



ANIL AGARWAL DIALOGUE 2022

2021: Another Year of Extremes Akshit Sangomla

Earth is heating up

- In 2021 the concentration of carbon dioxide was the highest in 3 million years at 416.45 parts per million
- Carbon dioxide is a long living green house gas and traps the heat in the atmosphere
- This has caused the Earth to heat up by 1.09 degree Celsius since pre industrial times (IPCC AR6)
- 2021 was one of the seven warmest years ever recorded despite double La Nina



Warming affects extreme weather

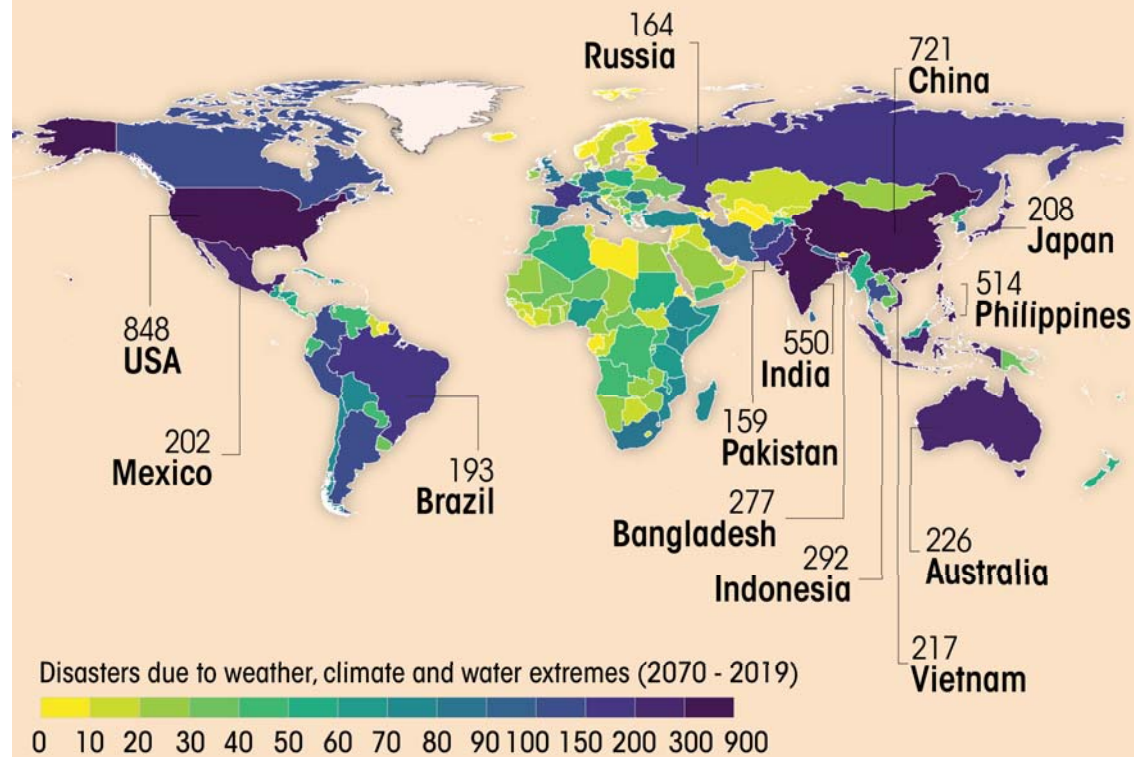
Change in character of extreme weather

- Increase in intensity of tropical cyclones, rapid intensification, more rain
- Extreme rainfall events which induce floods, flash floods and landslides
- Dust, hail and thunderstorms with lightning
- Disruption of the monsoon leading to cycles of floods and droughts
- Cold waves and cold days with ground frost
- Heat waves with wild fires and possible drought
- Heavy snowfall leading to avalanches



CLIMATE CHANGE-INDUCED DISASTERS

India ranked 3rd out of 188 countries experiencing disasters due to climate change. Countries from South Asia — Bangladesh(6th), Pakistan (13th), and Nepal(25th) — all featured in the list of 25 worst-hit countries



