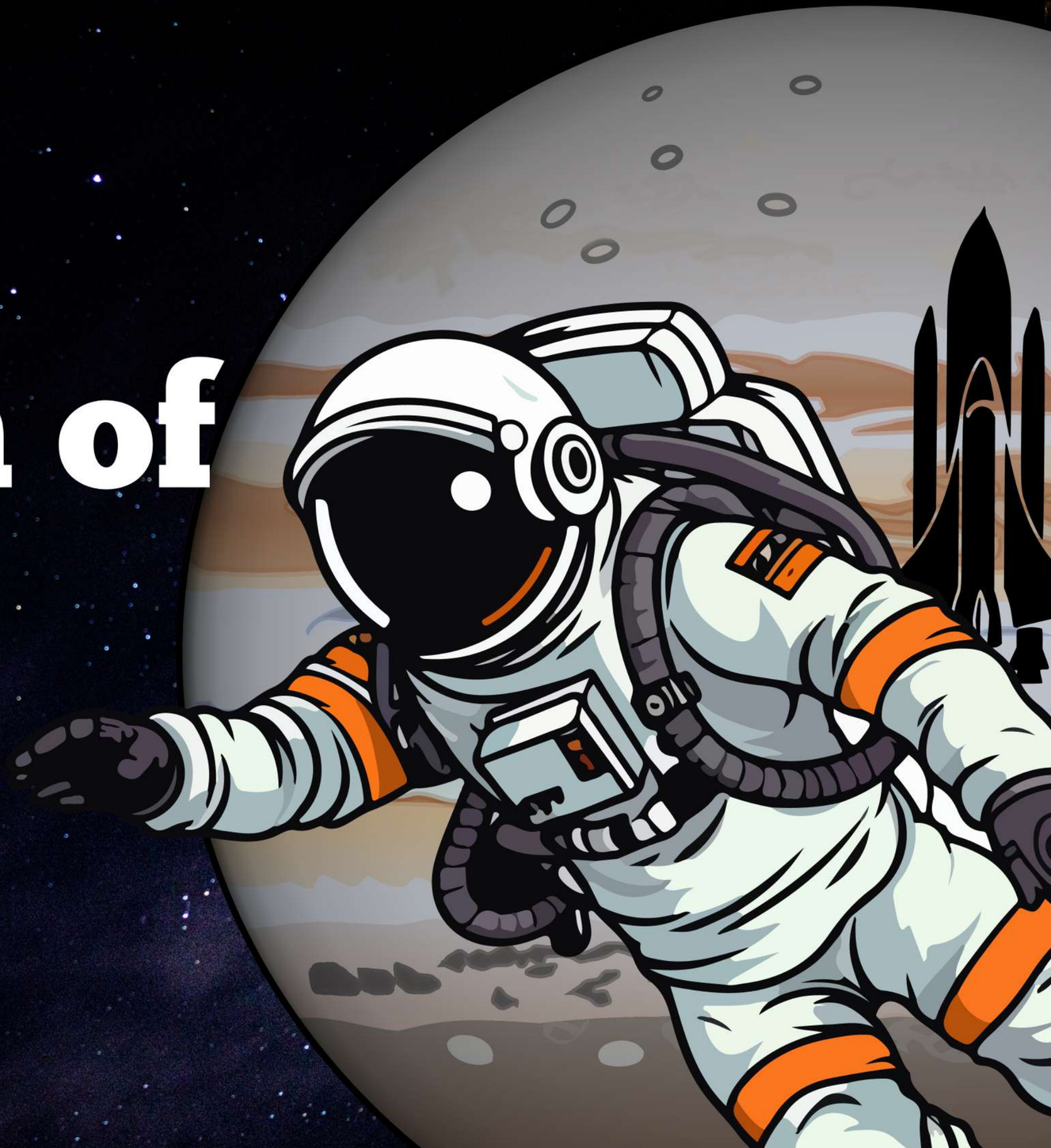
Animation Celebration of Terra Data



By, Team TerraSix

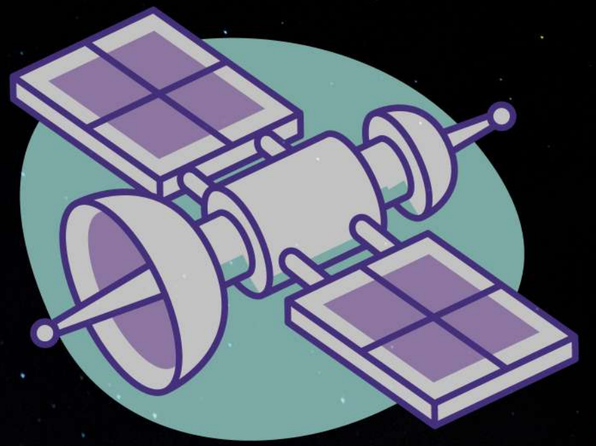
What is Terra?

Terra is a satellite sent by NASA to watch Earth from space. It takes pictures and collects information about the air, land, and water. Terra helps scientists see things like pollution and weather so they can understand how Earth is changing and how to keep it safe.

Terra Satellite

- MODIS (Moderate Resolution Imaging Spectroradiometer) - Captures global images of land, ocean, and atmosphere.
