



RealPEP-P2 : Observation-based Weather Analysis and Nowcasting (QPN)

Presented by Mathias Emond and Silke Trömel

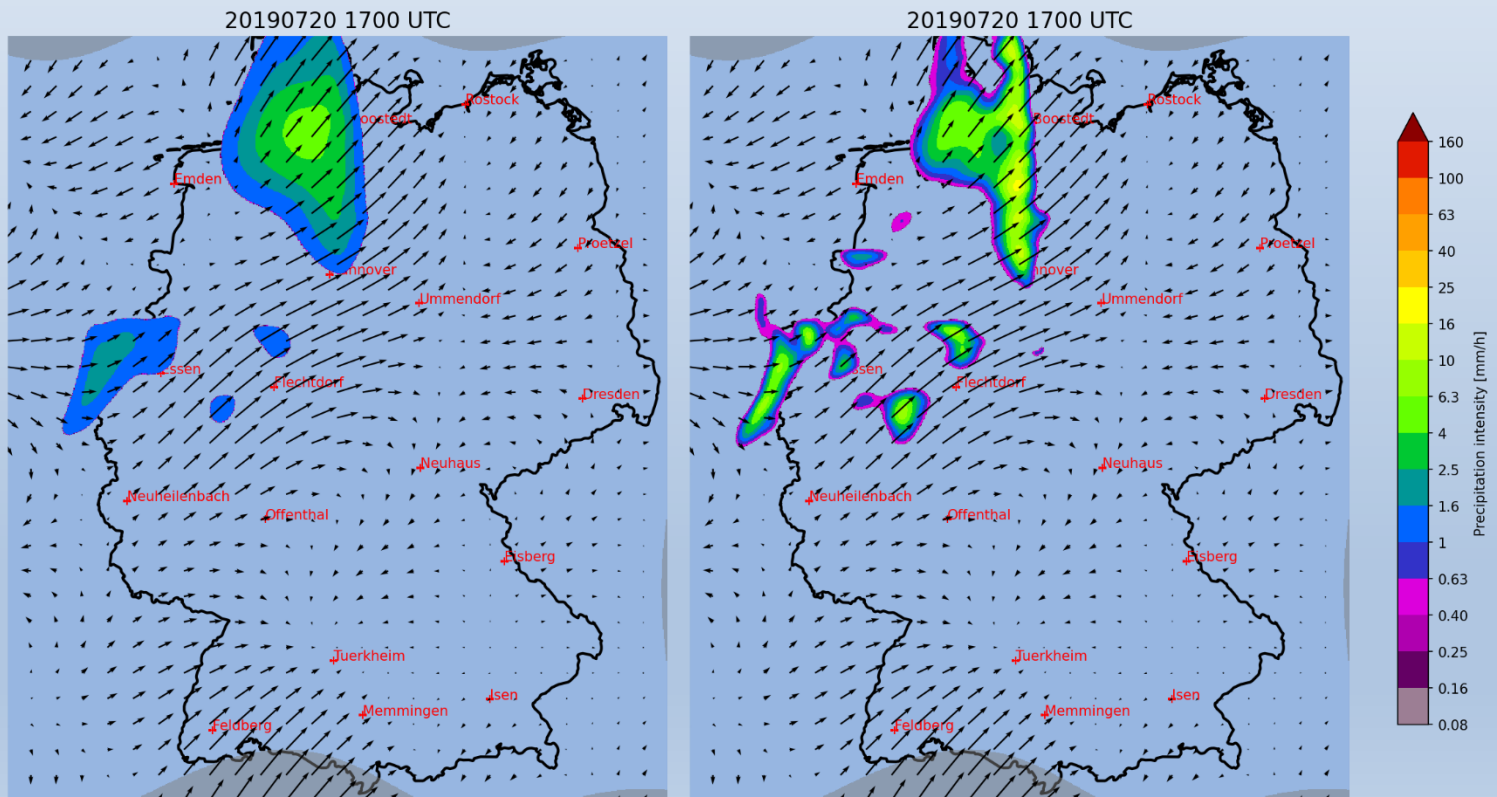
On the 9 th of October 2024

P2-Phase I

P2-Phase I: SPROG vs SPROG-LOC

SPROG

SPROG-LOC

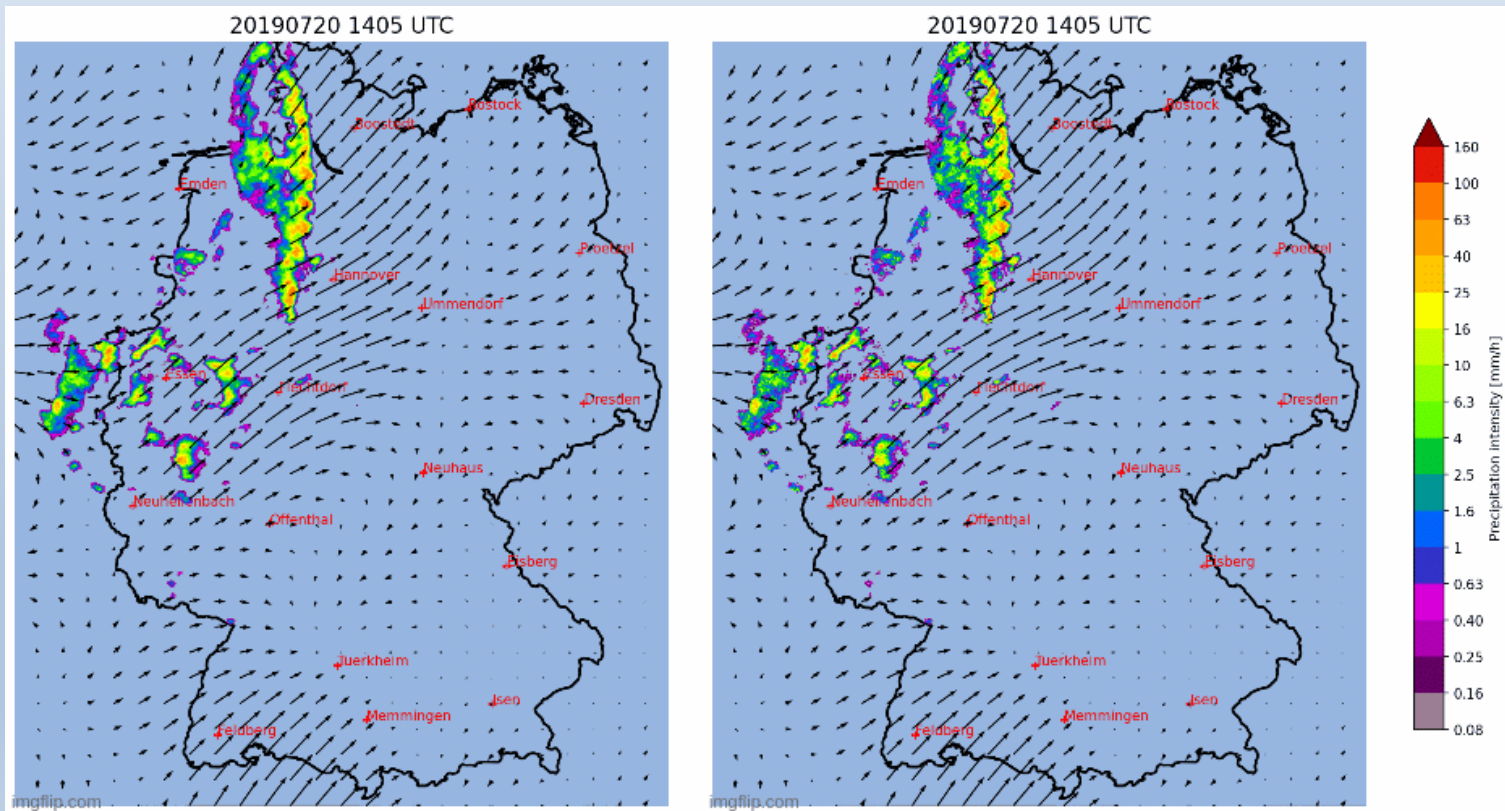


P2-Phase II

P2-Phase II: STEPS vs STEPS-LOC

STEPS

STEPS-LOC



P2-Phase II

Tasks for P2-Phase II:

- Benchmark of SPROG-LOC and STEPS-LOC over 120 days of QPE from P1
- Evaluation of the new QPE's products uncertainties
- Detection and quantification of updrafts using Z-DR columns and size sorting effect
- Feeding of a machine learning neural network by satellite observations to include Convection Initiation
- Detection of stratiform rain enhancement through the study of K_{DP} between -10°C and -15°C

