Segura, H. and Hohenegger, C., 2024: How do the tropics precipitate? Daily variations in precipitation and cloud distribution. *J. Meteor. Soc. Japan*, **102**, http://doi.org/10.2151/jmsj.2024-028.

Plain Language Summary: The daily variability (or daily variations) of precipitation in the tropics impacts agriculture and water resources planning, but it is still unknown whether it is modulated by extreme, moderate, or light precipitation rates. Similarly, are those precipitation rates coming from low-level, congestus, or cumulonimbus clouds? To address those questions, a framework is developed to identify the precipitation rates modulating the precipitation variability in the tropics and whether it is the daily variations in the area fraction they cover from the tropics or the change in its intensity. We apply this framework in the one-year simulation of the coupled-global ICOsahedral Non-hydrostatic model in its Sapphire configuration (ICON-Sapphire) and observations (IMERG).

- 60% of the daily variations in tropical precipitation are explained by precipitation rates between 20 and 70 mm d^{-1}.
- This relationship is explained by the daily variations in the area covered by precipitation rates between 20 and 70 mm d^{-1} and not their mean intensity.
- Variations in the number of grid points precipitating between 20 and 70 mm d^{-1} are explained by variations in congestus clouds in ICON-Sapphire.

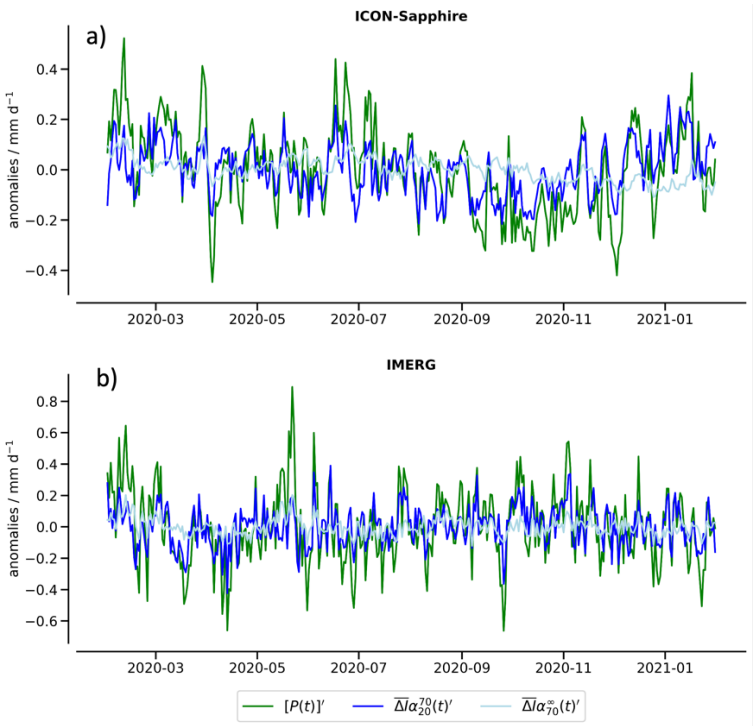

Fig. 1. Time series of the daily variations of tropical precipitation (*[P(t)]′;* green solid line), the daily variations in the fraction area covered by grid points precipitating between 20 and 70 mm d^{-1} ($\alpha_{20}^{70}(t)'$) times the difference in the annual mean intensity between grid points precipitating more than 20 mm d^{-1} and less than 20 mm d^{-1} ($\overline{\Delta I}$), in blue solid line, and the daily variations in the fraction area covered by grid points precipitating more than 70 mm d^{-1} ($\alpha_{70}^{\infty}(t)'$) times $\overline{\Delta I}$, in cyan solid line. a) ICON-Sapphire. b) IMERG.