Cloud patterns in four dimensions

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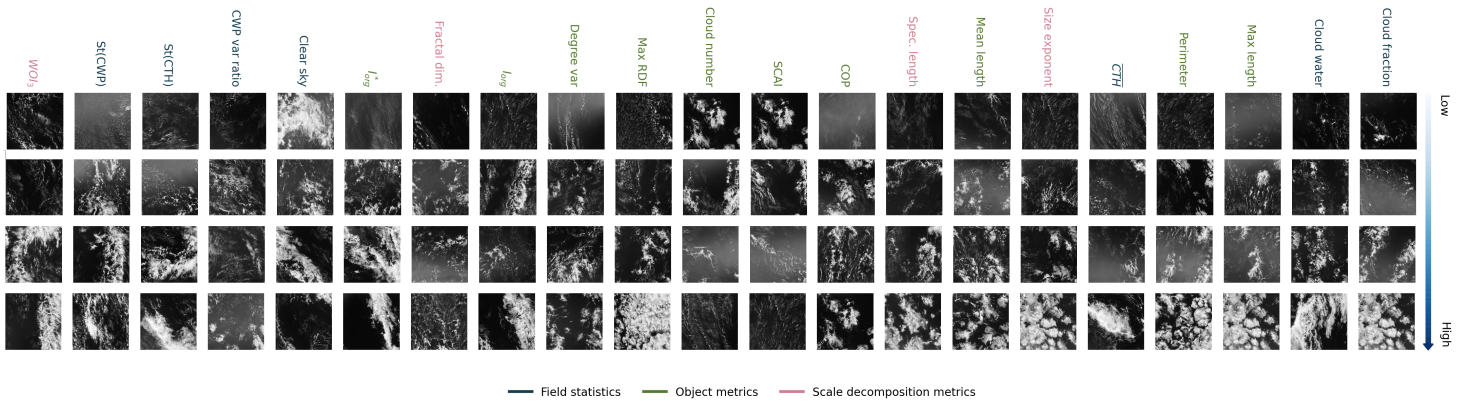
Motivation

- Many descriptions of shallow cloud patterns exist (see e.g. posters by Mikael, Hauke, Raphaela, Leif...)
- Of these, many base themselves on *metrics*

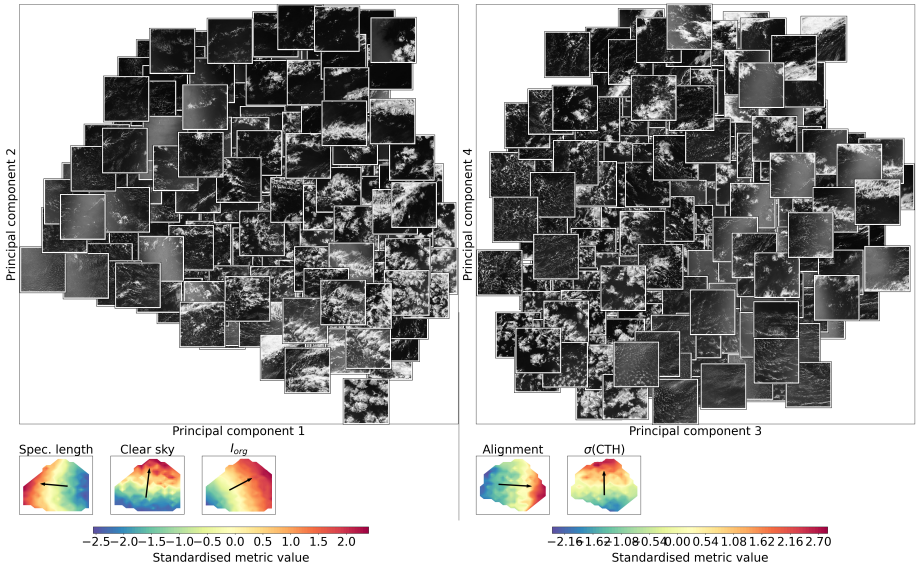
So...

- How much independent information is there in typical organisation metrics?
- How to combine these metrics to describe patterns in trade-wind cloud fields?
- Does pdf of patterns contain traces of "typical" patterns?

1. Compute 21 organisation metrics for 5000 trade-wind cloud scenes



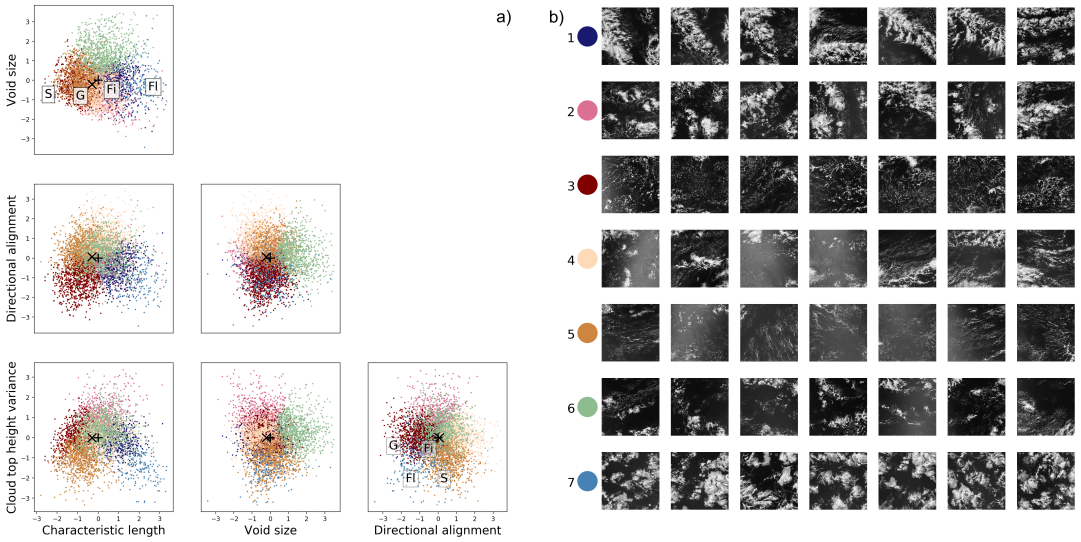
2. Reduce to 4 principal components, which capture 82% of variance in metrics



Using the original metrics, we can **interpret** the metric space spanned by these PCs:

- PC1 → Cloud spectral length → "Characteristics length scale"
- PC2 → Clear sky → "Void size"
- PC3 → WOI_3 → "Directional alignment"
- PC4 → $\sigma(CTH)$ → "Cloud-top height variance"

3. The pattern distribution is a unimodal continuum



- Objectively separates oft-analysed regimes (see e.g. Hauke, Ping-Ping or Raphaela's posters)
- No multimodality, and thus no multiple "typical" patterns, found

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