The changing science of cyclones; linked to changes in temperature and land-sea interaction and their impacts

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Cyclone Amphan

• Was the **strongest cyclone** in Bay of Bengal after records began 129 years ago
• Maximum wind speeds measured at **270 km/hr** by US Joint Typhoon Centre over Bay of Bengal
• Rapid intensification. 140km/hr to 260 km/hr in 18 hours
• Made landfall with speeds of 155-165 km/hr. Hit **Kolkata** with wind speed of **130 km/hr**
• Large scale inundation of South Bengal
• Warm sea surface at 32-34°C and reduced aerosols due to CoVID-19 lockdowns in South Asia intensified it to super cyclone strength; evidence of increase in mean sea level also increased intensity of storm surge
Cyclones: changing ‘nature’

• Fani (May 2019): longest lived cyclone ever in Bay of Bengal; wind speeds reached 215 km/hr, even 90 km inland.

• Warm sea surface made it strong in spite of a high aerosol concentration. Rapid intensification in phases

• Titli (Oct 2018) Vayu (June 2019) and Ockhi (Nov 2017) all went through rapid intensification

• Titli and Ockhi also made unexpected turns in tracks; unpredictable and so more challenging to forecast
Why? Connection with changing temperatures: land/sea interface

- Rapid intensification
- More storms becoming severe cyclones.
- 12/16 storms have become severe since 2018 in NIO region
- Slow movement over sea and land
- Carry more rainfall
- Travel much further inland than before
- High storm surge and inundation
- Slowing down of winds around the cyclone
Wind: missing but linked

- **Slowing down of winds** around the cyclone
- A global phenomenon that is less understood
- Also caused marine heat wave off the US coast in 2019

- This is the new frontier for science
Cyclones leave behind long term ecological impacts

- Cyclones are multi hazards - wind, rainfall, storm surge
- Wind during cyclone then change the local wind patterns; lead often to heat waves
- Saline water ingress increasing land degradation (25 km for Amphan estimated)
- Four new mouths opened in Chilika (post-Fani) which brought down fish catch – impact continues (February 2020)
- Such impacts can increase chance of human migration as land-water systems decline in productivity
List of Articles

1) https://www.downtoearth.org.in/news/climate-change/-less-atmospheric-aerosol-may-have-intensified-cyclone-amphan--71280