Maritime Continent Diurnal Cycle of Precipitation: How can it be Characterised Accurately?

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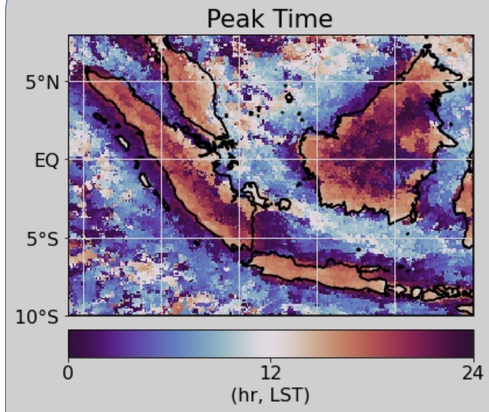
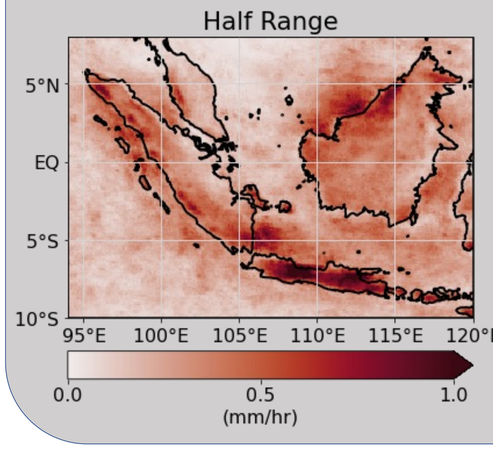
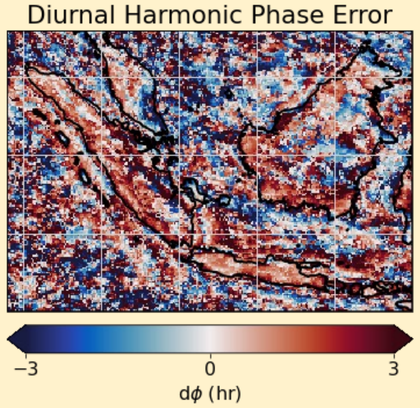
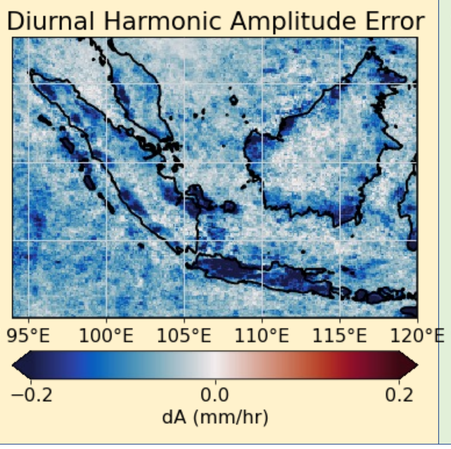
No Waveform