- MOPITT (Measurements of Pollution in the Troposphere) - Measures carbon monoxide and methane in the atmosphere.
- ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer) - Provides high-resolution images of land surface and temperature.
- MISR (Multi-angle Imaging SpectroRadiometer) - Observes Earth from multiple angles to study clouds, aerosols, and surface features.
- CERES (Clouds and the Earth's Radiant Energy System) - Measures Earth's radiation budget to study climate and energy balance.

Air Pollution Challenges in India



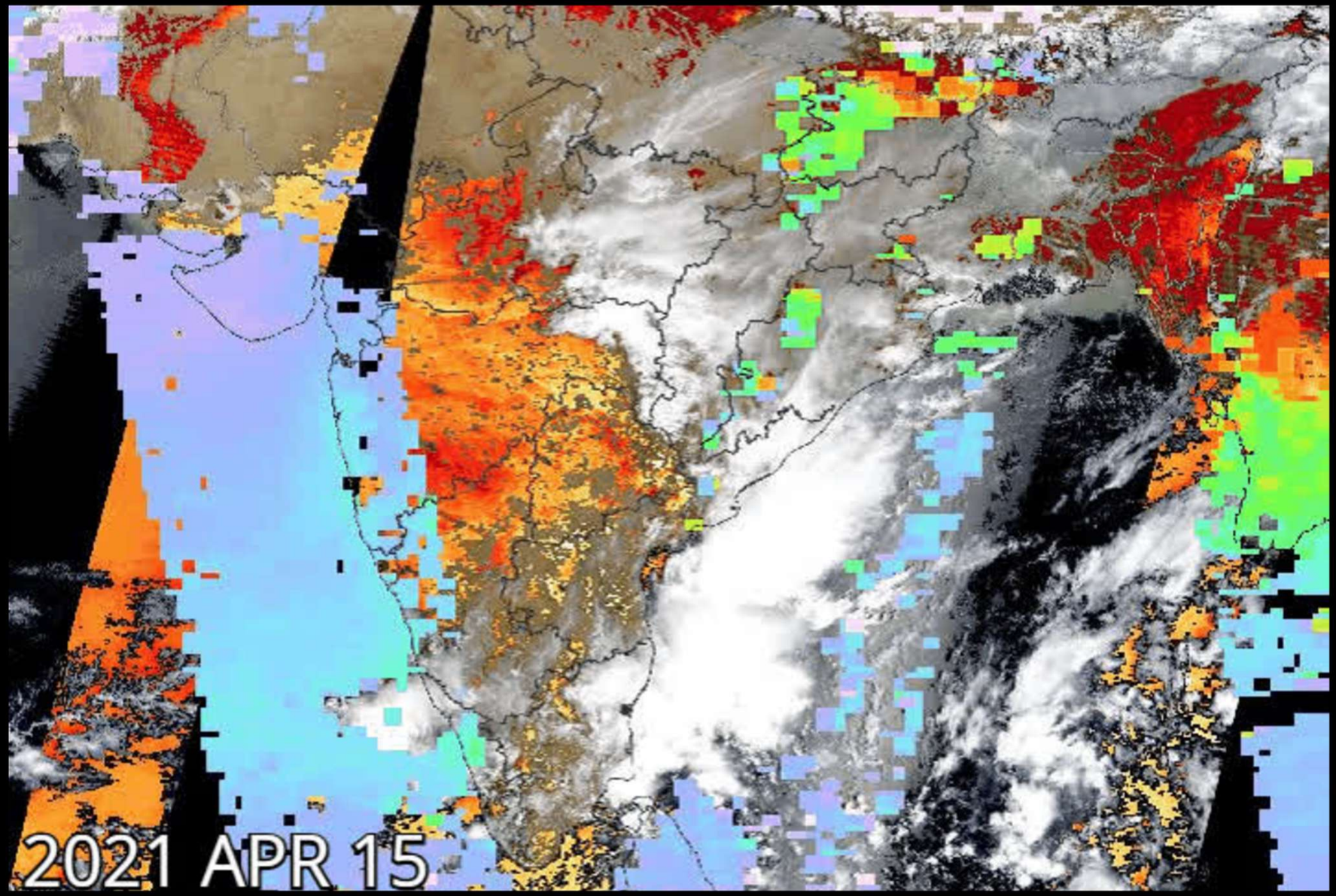
India has big problems with air pollution because of many reasons. Pollution comes from cars, factories, dust from building sites, and burning crop leftovers, especially in winter in northern states. More vehicles on the road add to the dirty air. Factories and power plants also release harmful gases. People sometimes burn trash openly, which makes pollution worse. Weather and land features can trap pollution near the ground, making the air dirty for longer times. Although there are rules to control pollution, they are not always followed well. All these problems make the air unhealthy to breathe and cause health and environmental issues across India.

