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

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Down To Earth magazine**



# Cyclone Amphan

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- 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’

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- 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

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- **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

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- **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
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- **This is the new frontier for science**



# **Cyclones leave behind long long term ecological impacts**

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- 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

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- 1) <https://www.downtoearth.org.in/news/climate-change/-less-atmospheric-aerosol-may-have-intensified-cyclone-amphan--71280>
- 2) <https://www.downtoearth.org.in/news/natural-disasters/cyclone-amphan-discrepancy-in-wind-speed-data-of-us-agency-imd-71251>
- 3) <https://www.downtoearth.org.in/news/natural-disasters/amphan-will-bring-saline-water-25-km-inland-cause-large-scale-inundation-imd-71226>
- 4) <https://www.downtoearth.org.in/news/natural-disasters/amphan-now-strongest-ever-cyclone-recorded-in-bay-of-bengal-us-agency-71230>
- 5) <https://www.downtoearth.org.in/news/climate-change/a-warming-bay-of-bengal-may-have-turned-amphan-into-super-cyclone-experts-71214>
- 6) <https://www.downtoearth.org.in/news/natural-disasters/cyclone-fani-opens-four-new-mouths-in-chilika-lake-increases-salinity-wipes-out-fish-65071>
- 7) <https://www.downtoearth.org.in/news/natural-disasters/slowing-down-winds-make-cyclones-like-fani-more-severe-unpredictable-64504>