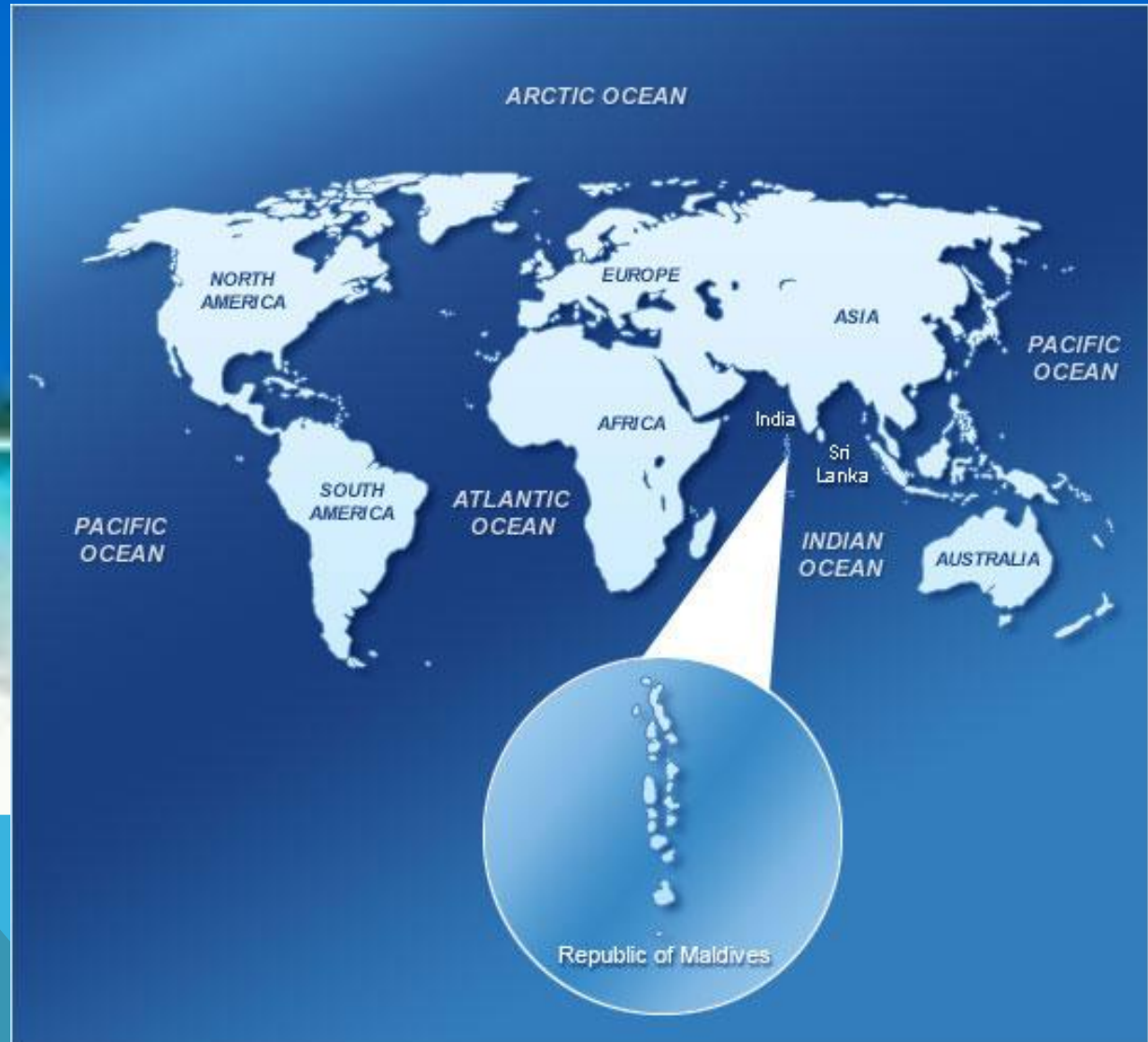


DRAGONFLY MIGRATION ACROSS THE WESTERN INDIAN OCEAN



PAPER BY: R. CHARLES ANDERSON
ACCEPTED IN 2009
PRESENTED BY: DAWN ROTH

MALDIVES



IMPORTANT INFORMATION ABOUT DRAGONFLIES

- **Need fresh water to breed**
- **1 year lifecycle is typical. (10-11 months as larva, 1-2 months as adults)**
- **Most dragonflies don't fly very far in their few months of adulthood (maybe a few km)**



GLOBE SKIMMER DRAGONFLY



Rather plain looking, and quite common.