Source: World Meteorological Organisation

Down To Earth



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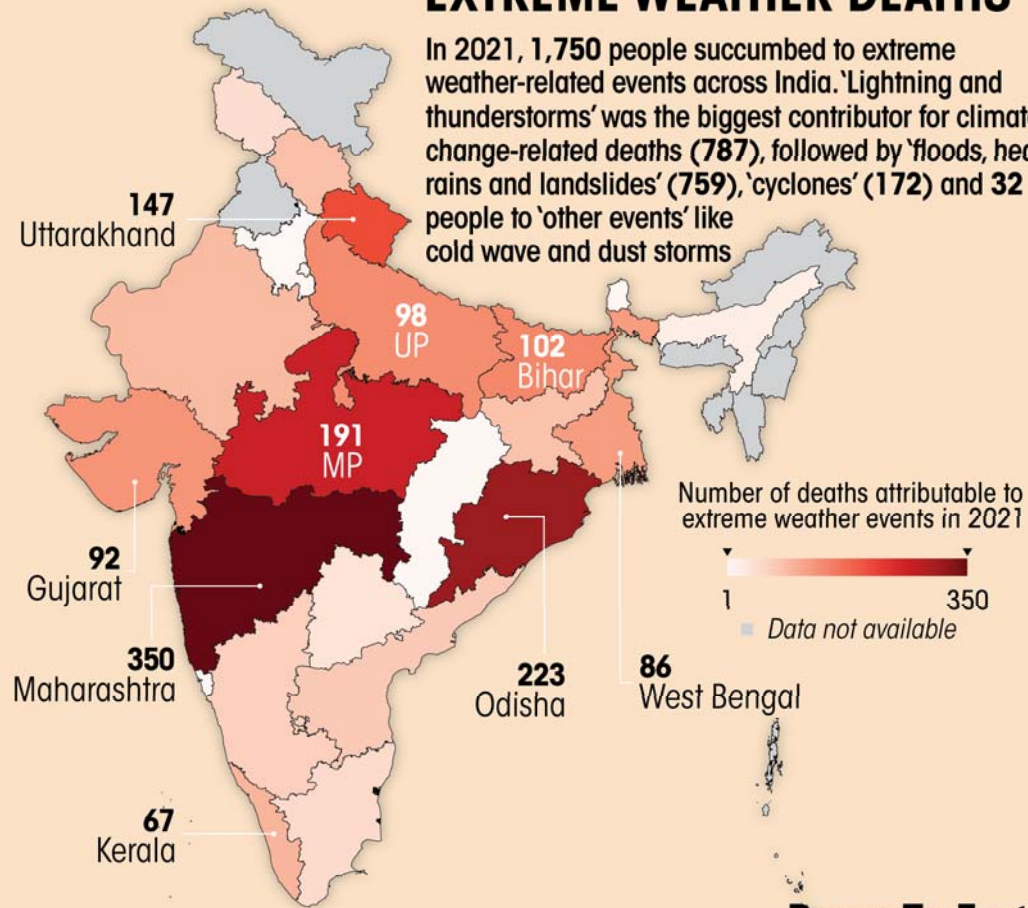
2021 Year of Extremes: India

- Extreme rainfall event in south India possibly connected to sudden stratospheric warming event over the Arctic
- String of cloud bursts in Uttarakhand in February, March and May
- Erratic monsoon that started well, then stalled and went out with a bang
- Weird cyclones - Gulab, Shaheen and Tauktae
- Excess post monsoon rains, especially in south India



CLIMATE CHANGE: EXTREME WEATHER DEATHS

In 2021, 1,750 people succumbed to extreme weather-related events across India. 'Lightning and thunderstorms' was the biggest contributor for climate change-related deaths (787), followed by 'floods, heavy rains and landslides' (759), 'cyclones' (172) and 32 people to 'other events' like cold wave and dust storms



Source: India Meteorological Department

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Unusual weather: Cyclone Tauktae

