

Seasonal variability of the structure function and their dependency on day/night variability, weather regime

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Purpose

- Investigate seasonal variability of structure functions, and their dependency on day/night variability, weather regimes by climatic background error statistics

Methodology

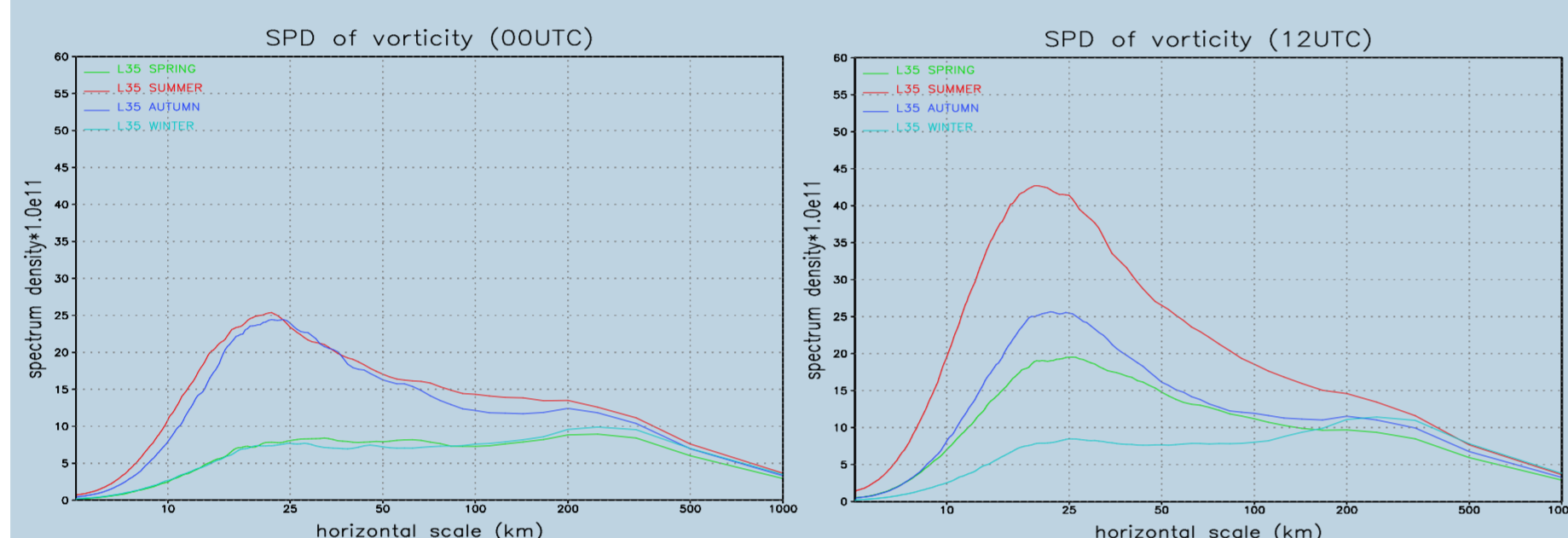
- Ensemble-based method is adopted to generate the data set for structure function statistics
- Version: Harmonie -36h1 Domain: Denmark (384x400)
- Period of data set: from 20100301 00/12UTC – 20110228 00/12UTC
- Diagnosis: The tool for diagnosing Harmonie structure function provided by Nils Gustafsson

Seasonal/diurnal dependency diagnosis of structure functions

Horizontal spectral (vorticity, about 500hPa)

