RealPEP Phase 2: C1 Infrastructure Current Status 16.05.2023

Mst. Mahfuja Akter

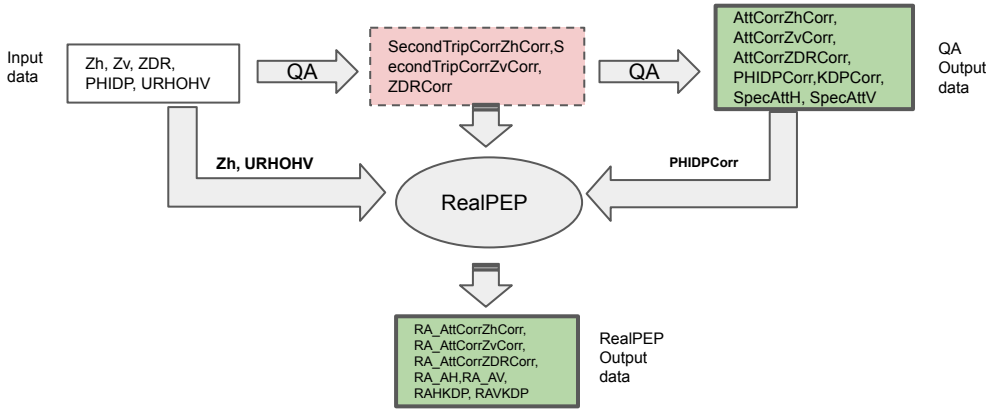
Dr. Silke Trömel

Meteorology Institute, University of Bonn

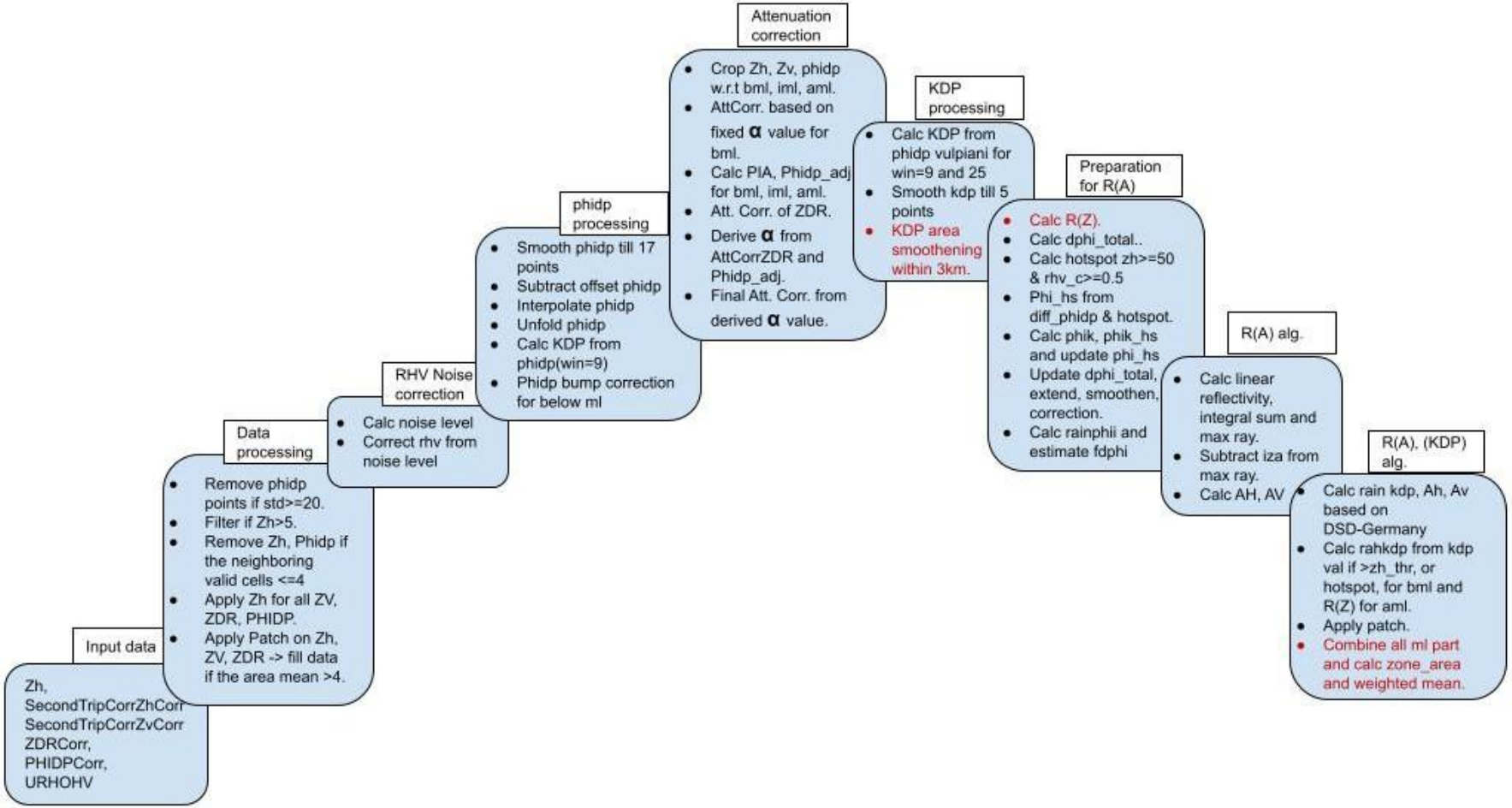
QA: Corrected Moments (Recap)

