02. Wind in the Indian Ocean

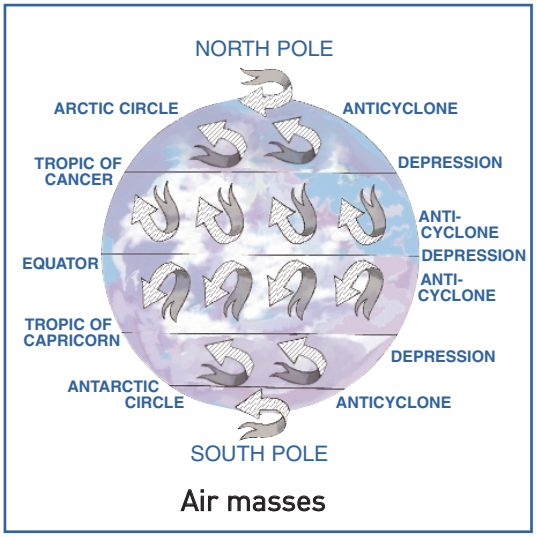
26C°

Earth, Water, and Climate

Wind...

The wind is a rather mysterious thing. The Greeks of Antiquity even assigned a God to it: Aeolos.

Wind is basically air movement. To simplify things, let's say that on the surface of the Earth there are some areas in which there is "too much" air (high pressure areas, or **"anticyclones"**) and other areas in which there is "not enough" air (low pressure areas or **"depressions"**). These pressure differences are created by the sun, heating the air, land, and water to greater or lesser degrees depending on the latitude and the time of year. Hot air is lighter than cold air. Wind establishes a balance by sending air from high pressure areas to low pressure areas.



Air masses

But the Earth also turns on its axis, which causes another curious phenomenon: air deflects to the right in the northern hemisphere, and to the left in the southern hemisphere (this is true not only of air but of all moving objects). This deflection is called the **Coriolis effect,** after the 18th century physicist who studied it.

This means that, in the northern hemisphere, wind moves in a counter-clockwise direction around areas of depression, and in a clockwise direction around anticyclones.

In the southern hemisphere, which is where our windsurfer will be taking her journey, the opposite is true: the wind moves in a clockwise direction around areas of depression, and in a counter-clockwise direction around anticyclones.

The greater the difference in pressure, the stronger the wind. You can see this for yourself when you blow up a balloon: if you release the opening when there is a lot of air inside, the air will escape very quickly, because there is a big difference in pressure between the air on the inside of the full balloon and the air outside of it. However, if your balloon has only a little air in it, the air will escape slowly - and may not even come out at all, if the pressure on the inside of the balloon is more or less the same as on the outside.

At the time of year when Raphaëla will be crossing the Indian Ocean between Australia and Réunion Island, the winds are fairly steady and come from the southwest. These are the **trade winds.**

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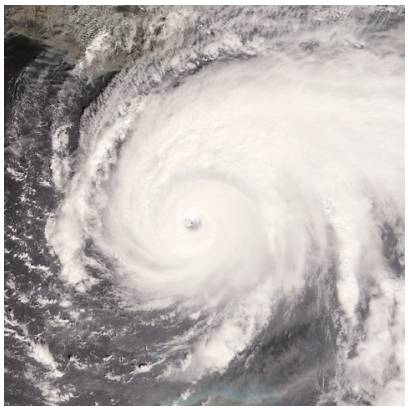

Hurricanes

In the tropical zone, the heat is such that ocean surface temperatures can sometimes exceed 27 °C (81 °F) dozens of meters deep. High rates of evaporation can lead to large vertical air movements. Because of the Coriolis effect, whirlwinds can form, generating a "tropical depression." If wind speeds exceed 17 meters/sec (33 knots, 61 km/h, or 38 mph), the depression becomes a "tropical storm" and is given a name. If wind speeds further increase and exceed 33 meters/sec (64 knots, 119 km/h, or 73 mph), the storm becomes a "hurricane."

The Indian Ocean is home to violent hurricanes. The islands of Madagascar and Réunion are subject to hurricanes in January and April. In 1980, Hurricane Hyacinth left 29 people dead on the island of Réunion. More recently, in March of 2004, hurricanes Galafio and Elita left dozens dead, hundreds missing, and tens of thousands injured in Madagascar.

Fortunately for Raphaëla, the southern Indian Ocean hurricane season is over in April.

Activity

Convert the knots in the table below to km/hour.

Category	Name	Force	Damage
1	Minimal	64 - 82 knots	Homes of poor construction are damaged. Coastal roads are inundated. Minor pier damage. Some small craft anchored in unprotected areas are torn from their moorings
2	Moderate	83 - 95 knots	Considerable damage occurs to shrubbery and tree foliage. There is some damage to roofing materials of buildings, and some window and door damage. Considerable damage to piers. Marinas flooded.
3	Extensive	96 - 113 knots	Foliage is stripped from trees. Mobile homes are destroyed. Smaller structures near the coast are destroyed. Areas less than 1.5 meters above sea level are submerged up to 10 km inland. Homes near the coast must be evacuated.
4	Extreme	114 - 134 knots	Shrubs and trees are blown down. Areas less than 3.5 meters above sea level are completely submerged. All homes within 5 km of the coast are evacuated.
5	Catastrophic	Above 134 knots	Major damage to even large buildings.

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