



Sea Conditions Guide

South China Sea and Southeast Asia

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Monsoon Climate

The South China Sea has a predominately tropical climate, dictated by two monsoons that are characterised by their direction of airflow.

The Northeast monsoon is active in the winter months of November to March, while during the summer between May and September the Southwest monsoon is active. The controlling factor of these monsoons is the intertropical convergence zone (ITCZ) between the North-east trade winds in the northern hemisphere (NH) and the south-east trades in the southern. During mid-summer in the NH, the convergence zone sits across mainland China but gradually moves southwards, reaching its southern limit of northern Australia by winter. The transition between each monsoon period is associated with light winds, but frequent thunderstorms as the ITCZ moves over.

Northeast Monsoon

As the landmass of east Asia cools towards the end of the summer large high pressure systems form over Siberia which intensifies as the temperatures drop further. Winds travel clockwise around these large systems tracking over mainland China and then through the South China Sea. Enhanced flow is usually experienced through the Taiwan Strait during these events, which can reach

Bf 8 but sometimes Bf 9 or 10 in extreme cases. New high pressure systems develop every 3-10 days, which results in the NE-ly winds surging and then waning as the high either dissipates or moves out into the Pacific, and the cycle starts again. These strong winds can create rough sea conditions with stronger swell travelling southwards towards Borneo and Malaysia.

Southwest Monsoon

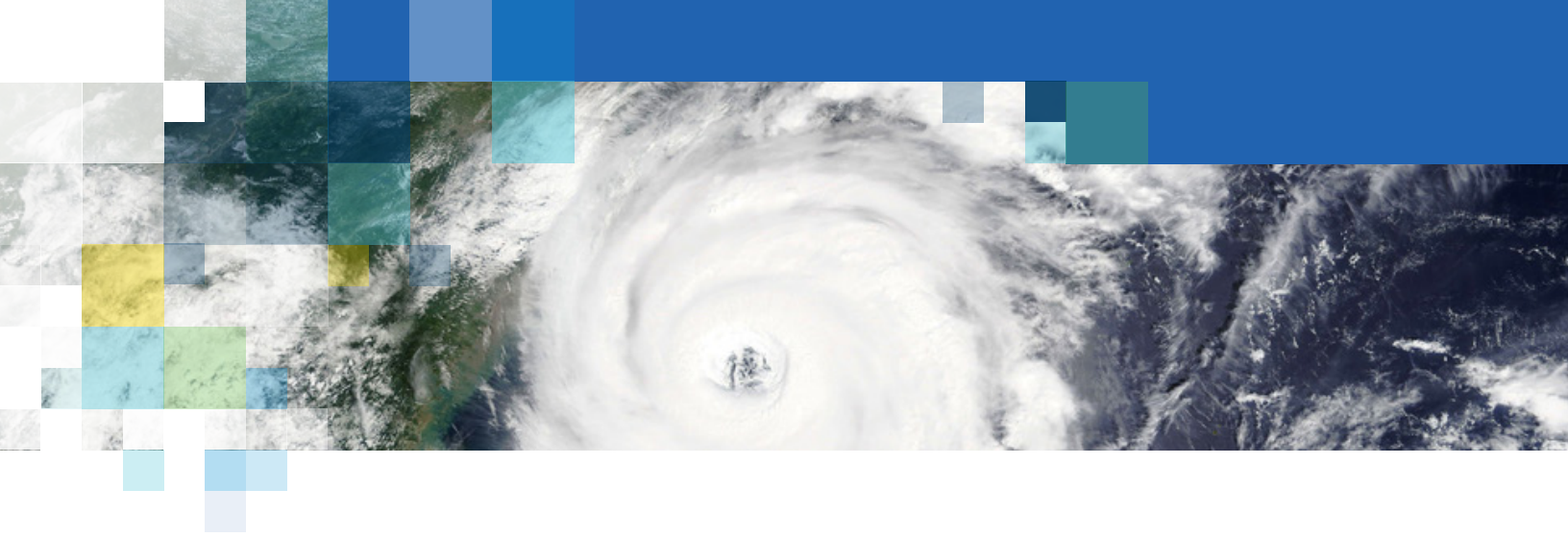
This monsoon develops as the Asian landmass warms during the Spring and into the Summer creating low pressure and allowing the ITCZ further northwards. This results in winds travelling towards the low pressure at the surface with the southeast trade winds in the southern hemisphere crossing the Equator and veering southwest through the South China Sea.



Sumatras

This is the name given to describe the lines of thunderstorms or squall lines that develop over the Island of Sumatra and head towards Malaysia and Singapore.

During the southwest monsoon, the south-westerly winds pass over the mountains of Sumatra and create mountain waves. These lead to atmospheric instability allowing thunderstorms to develop and merge together forming squall lines as they move NE into the Malacca Strait. The warm waters in the strait enhance convection needed for thunderstorm development and intensify the storms as they head towards the Malaysian peninsula and Singapore. As the storms move inland, they lose their source of moisture and heat, and dissipate.



Typhoons

Typhoons (Hurricanes and Cyclones in other parts of the world) generally occur when warm, moist air evaporates from the ocean surface and rises quickly.

This produces showers and thunderstorms and with persistent evaporation and heating from the warm ocean the cycle continues. Eventually a more organised circular wind pattern around a calm centre point known as the eye of the storm is created due to the rotation of the Earth.

The typhoon season in the northwest Pacific runs all year round and is the most active in the world with almost a third of all tropical cyclones forming in this basin. Northern hemisphere winter is the least active time of year but weaker tropical depressions and storms still develop in the region during this time. Activity increases through the Spring and Summer months with the peak between August and October.

Development Stages

The development of a tropical typhoons can be split into defined categories based on characteristics at each stage. Conditions such as high sea temperatures and low wind shear must be just right for development to continue through the various stages.

Tropical disturbance – a cluster of showers and thunderstorms that can occur regularly over the Tropics. These disturbances typically range in diameter between 100-300 miles and move westward with the prevailing winds. Sustained winds are generally around 15-25kts but gusts in the showers/thunderstorms can be greater.

Tropical depression (≤ 33 kts) – a still generally disorganised group of strong thunderstorms that develop a closed circulation pattern and rotate around a central area of low pressure. Anti-clockwise in the Northern Hemisphere.

Tropical storm (34-63kts) – at this stage the storm becomes more organised forming the more typical circular shape associated with a typhoon.

Typhoon – once a Tropical storm develops further and winds exceed 64kts (on the Saffir Simpson Scale used by DTN) it is then classed as a Typhoon. At this stage, the diameter of the storm is around 400 miles but can be larger and can last for several days when over open water. Along with direct impacts from the storm, such as damaging winds, very rough seas and extremely heavy rainfall, the very low pressure associated with the storm can produce large storm surges which can have serious impacts on coastal operation and communities. Once the storm reaches land or colder waters – usually $<27^{\circ}\text{C}$ – the supply of moisture is either stopped or greatly reduced and the storm begins to weaken.