1. Signal processor overflow
2. radar status analysis
3. application of threshold filters to reflectivity
4. application of threshold filters to radial velocity
5. smooth parts of phidp filter
6. speckle filter PHIDPCorr → PHIDPCorr
7. manual calculation of KDP
8. spectral width rotation correction
9. spoke detection reflectivity
10. dual prf unfolding
11. spoke detection radial velocity
12. sun spoke marking
13. corrupt image via range normalization
14. ring detection reflectivity
15. ring detection radial velocity
16. RadarQS single sweep algorithms
17. RadarQS volume algorithms
18. dual prf unfolding error correction
19. clutter detection polarimetric → ZhCorr, ZvCorr
20. second trip removal → SecondTripCorrZhCorr, SecondTripCorrZvCorr
21. ZDR filter → ZDRCorr
22. shielding correction
23. polarimetric attenuation correction → AttBiasZDRCorr, AttBiasZhCorr, AttBiasZvCorr, SpecAtth, SpecAttv, DiffAtt
24. single-pol. attenuation correction
25. speckle filter reflectivity → AttCorrZhCorr, AttCorrZvCorr
26. speckle filter differential reflectivity → AttCorrZDRCorr
27. speckle radial velocity → VhCorr, VvCorr
28. speckle KDP → KDPCorr
29. VERIFICATION: counter of moment data, qa bit counter, qa detection monitor