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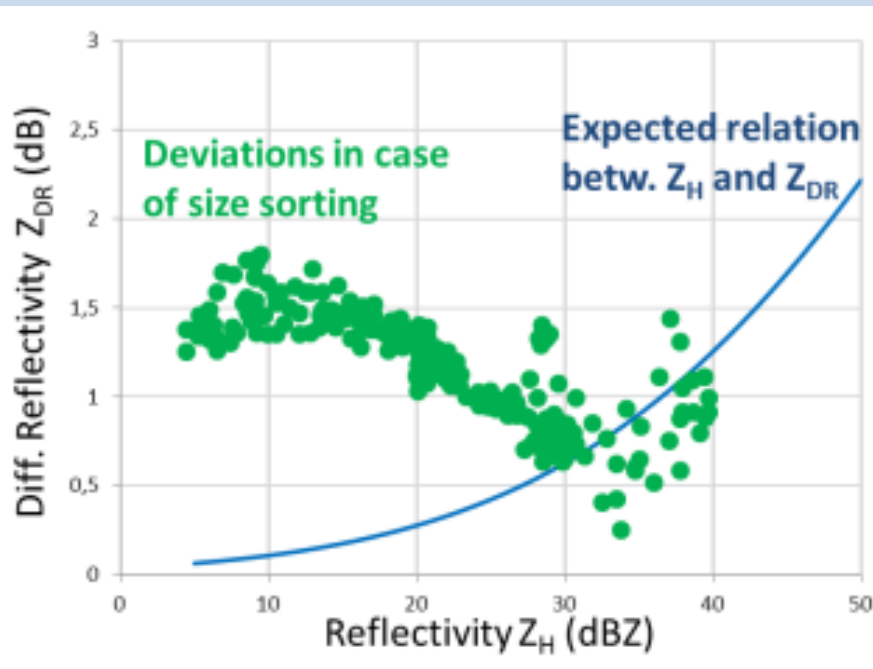
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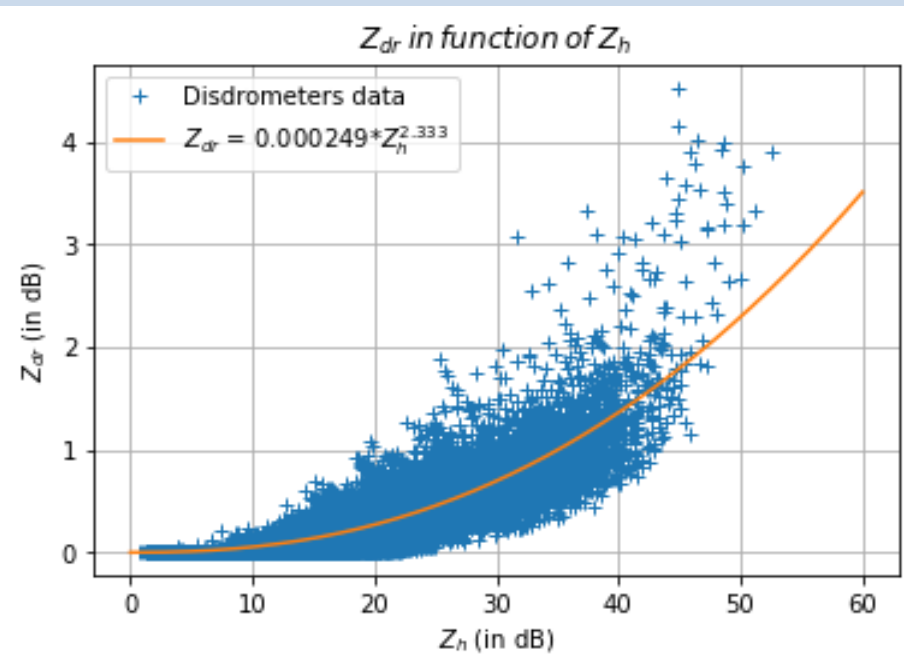
P2-Phase II

Size sorting detection using DSD's values:

Principle of the detection algorithm



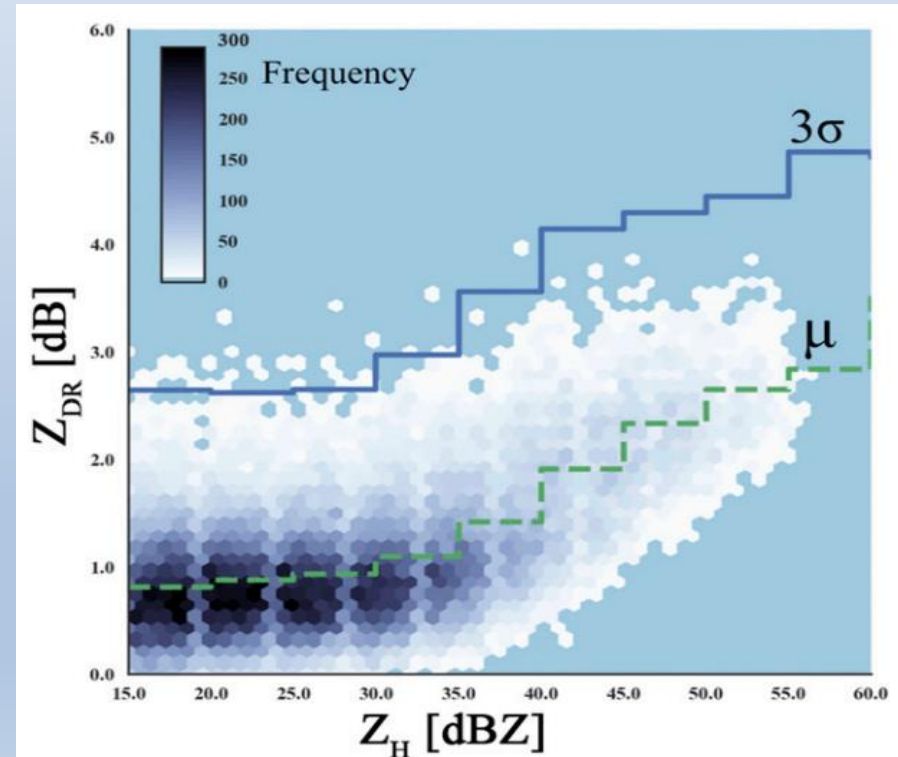
Disdrometers Data Tmatrix reconstructed



P2-Phase II

Size sorting detection with TRENDSS (Picca, 2018):

- Use the Radar Data itself
- Immune to Z_{dr} biases
- Spots Outliers of $Z_{dr} > 3\sigma$
- One set of 3 $Z_h - Z_{dr}$ relations by elevation angle
- Tailored for each Radar



P2-Phase II

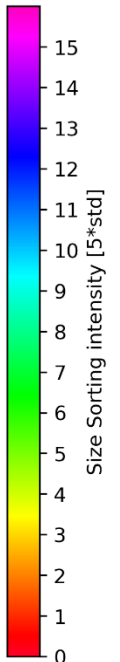
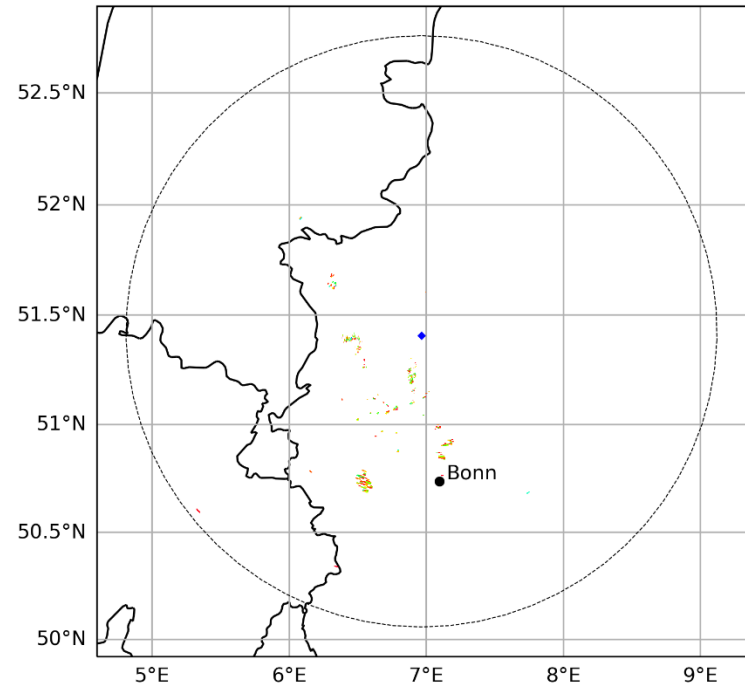
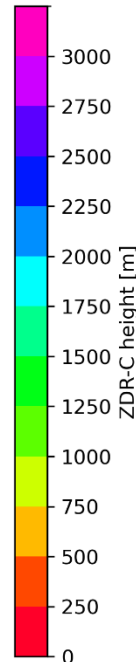
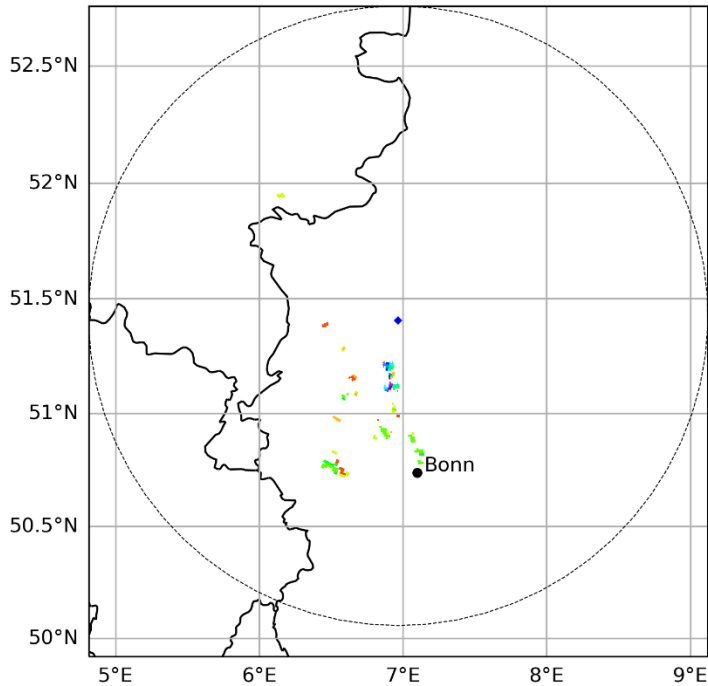
Snyder vs TRENDSS