Air Pollution Monitoring in India Using MODIS AND MOPITT (Terra Satellite)

- Introduction to MODIS AND MOPITT

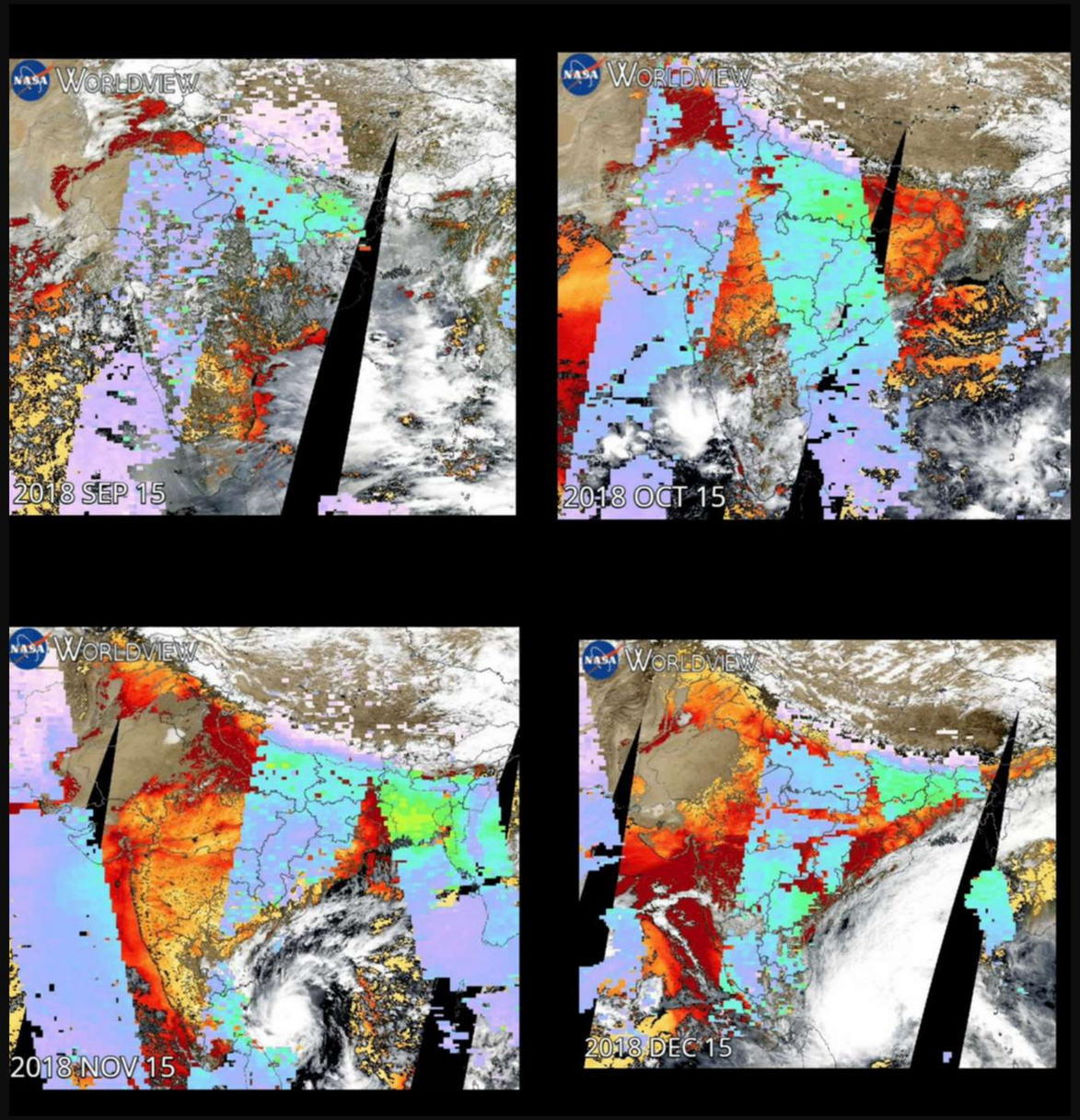
The Moderate Resolution Imaging Spectroradiometer (MODIS) is a powerful camera on NASA's Terra and Aqua satellites. It takes pictures of the Earth in many wavelengths, from visible light to infrared. .MOPITT (Measurements of Pollution in the Troposphere) is another instrument onboard NASA's Terra satellite. It measures gases like carbon monoxide (CO) in the lower atmosphere, which is important for understanding air pollution and its sources.

2018-2021 REGIONAL CLIMATE CHANGE (AIR POLLUTION)