Realpep: Workflow of Moment data

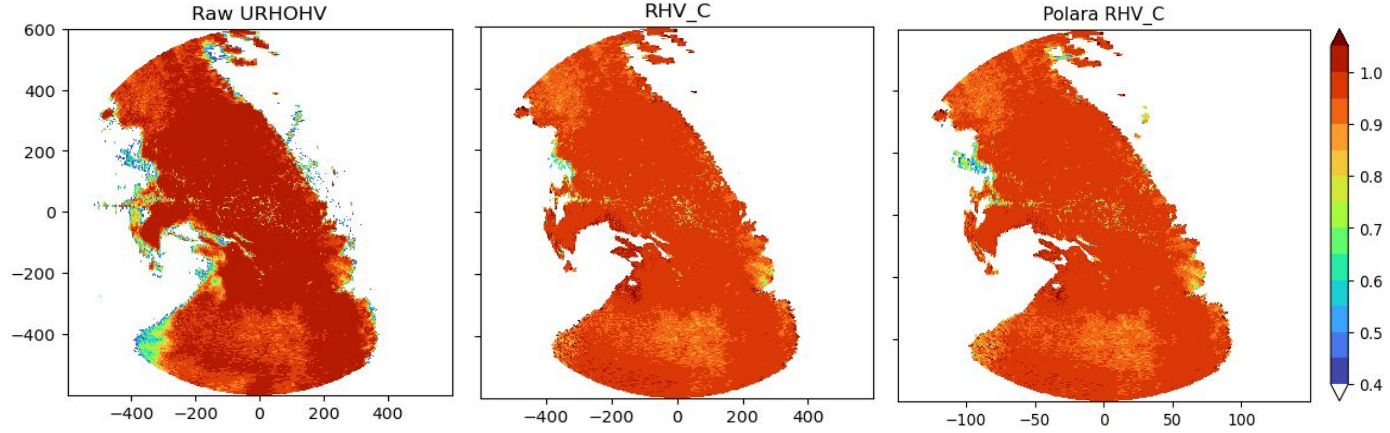


POLARA: Realpep(QPE) workflow



RHV Noise Correction: QPE Vs Polara

Radar: HNR
Melting layer: 2600 m

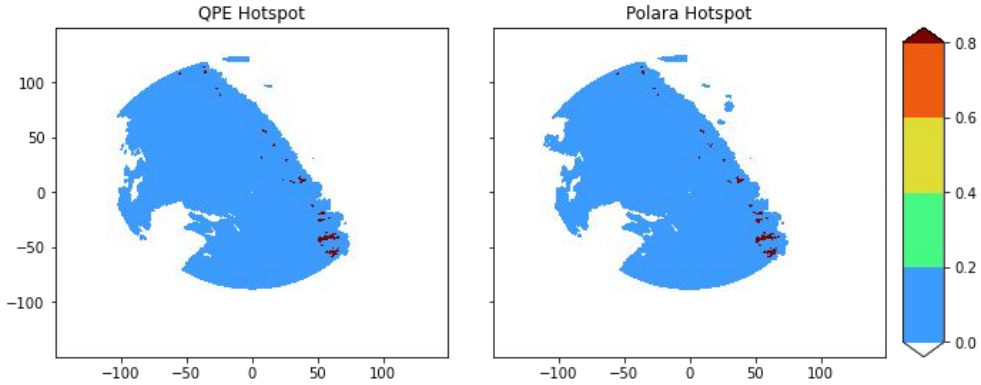


Time: 20170719 19:00

$$SNR(dB) = Z(dB) - 20log(distance) - nl(dB)$$

$$RHV_{corr} = RHV_{obs}(1 + 1/snr)$$

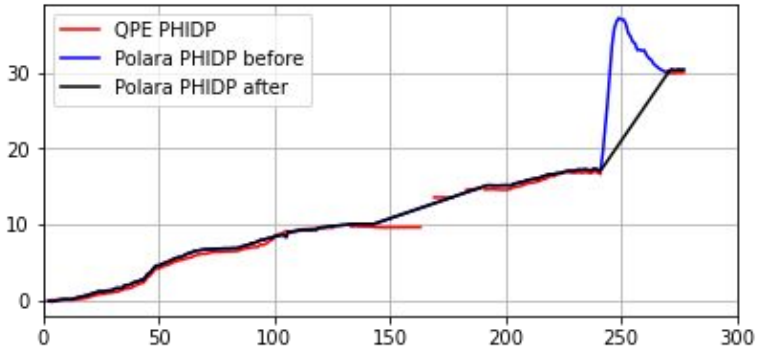
Hotspot and valid areas (Ryzhkov et al. (2007))