Snyder

TRENDSS

2017-07-19 13:35 UTC

2017-07-19 13:35 UTC



09/10/2024

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P2-Phase II

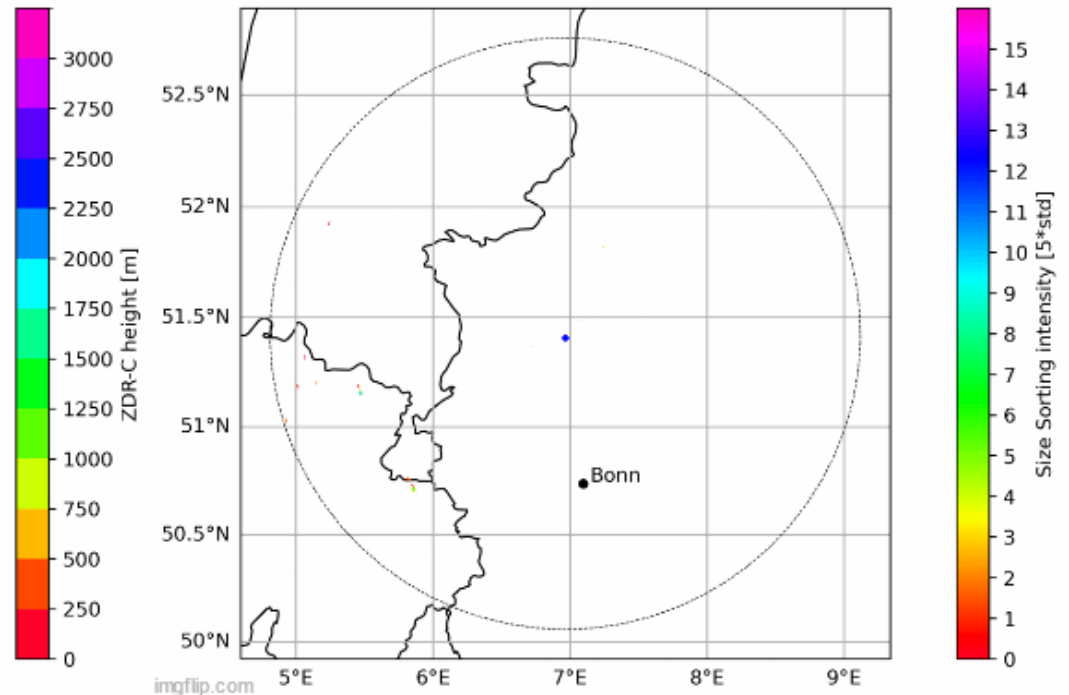
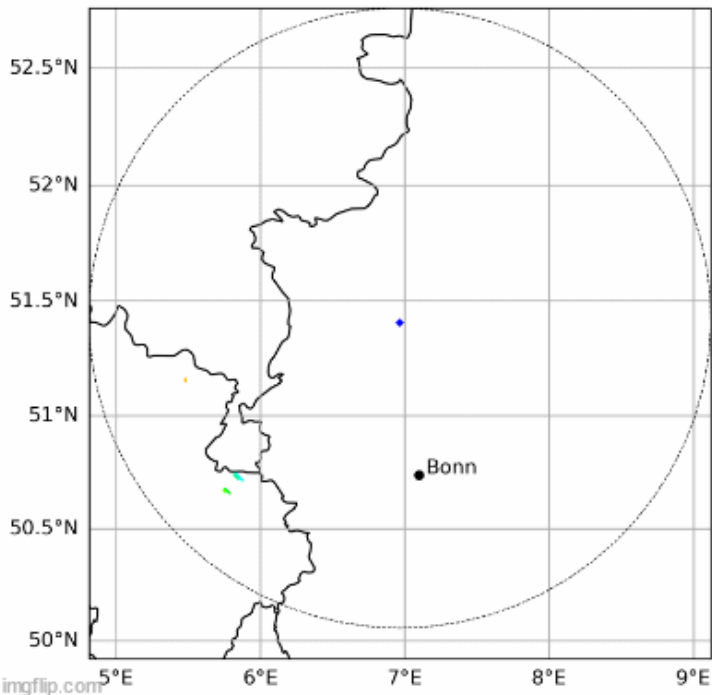
Snyder vs TRENDSS

