The southwest Indian ocean (SWIO) has been poorly studied so far despite a similar TC activity to that of the North Atlantic. Under the responsibility of RSMC La Réunion, tropical systems that form in this area strike vulnerable islands such as Madagascar (22 million inhabitants with very fragile infrastructures and an agriculture-dominated livelihood) or the Mascarene islands that include La Réunion (840,000 inhabitants) and Mauritius (1.2 million inhabitants). To support international inter-comparisons. To be analyzed at a given time \( t \), a system must:

- be tropical
- have reached at least the TD stage
- be over water to ensure the Dvorak technique is valid

### 1. SWIO climatology

173 tropical systems formed over the 1999-2014 period. Each year on average:

- 9.3 / 11.5 systems develop into TIs.
- 4.9 of those go on to become TCs.

This is about 11% of global tropical activity and almost equals the NA activity [3].

The official TC season runs between 1 November and 30 April but the basin sees activity from September to June.

### 2. RI climatology

RI thresholds (24-h intensity change)

1. RI is defined by \( \triangle V_{12} = \geq 11 \text{ m s}^{-1} \) or \( 30 \text{ kt} \) (or 54% percentile of the cumulative frequency distribution of 24-h maximum wind speed changes).

2. RI can also be defined by \( \Delta P_{21} \leq -20 \text{ hPa} \) (resp. \( -45 \text{ hPa} \)) corresponding to the 35% (resp. 1%) percentile of 24-h pressure changes.

3. RI also corresponds to \( \Delta T_{12} \geq +2.5 \text{ K} \) (resp. +2.5 CI) using the 96.5% (resp. 99.5%) percentile of 24-h Dvorak CI changes.

The \( \Delta P_{21} \) threshold equals that of the NA basin [1, 2] but we used 10 min average winds instead of sustained winds so RI would correspond to a higher 24-h intensity change in the SWIO based on a 0.88 conversion factor.

This result must be put into perspective knowing that the NA dataset benefits from aircraft reconnaissance inputs and, thus, more reliable wind speed data. The \( \Delta T_{12} \) threshold can be compared to the minimum 24-h pressure fall of 1.5 hPa found in the western North Pacific [4]. The \( \Delta T_{12} \) threshold is almost twice the climatological intensification rate of tropical systems defined by the Dvorak technique.

### 3. Large-scale conditions associated with RI

An analysis of the dynamic and thermodynamic environmental fields in the 24-h intensification periods (in a 200-800 km region surrounding the storm center) using ERA-Interim data revealed five potential RI predictors (Fig. 3). For each of them, statistically significant differences are found to exist between the means of the RI and non-RI samples at the 99.9% level using a two-sided t test, after adjusting both sample sizes for serial correlation between cases [5].

**RI predictors**: the previous 12-h change in maximum wind speed (DVMXM12), a high 200-hPa divergence (DIV200), a weak 850–200-hPa vertical wind shear (SHR), a high sea surface temperature in a 200-km radius surrounding the storm center (SST), and a weak upper-level cyclonic potential vorticity (on the 350-K isentrope, PV350). The storm’s center latitude also showed statistically significant differences, but at the 99% level.

**References**