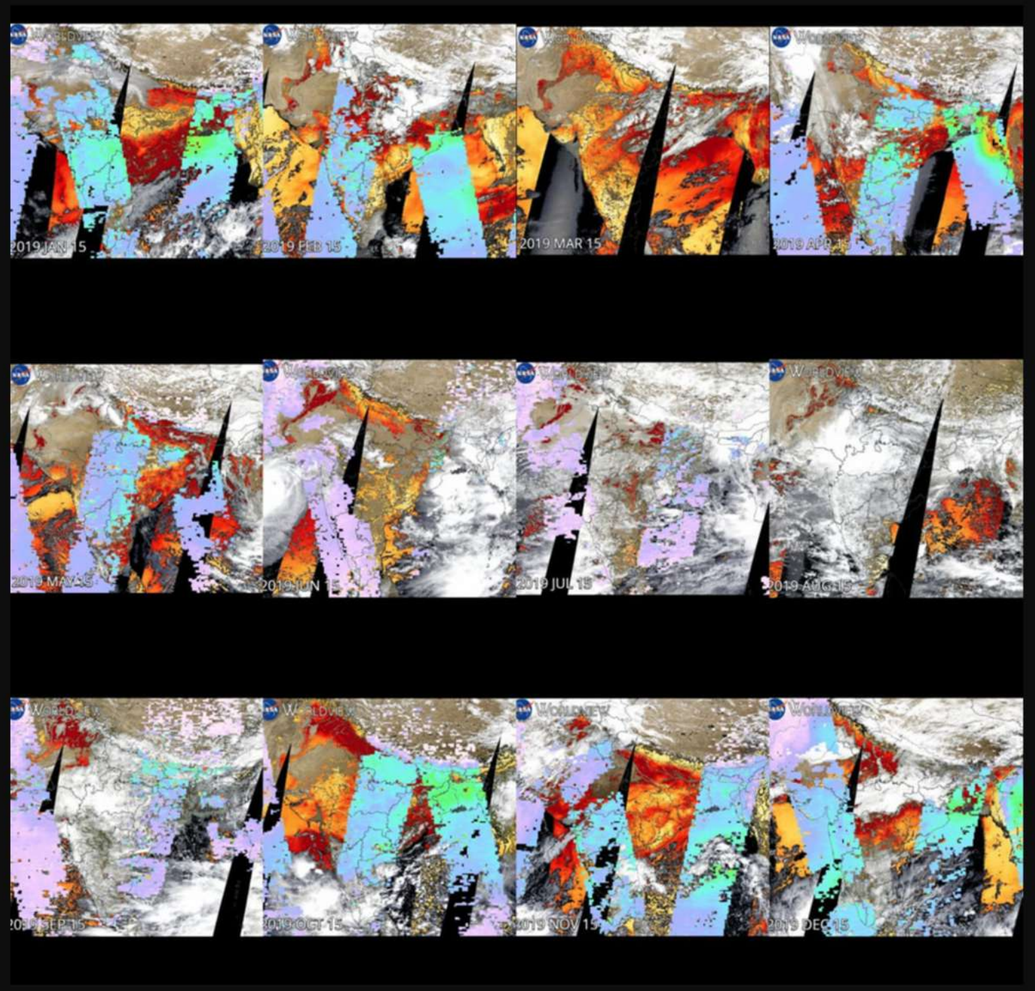
Post-Monsoon Transition 2018: India's Air Quality Cycle

- Sept 2018: Clearer skies (blues/greens) due to monsoon rains washing out aerosols; small AOD pockets show early burning or dust.
- Oct 2018: Rising AOD (yellows/reds) across the Indo-Gangetic Plain marks stubble burning onset and reduced dispersion.
- Nov 2018: Peak AOD (deep reds/browns) from intense pollution and temperature inversions trapping emissions; storms over Bay of Bengal affect weather.
- Dec 2018: Persistently high AOD across IGP with stagnant winter air, showing widespread, dense pollution plumes.



2019: India's Annual Air Quality Cycle

- Feb 2019: Peak winter pollution with high AOD (reds/browns) across the Indo-Gangetic Plain (IGP) from trapped emissions under stable, cool air.
- May 2019: Pre-monsoon dust season – elevated AOD (orange/red) driven by heat and mineral dust from western India.
- Aug 2019: Monsoon washout – lowest AOD (blues/greens) as rainfall and clouds clear aerosols.
- Nov 2019: Post-monsoon pollution surge – sharp rise in AOD (yellows/reds) across IGP due to stubble burning and stagnant air.