It is found nearly everywhere: the tropics, the Americas, Africa, Asia, Australia, and into the Pacific.

MALDIVES

- **Built entirely out of coral reefs that are covered in sand banks**
- **no surface fresh water**

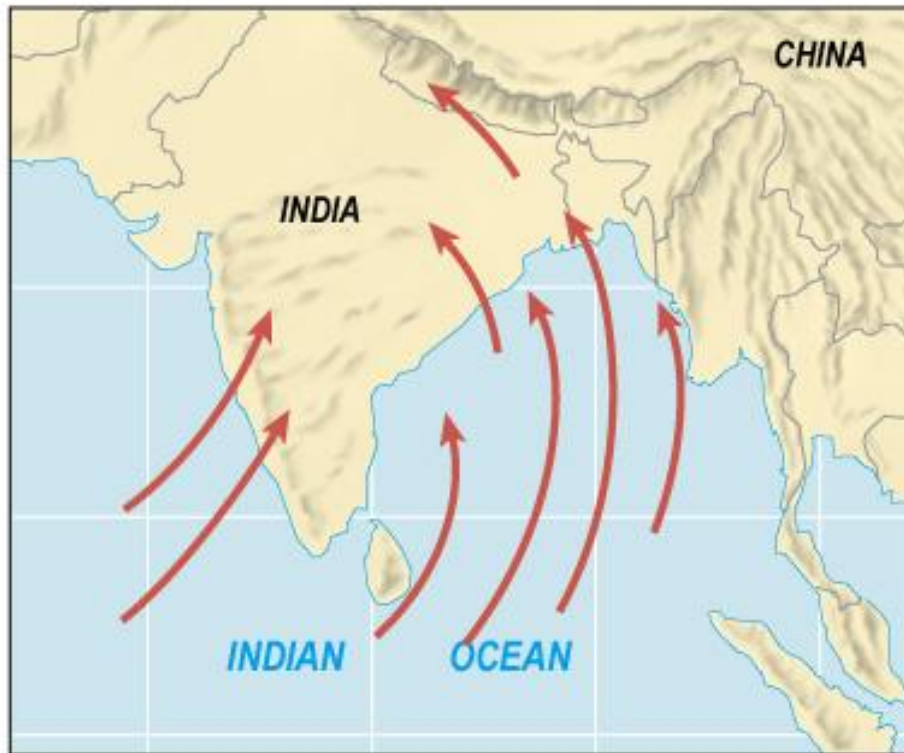
**So, why are millions of dragonflies showing up here every year around the 21st of October?
And where are they coming from?**

