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Teluk Bahang Water Catchment Study & Reservoir Operations Tool

1.0 Interannual Variations of Rainfall over Penang

The year-to-year variations of rainfall over Malaysia may be linked to some large-scale climate modulators such as El Nino – Southern Oscillation (ENSO) (Juneng et al. 2010, Juneng and Tangang 2008; Salimun et al. 2016). This results in anomalous dryness in certain years and anomalous wetness in other years. In fact, the modulation of ENSO is the main source of seasonal predictability of rainfall at interannual time-scale over many parts of Malaysia (Juneng et al. 2010). However it is known that the ENSO modulations over Malaysia and over wider Southeast Asia Maritime Continent demonstrate considerable spatial and seasonal variations which are strongly associated to the seasonal circulation driven by opposite monsoon regimes. In general, the strength of ENSO influence shift from the west to the east from the developing phase to decaying phase of ENSO. Therefore, influence and not spatially homogenous and only influence the rainfall interannually at certain seasons, but not others.

Here, we carried out an analysis to examine how the rainfall over Penang varies interannually and to examine if the interannual variations are linked to the El Nino – Southern Oscillation modulation. Unlike short-time rainfall which demonstrate strong spatial variations, the interannual anomalies are high homogenous in space. Therefore, in order to examine the interannual variations of rainfall over the study area, we first constructed a monthly rainfall anomaly index, from the spatial average monthly rainfall over all the available stations (Figure 1). In order to optimize the length of the data for climate analysis, the index was constructed from January 1982 to September 2020. Note there are only a few stations (dams) that has the complete data from September 2020. Therefore, the interpretation for September 2020 was handled with care.

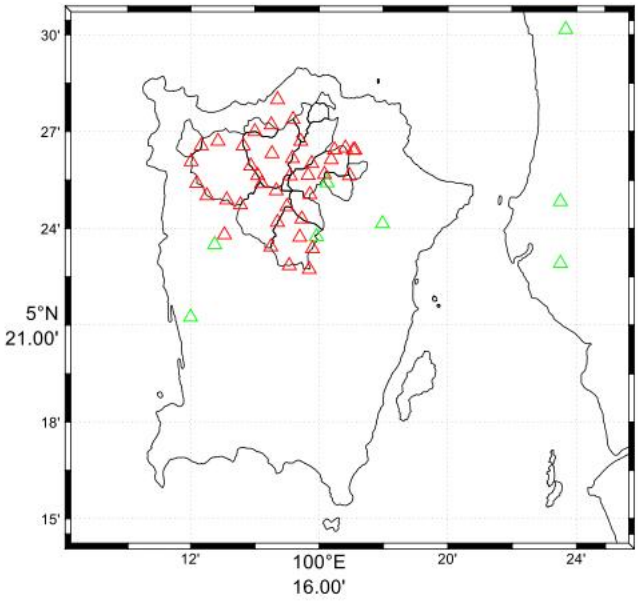

Figure 1. Stations used to construct the monthly rainfall index for examination of interannual variations. The stations in green are JPS stations.