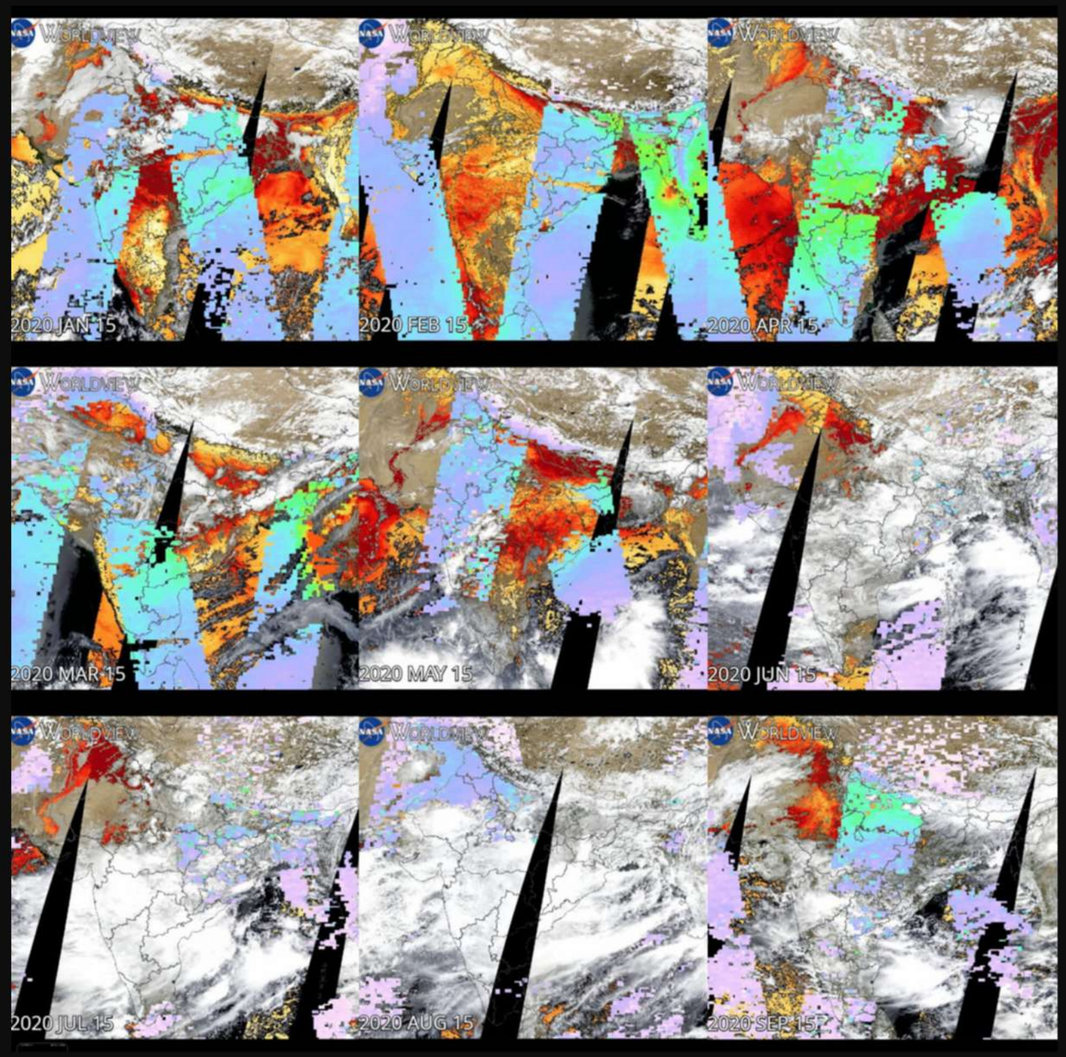


(these four snapshots from 2019 powerfully demonstrate the predictable annual cycle of air pollution over India)