Closest place= India



MONSOON SEASON

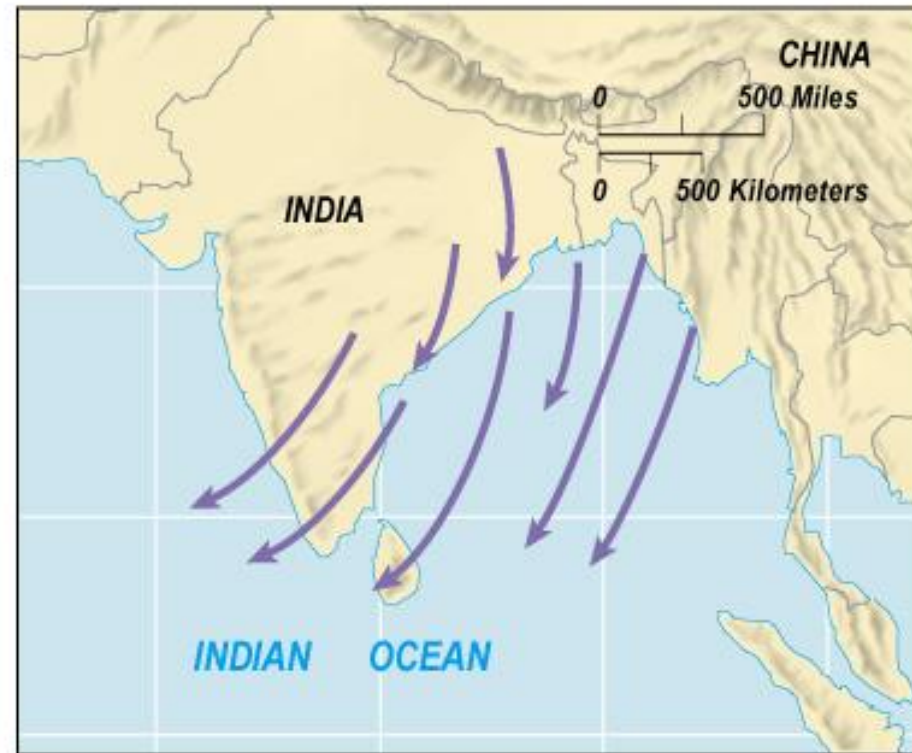
May to October



(a)

Summer

December to March



Winter

The Inter-tropical Convergence Zone (ITCZ)
marks the boundary between these two wind systems

That's strange. In October the wind is blowing toward India not away from it.

Logically, it seems impossible. but by contacting multiple colleagues living around India he was able to find that sure enough these dragonflies were coming from there.

But how were these insects flying 400 miles across the ocean against the wind?

The bottom of the slide features a decorative design with overlapping geometric shapes. On the left, there is a bright orange triangle pointing towards the center. Overlapping this is a larger, semi-transparent blue triangle that points towards the right. The rest of the bottom section is a solid, lighter blue color.