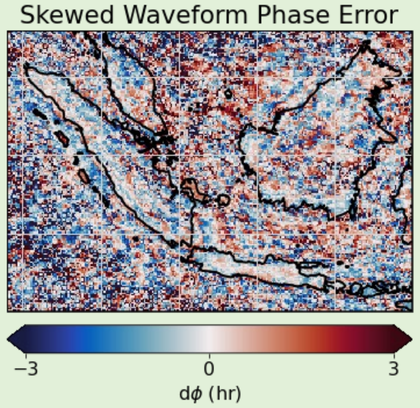
Simple Waveform

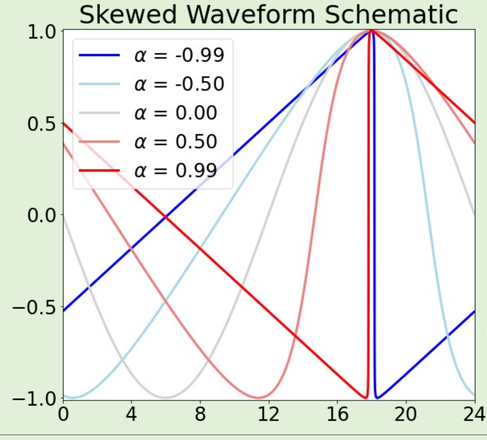


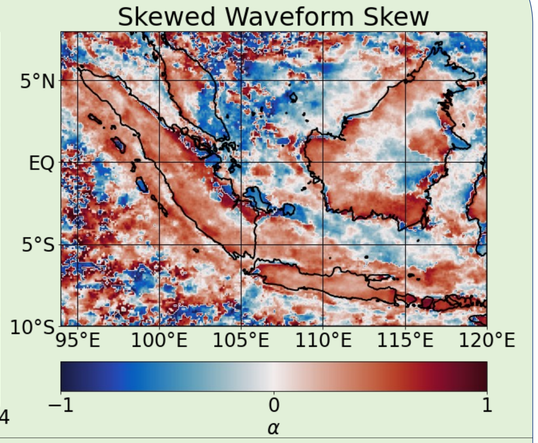


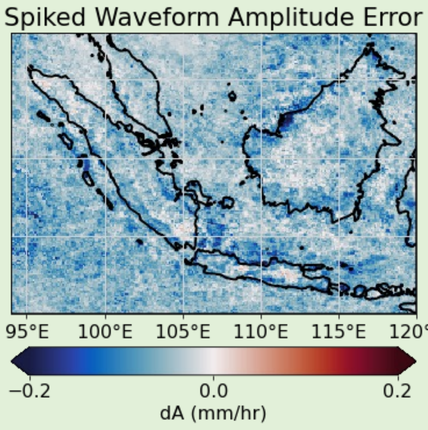
New Waveforms

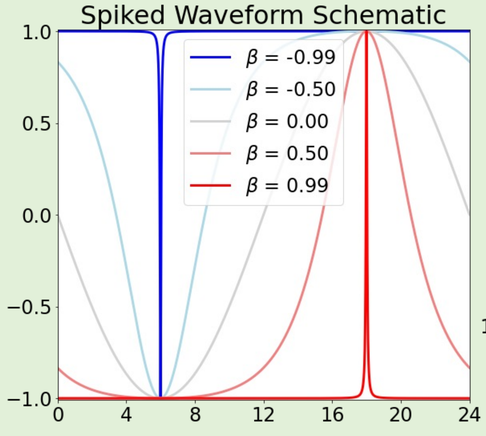
(Python-users can find form-fitting functions for these waveforms by scanning the big QR code!)

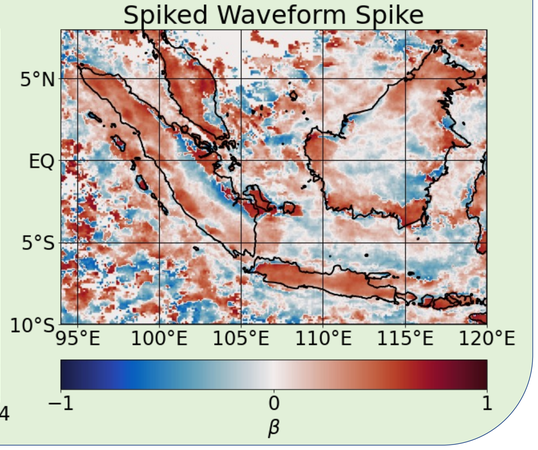












Overview

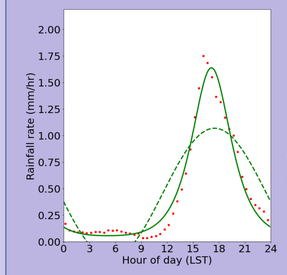
- Maritime Continent experiences a **strong diurnal cycle**, especially in boreal winter
- **High resolution of GPM-IMERG** allows detailed description of cycle
- Half Range and Peak Time help describe the peak
- **Waveform approximation** can help describe the full 24h cycle intuitively
- First diurnal harmonic **can be inaccurate** in its representation of overall variability
- New waveforms improve amplitude and phase accuracy and help **characterise cycle asymmetries**

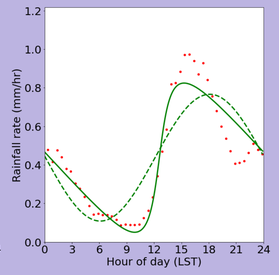
Findings & Implications

- **Skew-permitting waveform** (top right above) captures the **rapid intensification** and gradual weakening of precipitation over near-coastal land
- **Spike-permitting waveform** (bottom right above) captures the **brief but extreme peak** in precipitation over Java and many other near-coastal land regions
- Skew is an indicator of the comparative consistency of precipitation onset and end, with **onset consistency decreasing away from coasts**
- More positive spike tends to indicate more consistent precipitation timing, but negative spike **around Java** may imply **consistent suppression**

Applications

- The diurnal cycle of precipitation is just one example of a cycle with one main peak
- These waveforms may be applied for diurnal cycles, annual cycles, spatial cycles, MJO phase cycles and more!
- Try them out on your own cyclic data





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COAS Centre for Ocean and Atmospheric Sciences

UKRI Natural Environment Research Council