Time: 20170719 19:00

Zh>=50 and RHV_C>=0.5

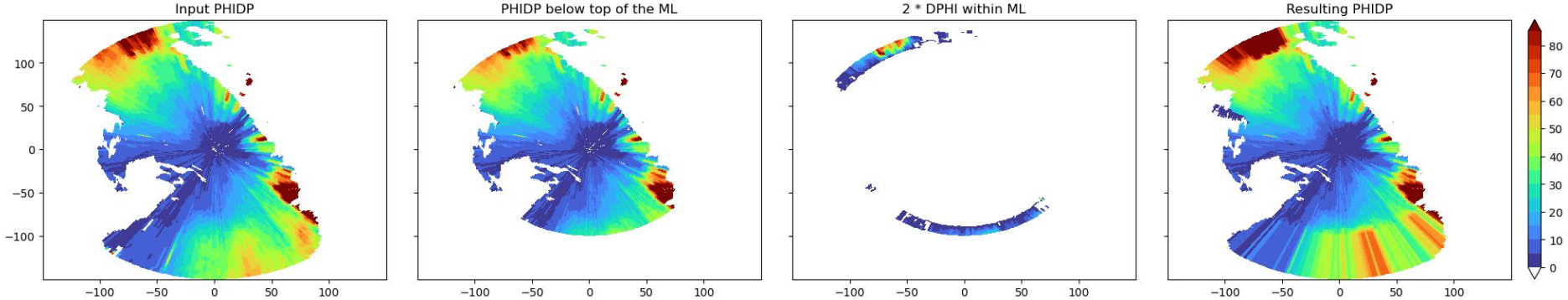
PHIDP Bump correction



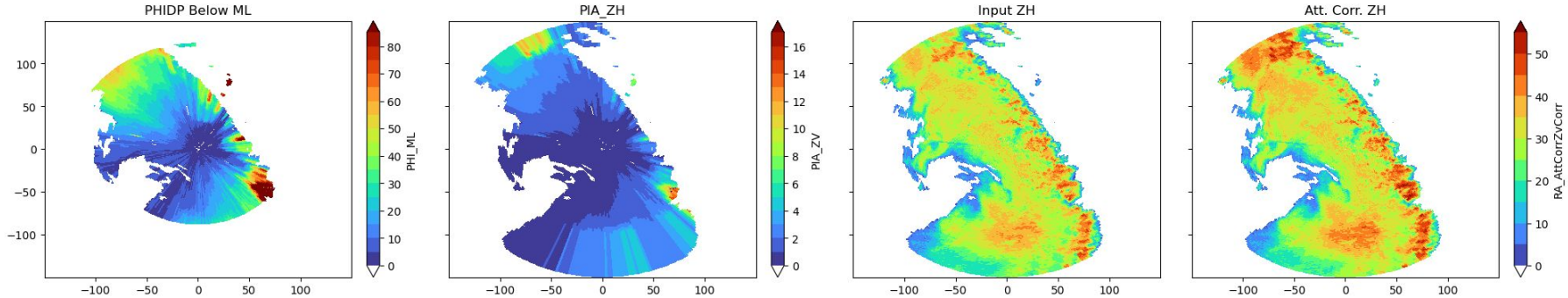
Time: 20170719 19:20

PHIDP processing for Att. Corr.

Radar: HNR
Melting layer: 2600 m



- Calculate AttCorrZDR with resulting PHIDP and belta
- Derive α
- Calculate AttCorrZh and AttCorrZV