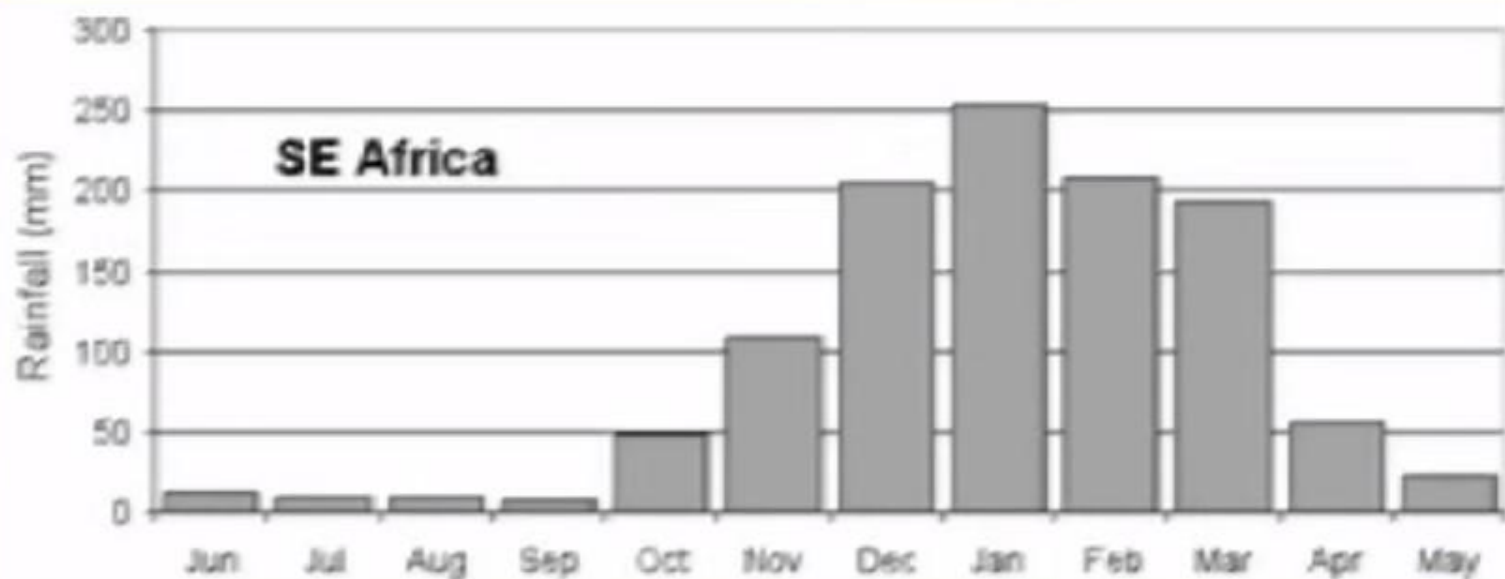
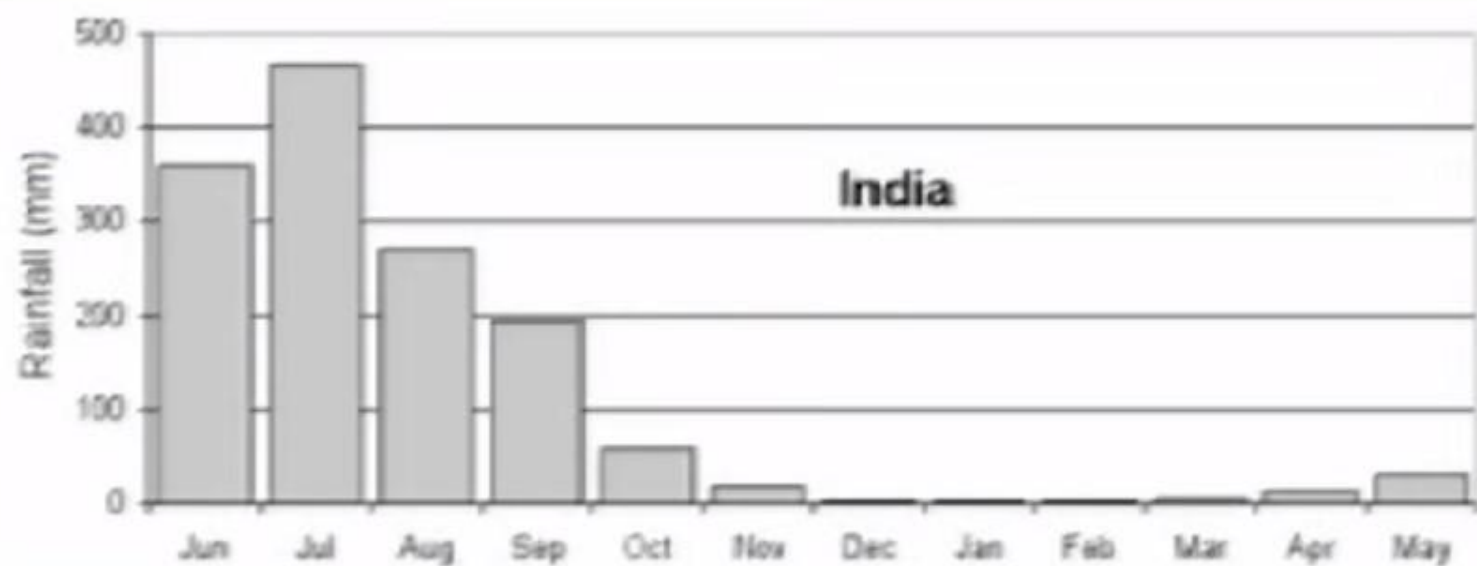
- **He discovered that the dragonflies were there from October to December. This means that they leave inter-monsoon & traveling with the ITCZ.**
- **While the surface winds remain Westerly until the end of October, winds North of the ITCZ (international convergence zone) and above the front are predominantly North-easterly.**
- **So, they are traveling above the surface winds: 400 miles across the sea at a height around 1000 m in the air.**

WHAT ARE MILLIONS OF DRAGONFLIES DOING EVERY YEAR FLYING ACROSS OCEANS TO THEIR APPARENT DOOM?

They are breeding in temporary rain water pools, laying their eggs where the seasonal rains are.

Charles Anderson discovered that rather than having the typical 10 month larva stage, these dragonflies develop in 6 weeks.







- **These dragonflies travel 14,000-18,000 km (about 10,000 miles), which is the longest migration of any insect.**
- **Monarch butterfly migration is 4,800 miles. (about half as long!)**
- **It is the first known insect migration across open ocean water.**
- **It is also known that some birds take this similar migration, flying at the same altitudes and taking advantage of the same winds. Gorging themselves on dragonflies.**

REFERENCES USED

Anderson, Charles. “Do dragonflies migrate across the western Indian Ocean?” Journal of Tropical Ecology, 2009

<https://www.youtube.com/watch?v=WNDWYW4yWEM>