Seasonal dependency

Summer: Dominate peak in meso-scale
Winter: weak peak in synoptical-scale



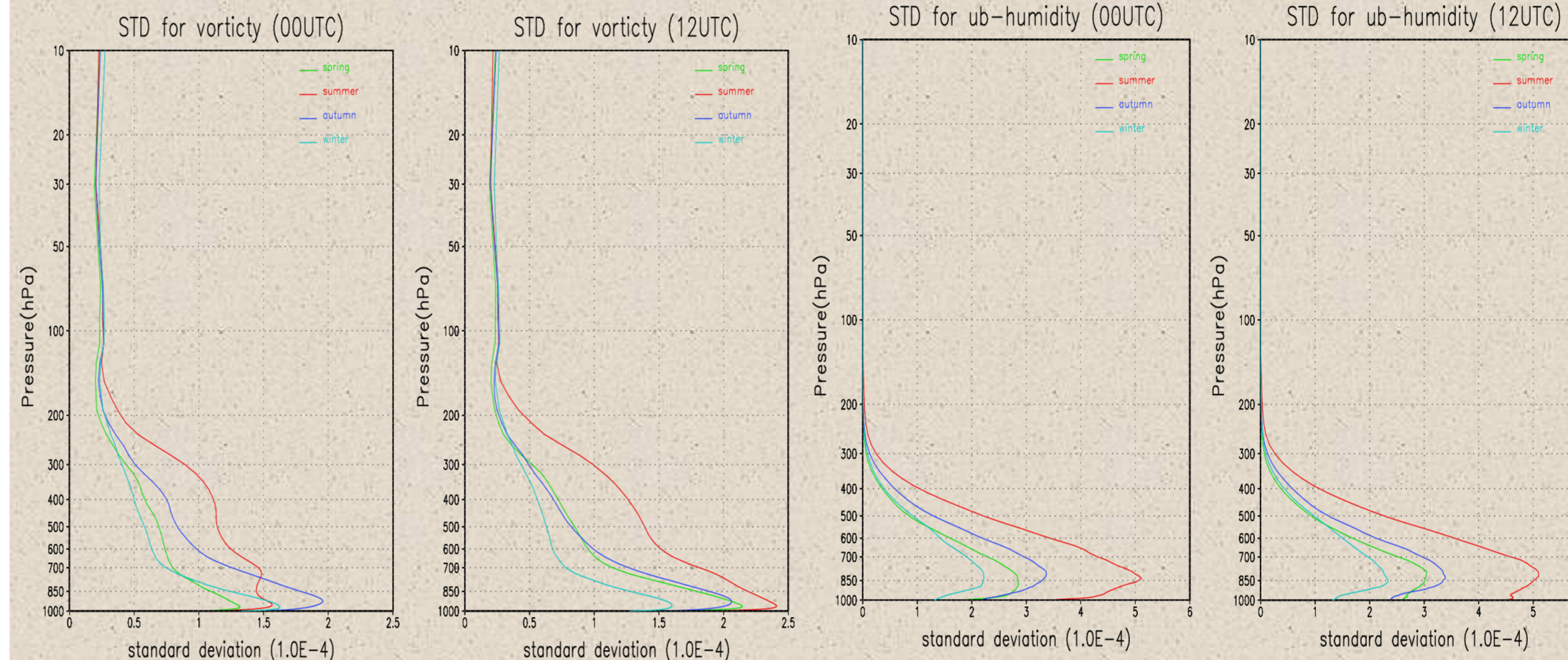
Diurnal dependency

More energy in meso-scale at day than at night during spring/summer/winter; less diurnal variation during autumn.