$PIA = \Delta\phi_{DP}\alpha$

PIA += 3 * *DPHI_IML* * 0.0927

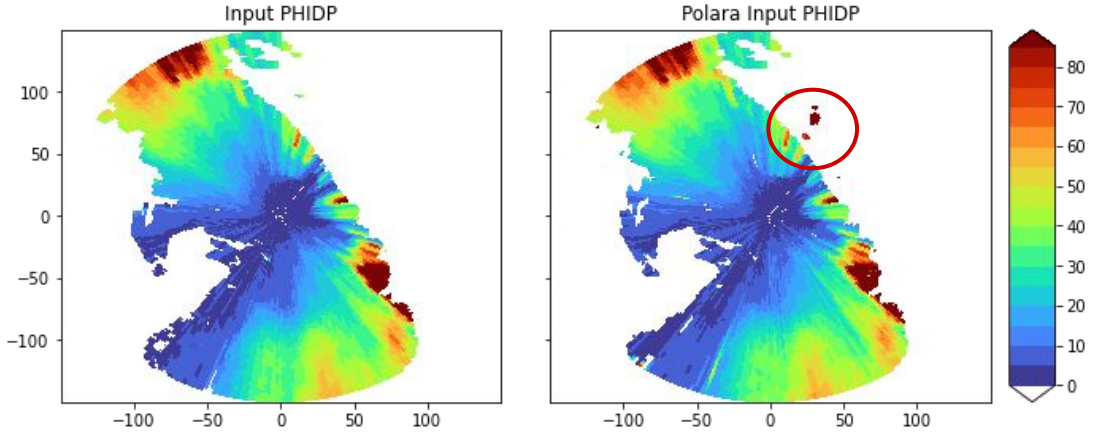
ZH

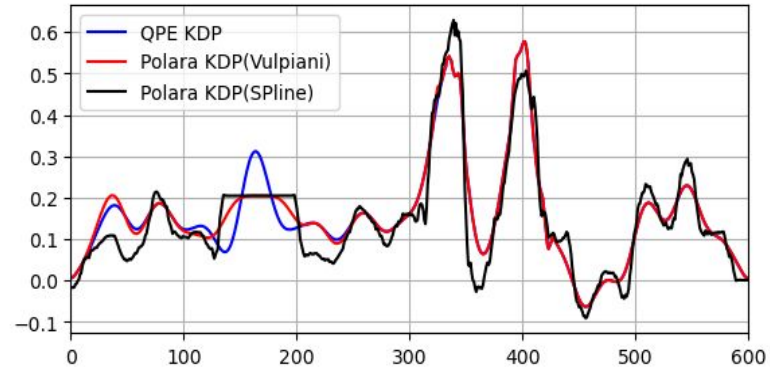
AttCorrZH = ZH + PIA

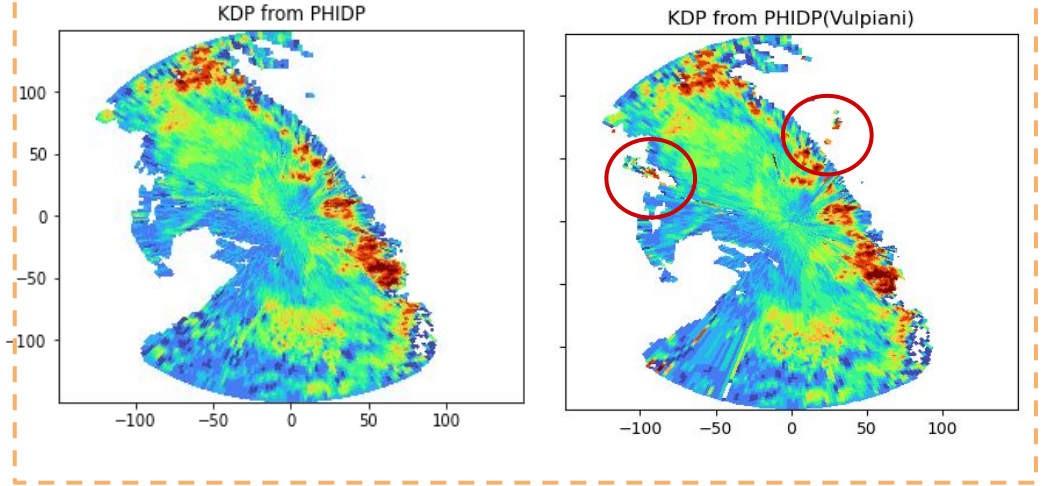
PHIDP & KDP: QPE Vs Polara

- Echo's are visible in Polara

Radar: HNR
Melting layer: 2600 m
Time: 20170719 19:00





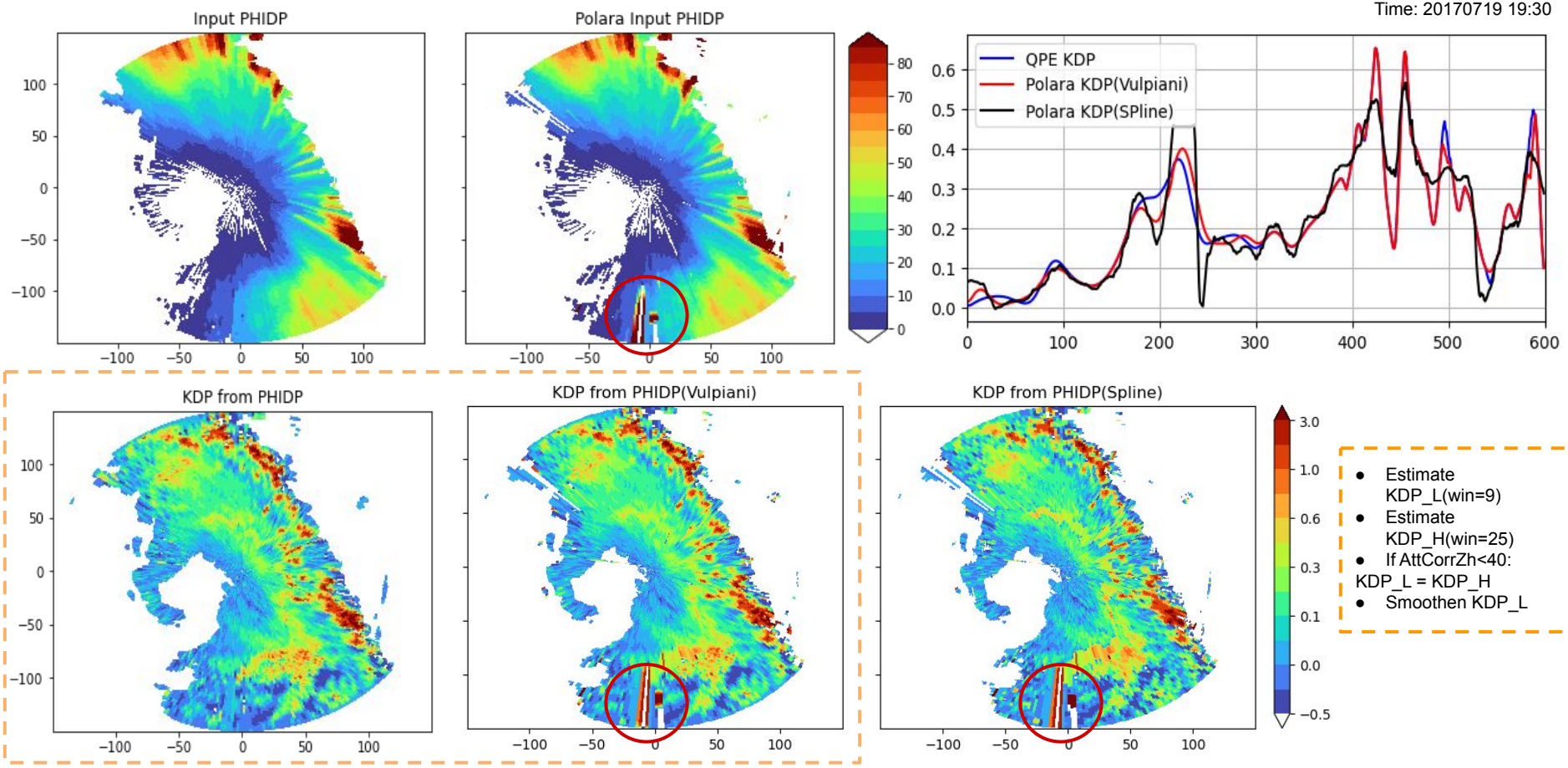


- Estimate KDP_L(win=9)
- Estimate KDP_H(win=25)
- If AttCorrZh<40: KDP_L = KDP_H
- Smoothen KDP_L

