



# Sea breeze characteristics over a coastal station in peninsular Malaysia

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Land and sea breezes are formed due to differential heating between land and sea surfaces and are prominent local circulation in the tropical region. We present the first observational analysis of the overview of sea-breeze characteristics based on Automatic Weather Station (AWS) data and radiosonde ascends at Bachok Marine Research Station in peninsular Malaysia. Onset criteria for sea breeze were defined based on the variations of Sea Breeze Component (SBC). Associated parameters such as surface wind direction, wind speed, humidity, and air temperature are analysed for 3 yrs (2015–2017) from the AWS. The radiosonde data taken during two field experiments during northeast monsoon and southwest monsoon are utilised to investigate the impact of monsoons on the sea breeze in greater detail. The influence of synoptic-scale motion on the sea breeze is also investigated using radiosonde and reanalysis data. Generally, the sea breeze sets in from the east at about 10:00 AM and occasionally, prevailing monsoon flow intruded into the local circulation. An increase in station pressure is noted during the onset. The time of onset, as well as the strength of the sea breeze, is influenced by conditions such as clear, cloudy, partially cloudy days and the presence of thunderstorms.

**Keywords.** Sea breeze; diurnal variation; monsoon; synoptic wind.

## 1. Introduction

Extensive theoretical and observational studies on sea breeze circulations had been conducted in different parts of the world, such as south-eastern Australia (Physick and Abbs 2002), Indonesia (Hadi *et al.* 2002), Brunei Darussalam (Hassan and Raman 2008), and southern France (Drobinski *et al.* 2006). One of Yoshikado (1992) studies,

based on a numerical experiment using a two-dimensional hydrostatic boundary layer model, examined the basic characteristic of a daytime heat island circulation. He showed that a daytime circulation which is much stronger than the nocturnal circulation can develop and evolve into the sea breeze system to a notable effect on its pattern. Sea breeze, a dominant feature along with the tropical and the subtropical coastlines occurs along