Standard deviation for vorticity/unbalanced humidity

Seasonal dependency

Larger in summer than in winter



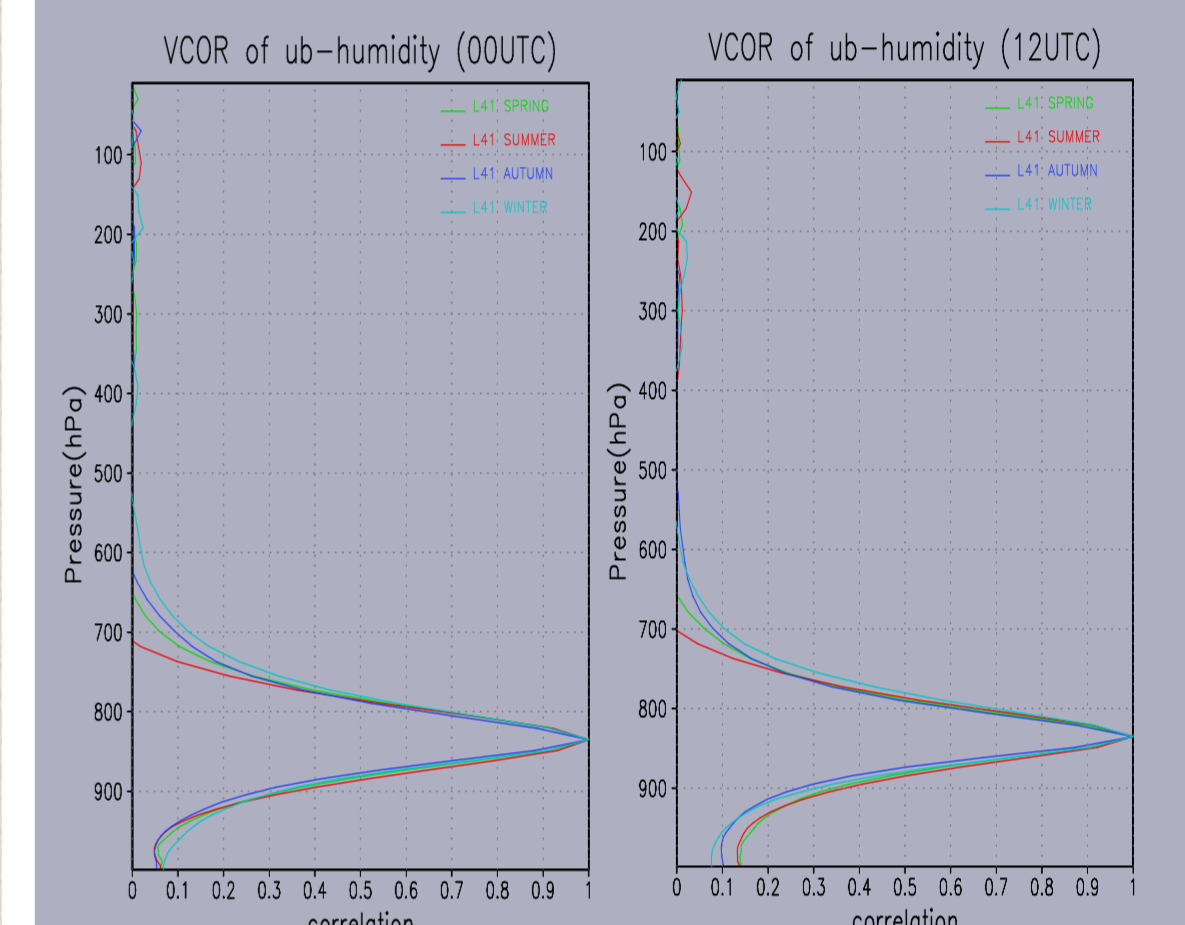
Diurnal dependency

Very little diurnal change

Vertical correlations (vorticity and humidity)