PHIDP & KDP: QPE Vs Polara

- Echo's are visible in Polara

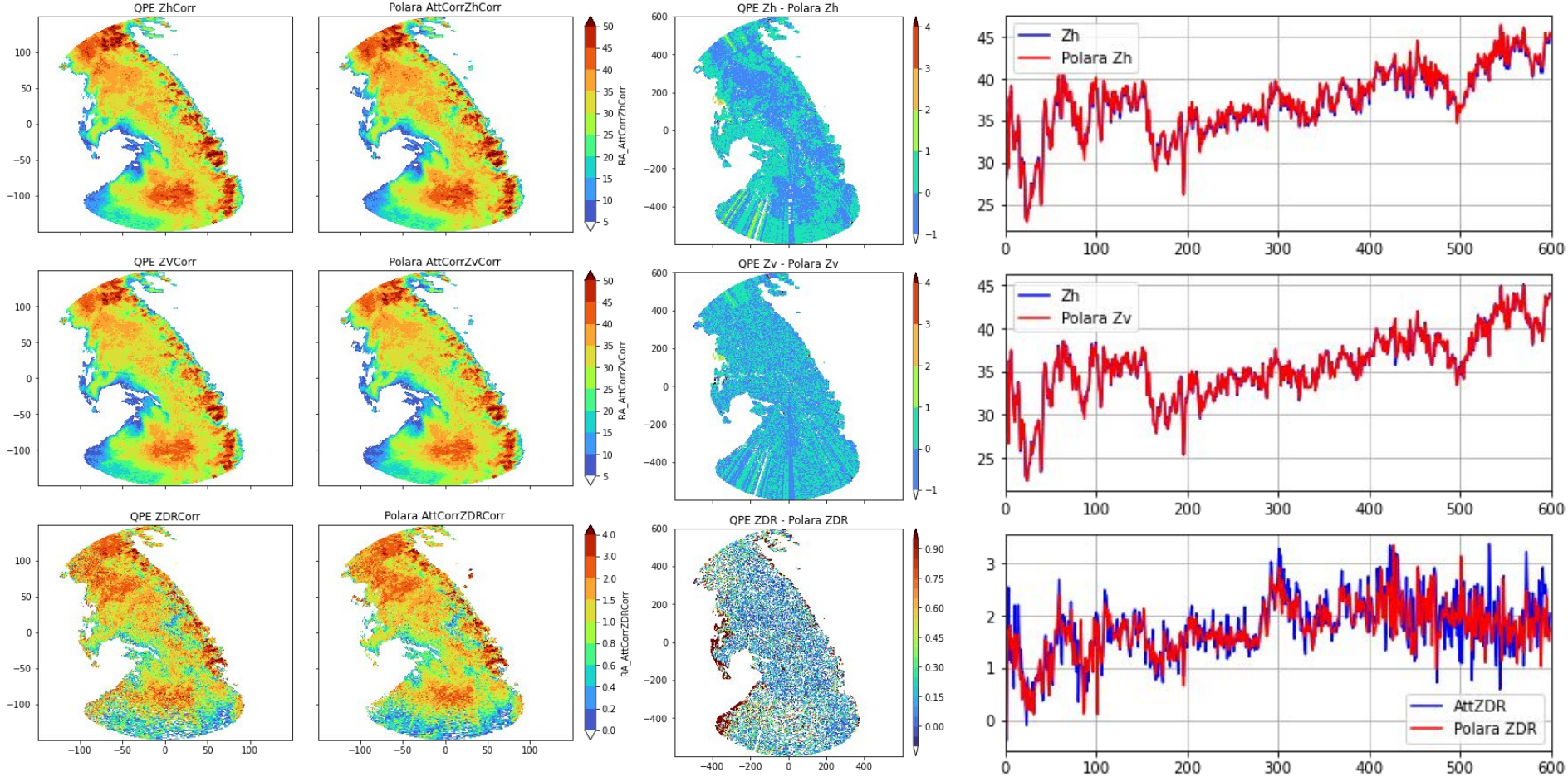
Radar: HNR
Melting layer: 2600 m
Time: 20170719 19:30