Snyder

TRENDSS

2017-07-19 12:00 UTC

2017-07-19 12:00 UTC



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P2-Phase II

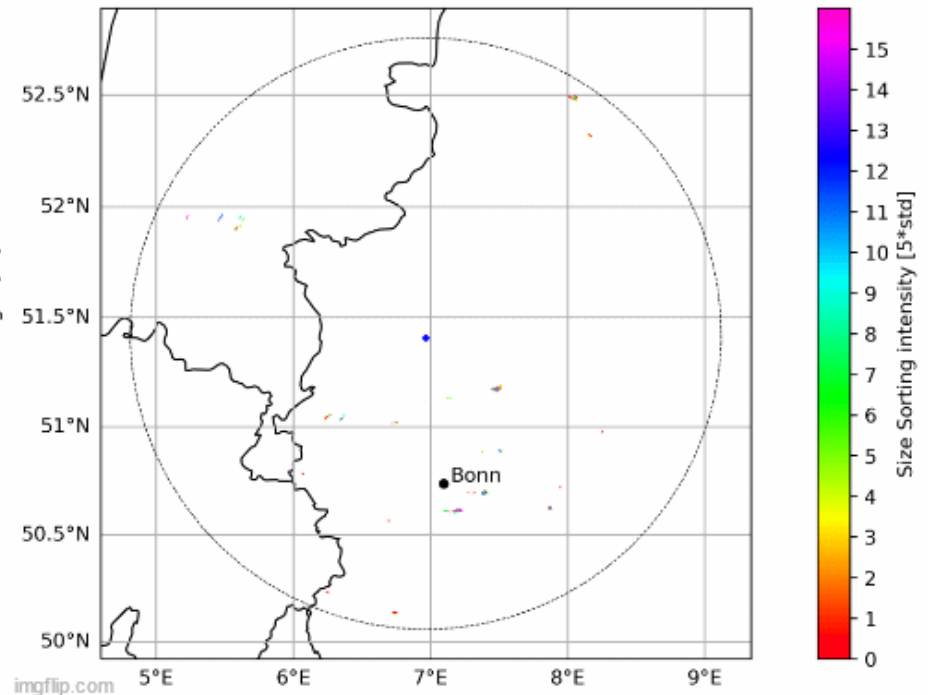
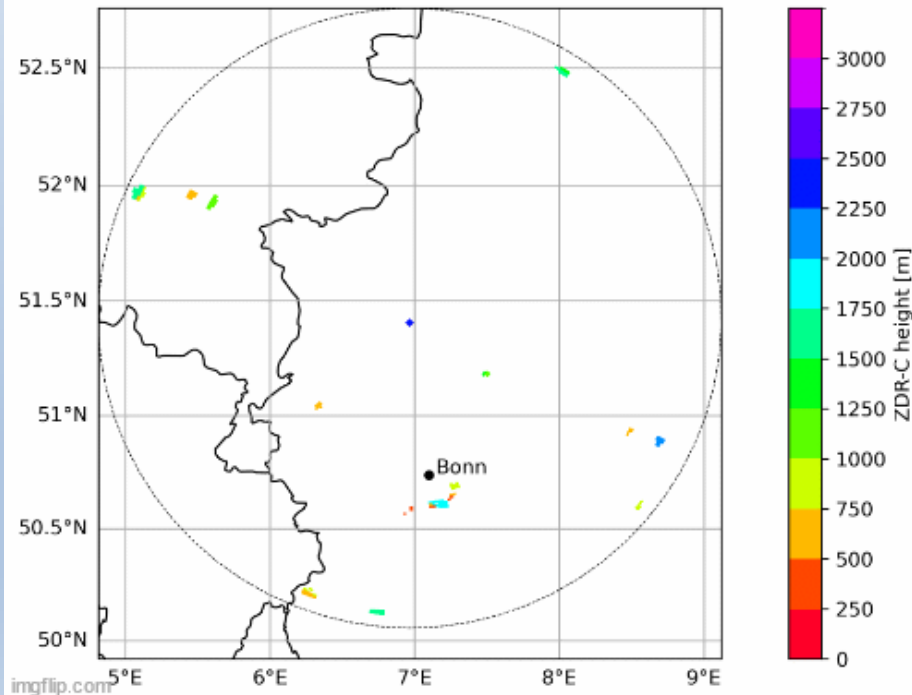
Snyder vs TRENDSS

Snyder

TRENDSS

2016-06-04 12:45 UTC

2016-06-04 12:45 UTC



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P2-Phase II

A new technique : The ZDR hotspot technique (Vinzent Klaus and John Kraus, 2023)

« *Identifying updrafts with Z_{dr} hotspots* » (2023)

Principle : Detects anomalously high values of Z_{dr} relatively to neighbouring gates (hotspots)

P2-Phase II

The ZDR hotspot technique

Compute CAPPI (Constant Altitude Plan Position Indicator) Data for Reflectivity, Z_{DR} , and Depolarization Ratio (DR) at the Height of the -10°C Temperature.