Seasonal dependency

Slightly wider in summer than in winter



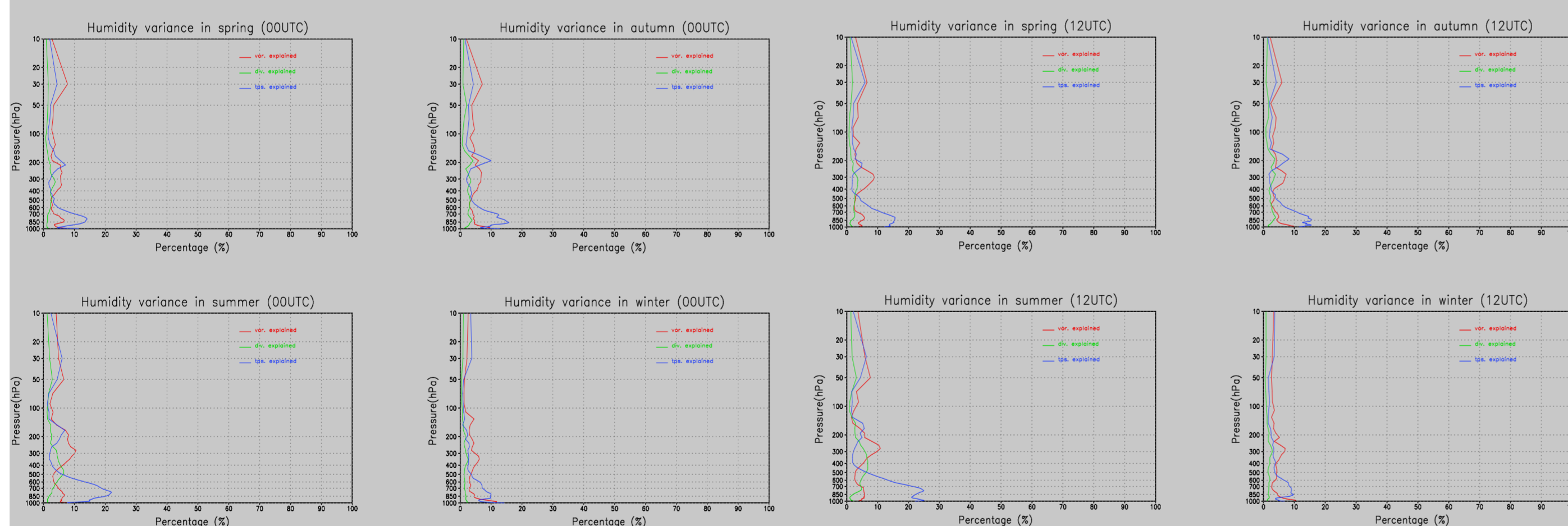
Diurnal dependency

Slightly wider at daytime than at night

Moisture balances

Seasonal dependency

Winter : coupling between vorticity and humidity is comparable to those between unbalanced temperature and humidity
Summer : coupling between unbalanced temperature and humidity is dominate



Diurnal dependency

Coupling between unbalanced temperature and humidity at daytime is larger than at night, especially during summer

Ongoing/future work

- Similar statistics and diagnosis for DMI's operational larger domain
- Impact study on dependency of the structure functions
- Investigation of the dependency on boundary layer stability

