Climate Change and cyclones: global learning
Global tropical cyclone activity in 2018-2019 was above average.

Northern hemisphere had 72 tropical cyclones, compared with the average of 59: Accumulated cyclone energy (ACE) was 4% above average.

Southern hemisphere season was also above average, with 27 cyclones, highest number in a season since 2008–2009.

Particularly extreme cyclone season in the North Indian Ocean.

- Three cyclones reached maximum sustained winds of 100 km or more (first known instance in a single season)
- Seasonal ACE was the highest on record by a large margin.

Also bad in South Indian Ocean basin: 18 cyclones of which 13 reached hurricane intensity (highest number on record)
IPCC Fifth Assessment Report (AR5, 2014)

• However, raw number of events is not the best way to describe multiplying risks from climate change and cyclone activity.

• Historical data record is inconsistent and only robustly available for around 40 years. Hence, the IPCC’s assessment in 2014 that…

• “There is low confidence that long-term changes in tropical cyclone activity are robust, and there is low confidence in the attribution of global changes to any particular cause. However, it is virtually certain that intense tropical cyclone activity has increased in the North Atlantic since 1970.”
IPCC Special Report on Oceans, Cryosphere and Climate (2019)

• Much clearer link between climate change and cyclone intensity, as well as unpredictability (including through rapid intensification)

• “Anthropogenic climate change has increased observed precipitation, winds, and extreme sea level events associated with some tropical cyclones, which has increased intensity of multiple extreme events and associated cascading impacts”

• “The average intensity of tropical cyclones, the proportion of Category 4 and 5 tropical cyclones and the associated average precipitation rates are projected to increase for a 2°C global temperature rise above any baseline period.”
IPCC…future models show

• “Extreme sea levels and coastal hazards will be exacerbated by projected increases in tropical cyclone intensity and precipitation”

• Interaction with other climate risks: “Rising mean sea levels will contribute to higher extreme sea levels associated with tropical cyclones.”

• Extreme events are projected to significantly increase throughout this century under all greenhouse gas emissions scenarios.”