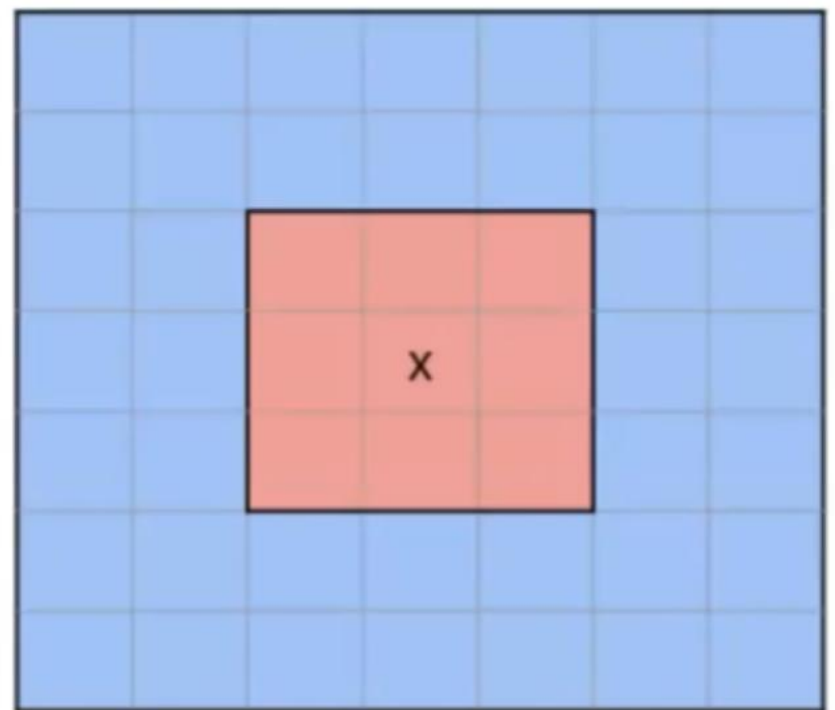
Convert the Az/Range coordinate CAPPI data to a 1 km grid centered at the radar

Compute and threshold the data based on $\text{DR} < -10 \text{ dB}$, Reflectivity $> 25 \text{ dBZ}$ with a dilation of 3 km and $Z_{DR} < 5.0$.

Compute the Z_{DR} Hotspot field.

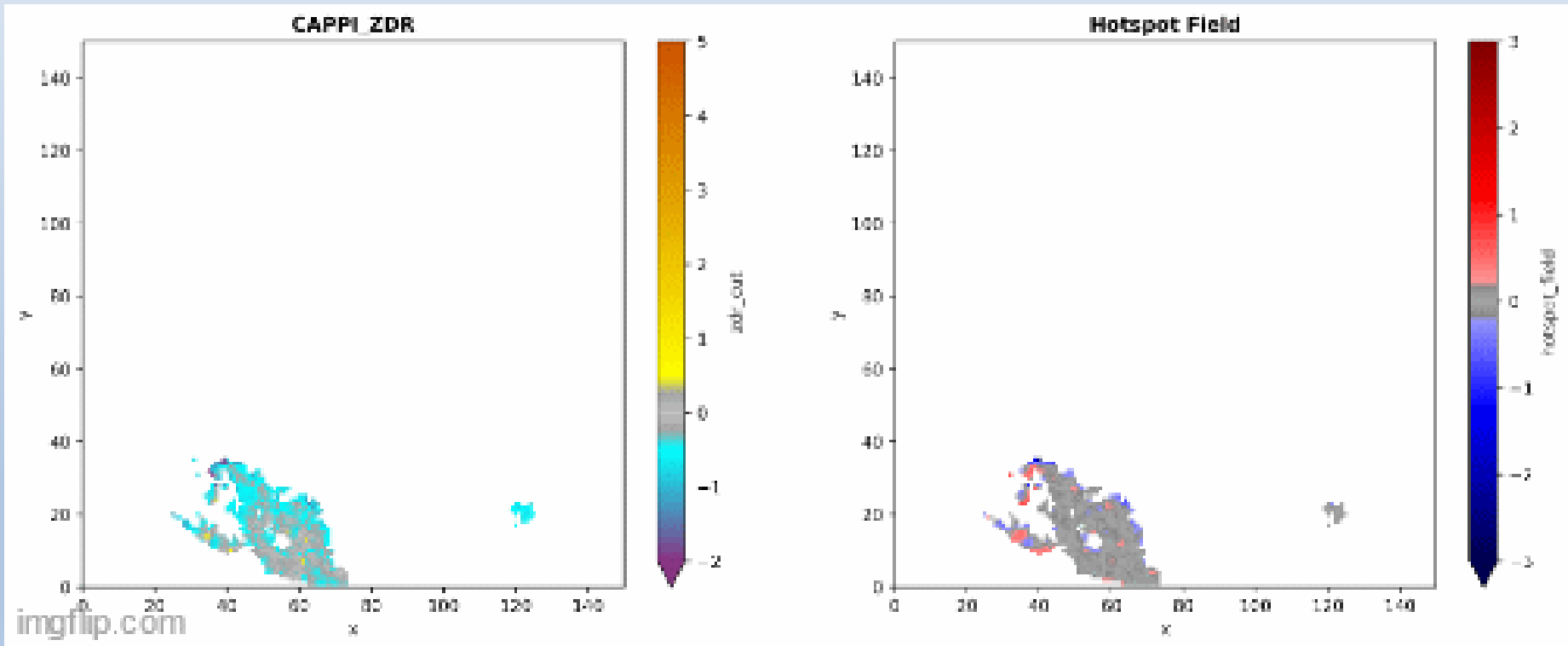
The Z_{DR} Hotspot Technique is focused on convective precipitation, therefore we trim the ZDR data to only those locations.