Acknowledgements

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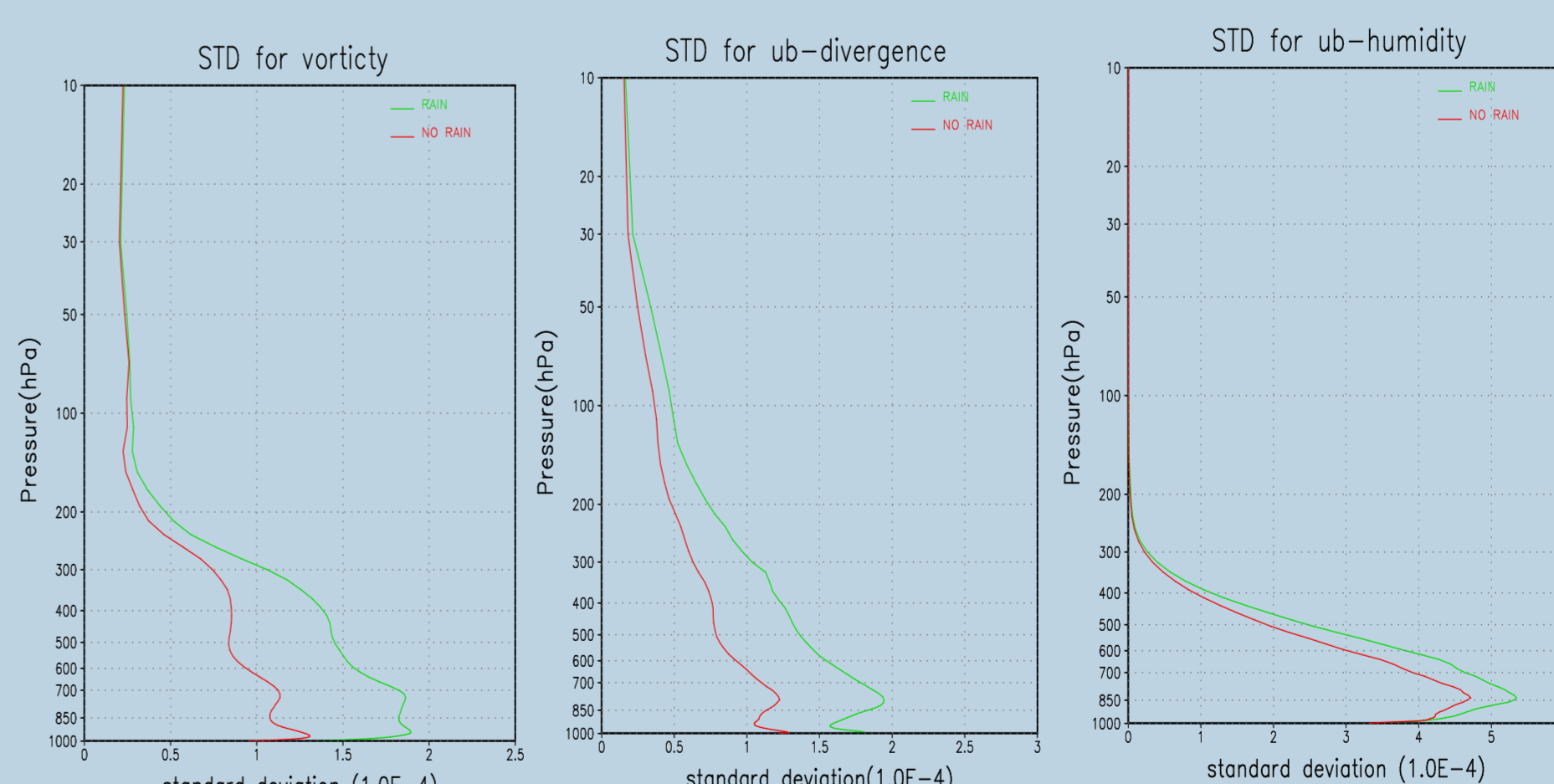
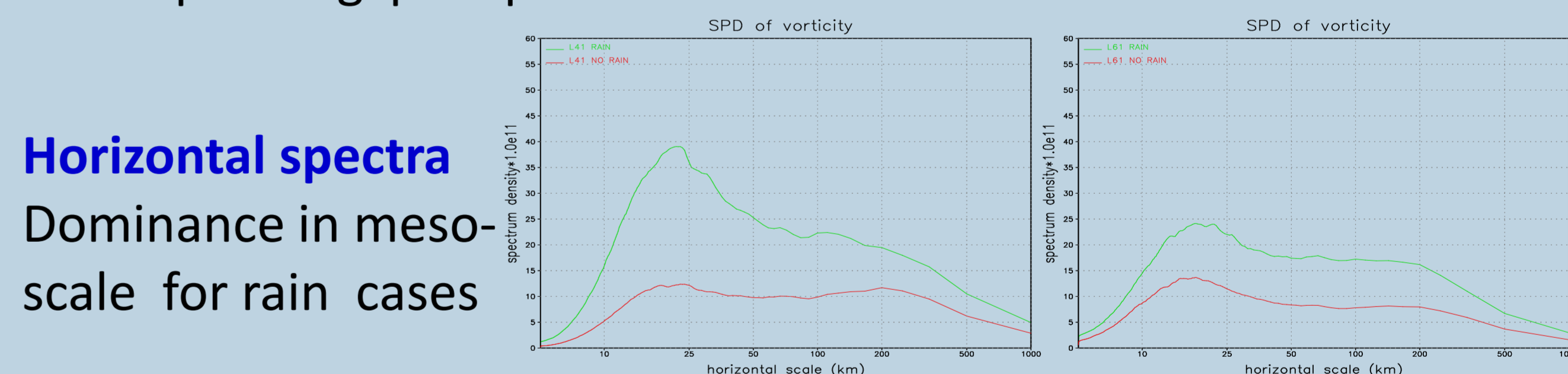
Weather regime dependency diagnosis of structure functions(rain/dryness)

Statistic sampling data collecting

Rain/Dryness cases are separated from 201006-201008 Harmonie ensemble 6h forecast data set according to corresponding precipitation measurements