- Cyclone Tauktae hit Gujarat coast in May 2021
- Rapid intensification
- Cyclones lose energy after hitting land but in the case of Cyclone Tauktae this loss of energy did not happen as quickly as it should have happened
- It travelled as a small storm all the way up to Delhi, causing rainfall and bringing down the temperature of the city
- The likelihood of this without climate change is less
- Such instances may happen more frequently as climate change rages on



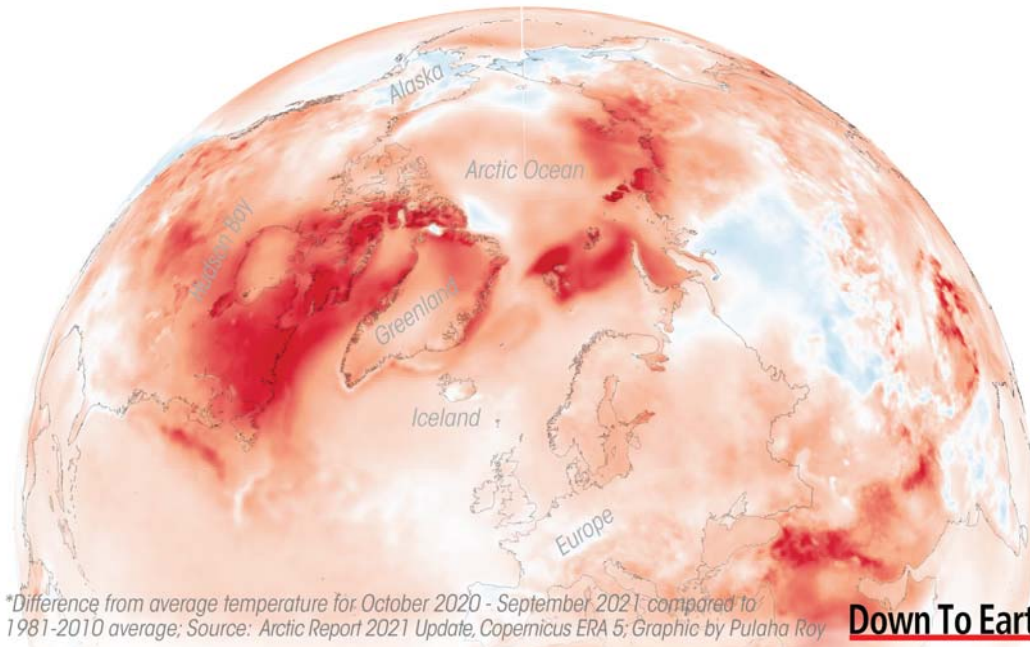
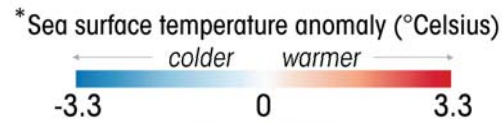
Unusual Weather: Excess South India Rainfall

- Coimbatore and Pathanamthitta districts experienced 10 weeks of continuous large excess rainfall
- Eight low pressure areas over two months of October (3) and November (5), no cyclone
- Twice in two months, three weather systems at the same time, interaction also happened
- **Intensity and interaction of the systems** caused floods in Uttarakhand, Andhra Pradesh, Tamil Nadu (Chennai)



Tracking Extreme Climate: Arctic

The Arctic Circle, one of the most climatologically important regions on earth, has continued to warm at more than twice the rate as the rest of the world through 2021. The time between October 2020 and September 2021 was the seventh warmest since record-keeping began. It was the eighth consecutive year since 2014 when the average temperature of the region was at least 1° Celsius above the pre-industrial average.