- 1) Zmask Reflectivity > 25.0 Dilated by 3 km, selects data near convection
- 2) $\text{DR} < -10.0 \text{ dB}$, removes non-precipitation echos
- 3) $Z_{DR} < 5.0 \text{ dB}$, final attempt to remove unrealistic data



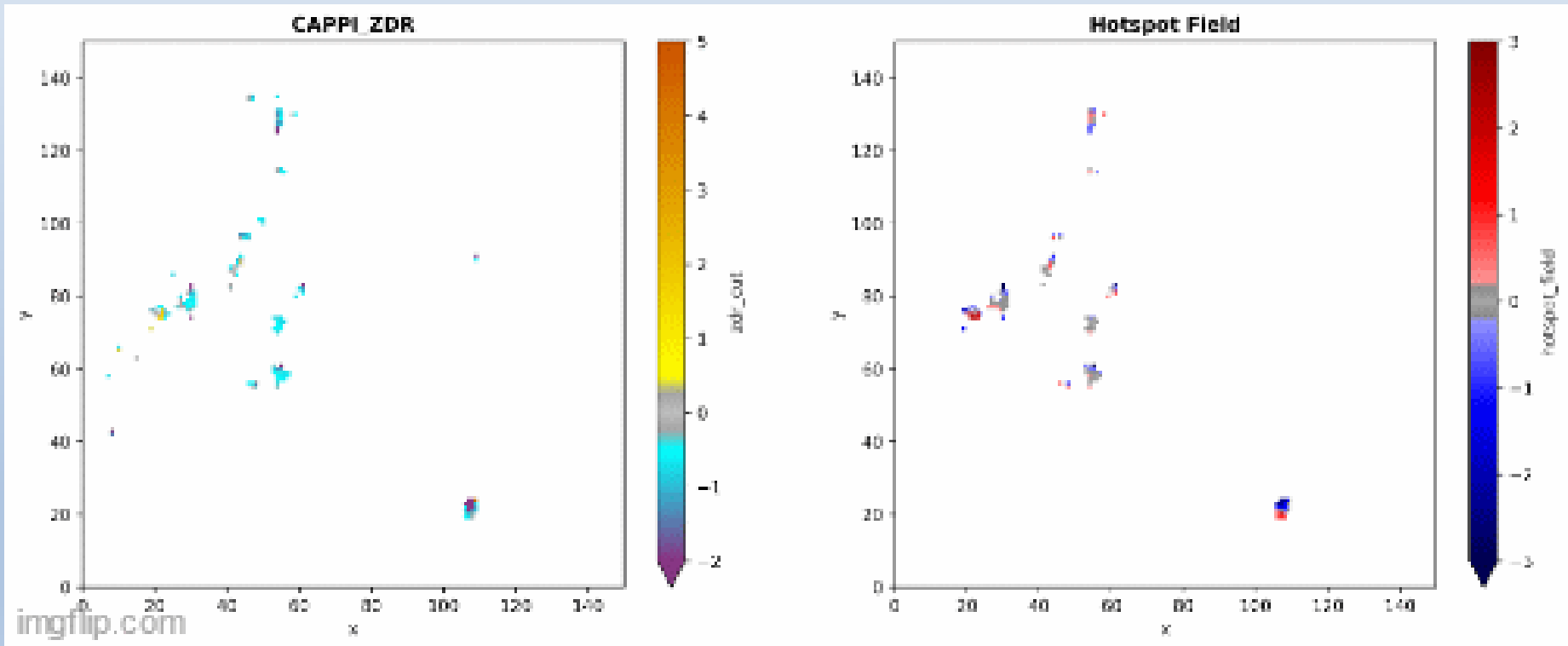
P2-Phase II

Hotspot on 2017-07-19 (-5°C) :



P2-Phase II

Hotspot on 2016-06-04 (-5°C) :



Thank you for your attention

Questions