2020: A Year of Unprecedented Shifts in India's Air Quality

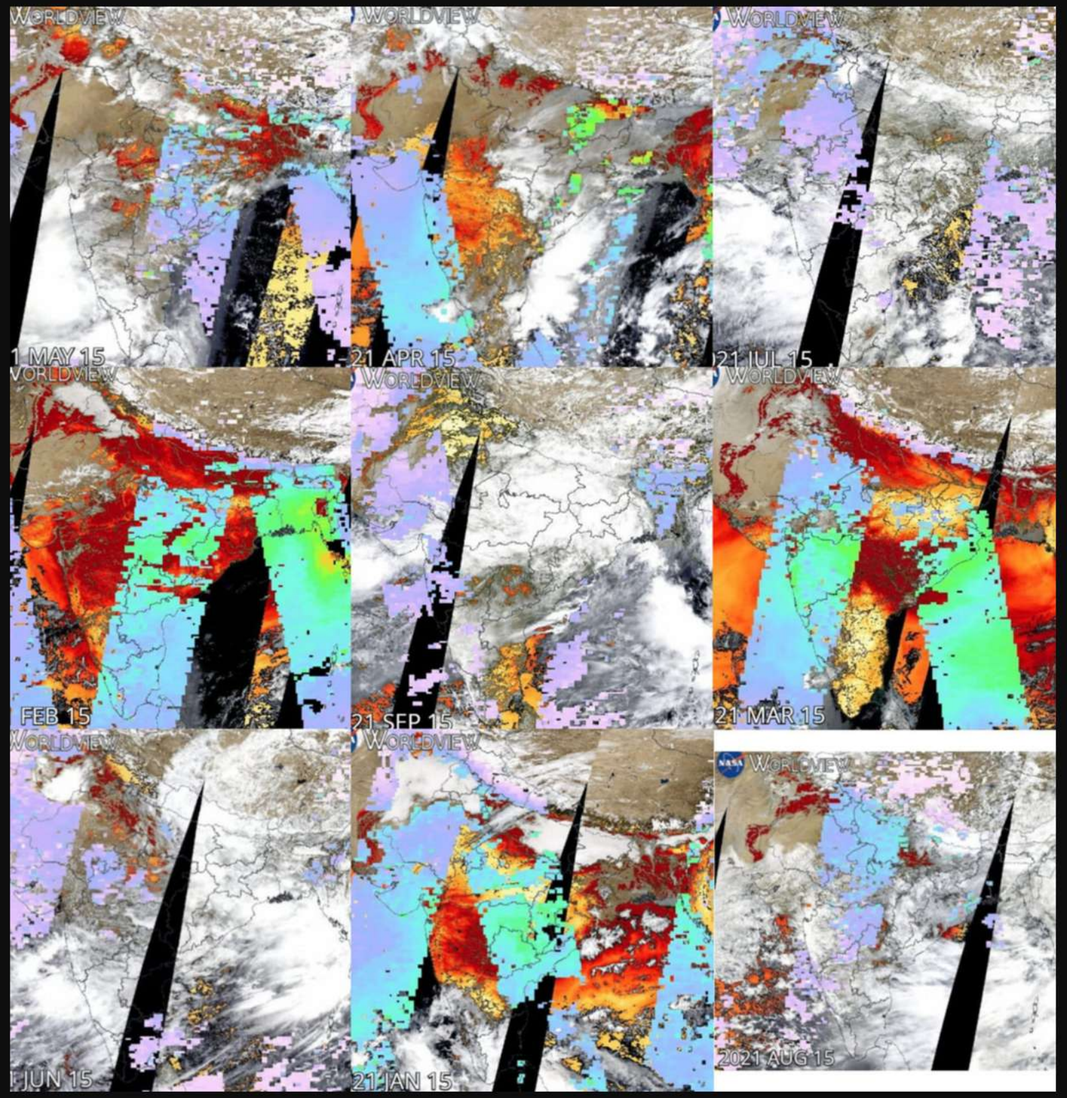
COVID-19's (Atmospheric Footprint)

- Feb 2020: High AOD (reds/browns) across IGP – typical late-winter pollution, pre-lockdown baseline.
- Apr 2020: Sharp AOD drop (blues/greens) during nationwide COVID-19 lockdown – drastic emission cuts.
- Aug 2020: Monsoon peak – cleanest air with rainfall washing out aerosols.
- Sep 2020: Post-monsoon rise in AOD (yellows/oranges) as stubble burning and stable air return pollution.



2021: Resurgent Seasonal Air Pollution Patterns Across India

- Jan 2021: High AOD (reds/browns) over IGP – peak winter pollution from trapped emissions.
- Apr 2021: Persistent high AOD (orange/red) with strong dust influence from western India.
- Aug 2021: Monsoon washout – lowest AOD (blues/greens) as rains cleanse the atmosphere.
- Sep 2021: Rising AOD (yellows/oranges) marks post-monsoon transition and start of stubble burning.




THANK
YOU