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Arctic Warming

- Arctic region is the climate capital of the world
- It is warming **four times faster** than the rest of the world (*AGU meeting on December 13, 2021*)
- Rainfall was recorded for the first time over the Summit Station in Greenland in August, 2021
- Three back to back storms in mid July, a rare event
- Lightning in the Arctic has increased by 8 times in the last decade
- Storms and lightning should be rare in the Arctic because of a lack of heat needed for convection

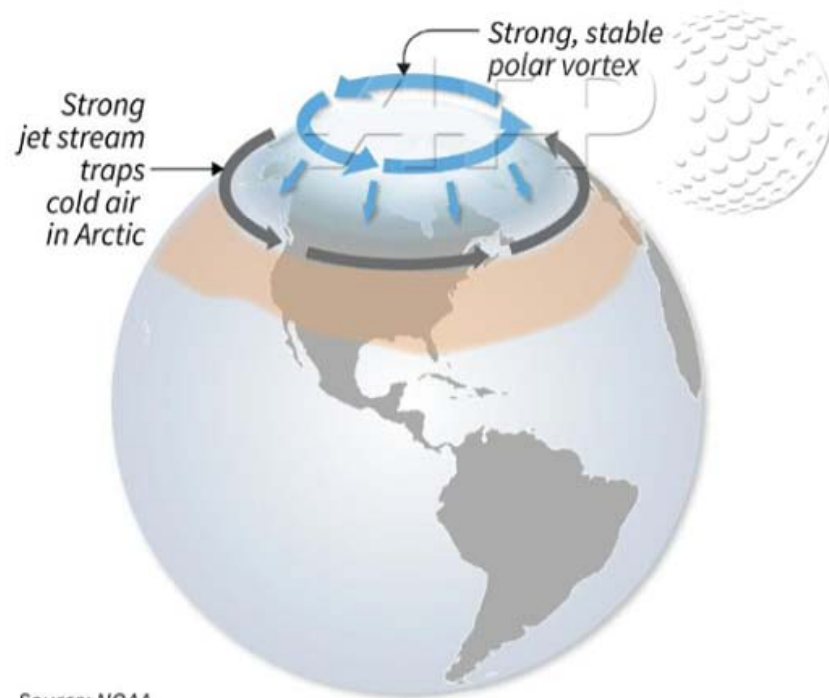


Warming Arctic driving extreme weather

Linked to severe winter storms in US and Europe, heatwave at North Pole

► Normal circumstances

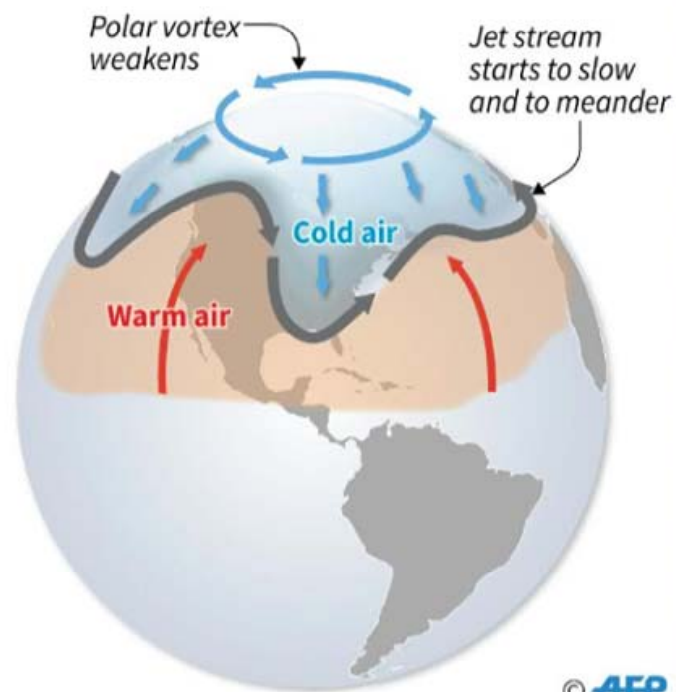
Strong jet stream and polar vortex hold freezing cold air in the Arctic and warm air in lower latitudes



Source: NOAA

► Arctic warms faster than lower latitudes

Jet stream and polar vortex weaken, allowing Arctic air to move south and warm air to move north



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Thank you