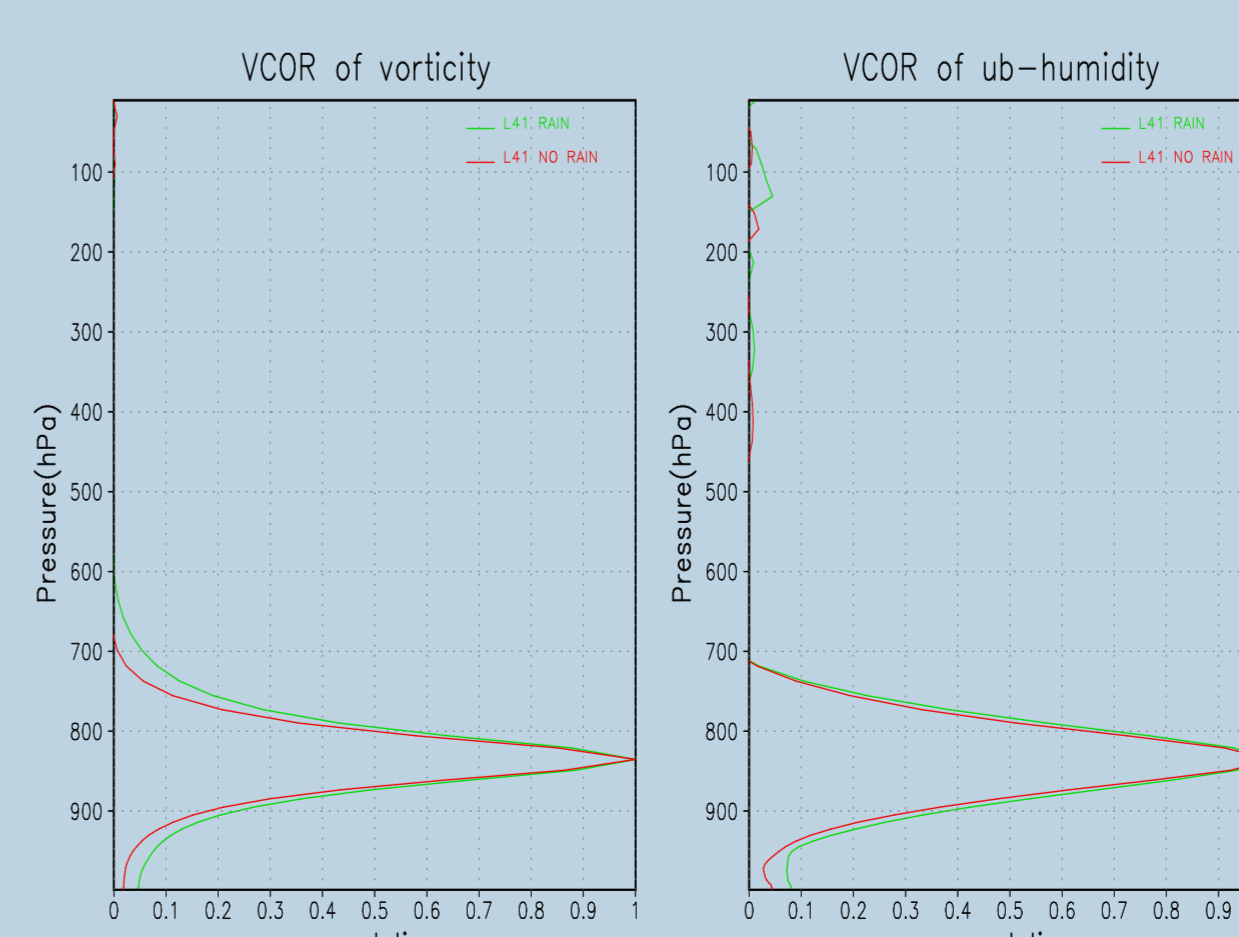
Horizontal spectra

Dominance in meso-scale for rain cases



Standard deviation

Vorticity/Divergence/Humidity: larger for rain than for dryness



Vertical correlation

Vorticity: wider for rain than for dryness
Humidity: little wider for rain than for dryness