Att. Corr: QPE Vs POLARA

- Echo's are visible in Polara

Time: 20170719 19:00
Radar: HNR
Melting layer: 2600 m



Att. Corr: QPE Vs POLARA

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Time: 20170719 19:30
Radar: HNR
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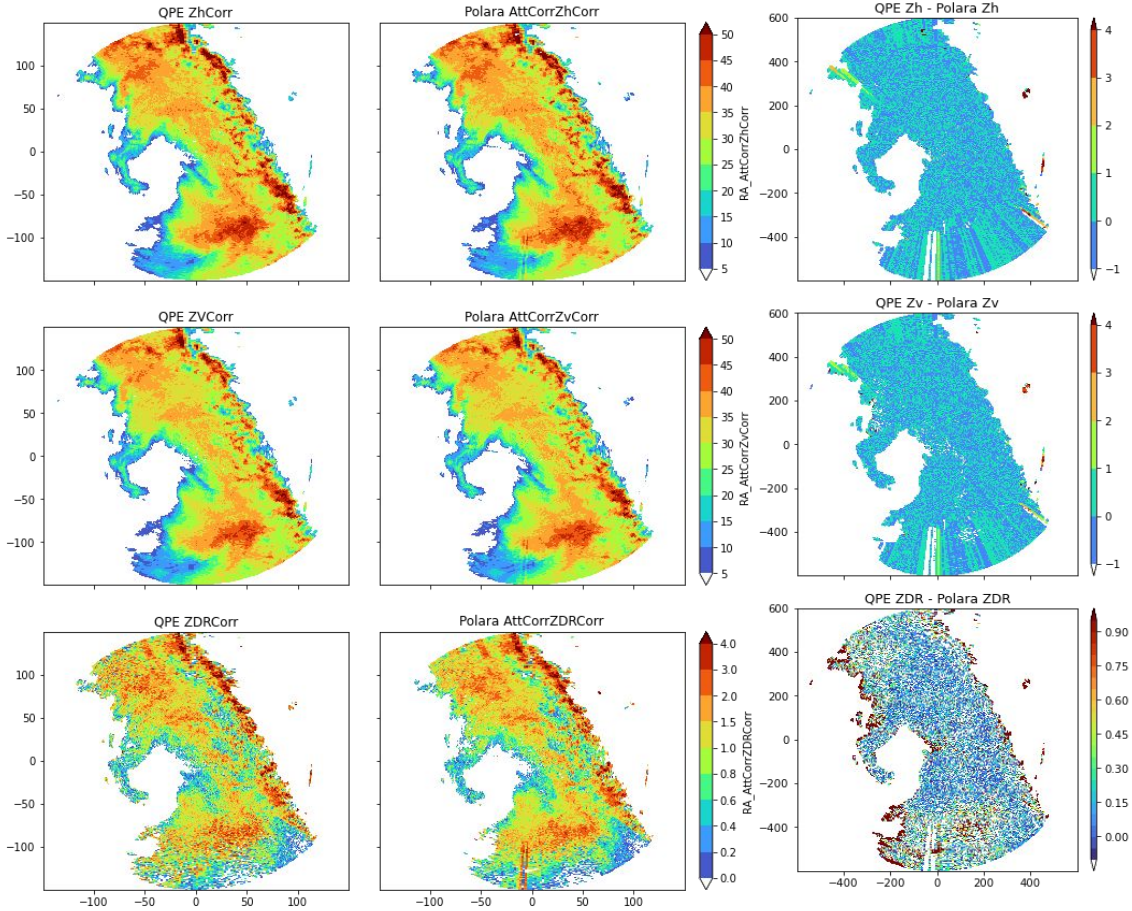

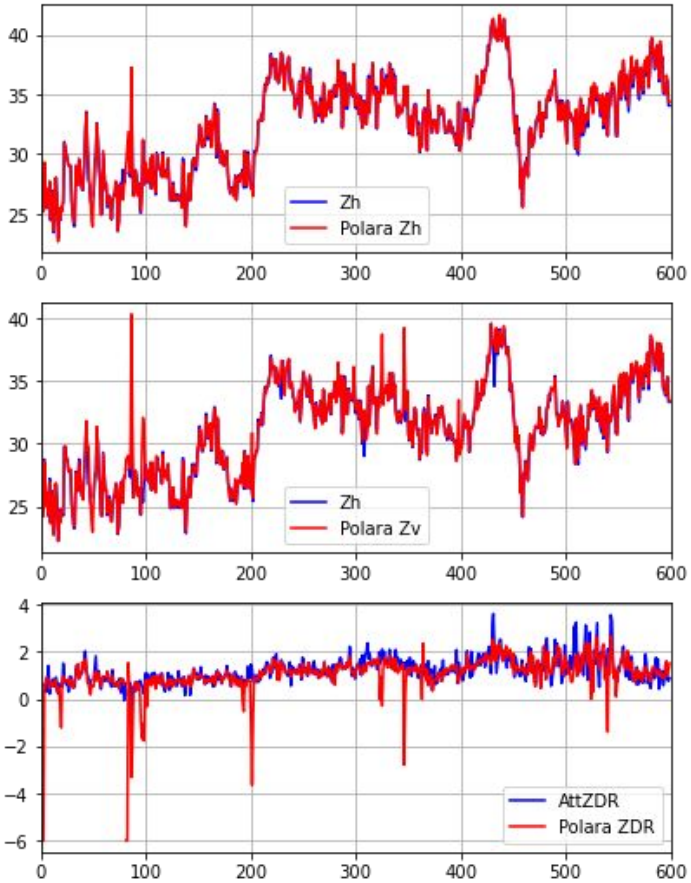

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Radar: HNR
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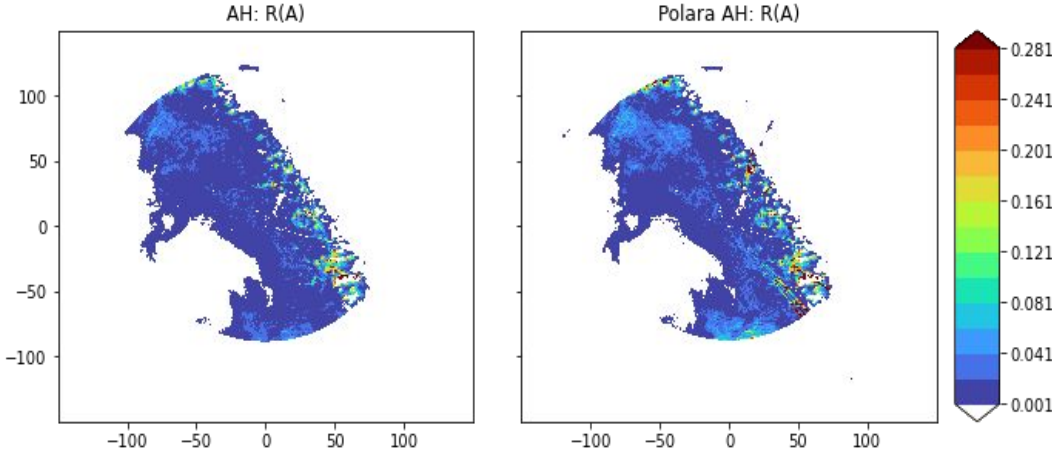
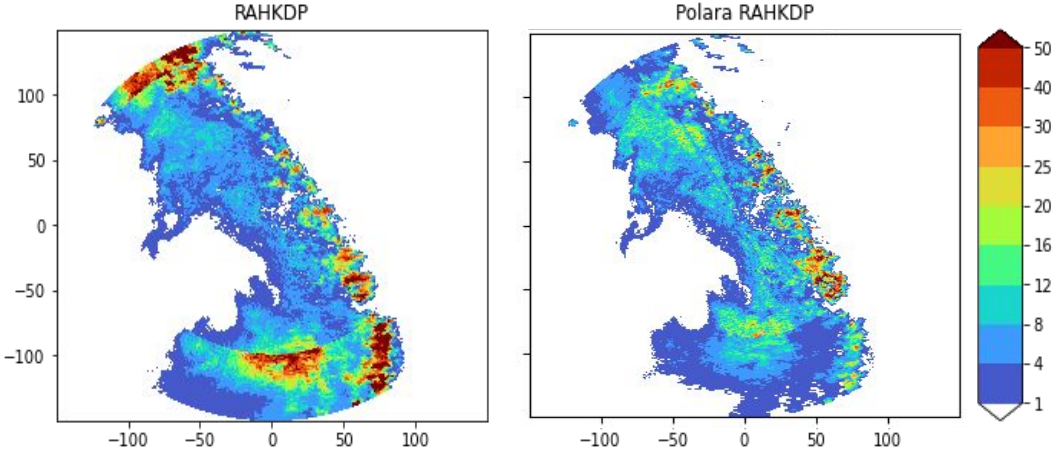


$$f\Delta\phi_{DP} = 10^{0.1 \cdot b \cdot PIA} - 1$$

$$A_{H/V}(r) = \frac{[Z_a(r)]^b}{0.46b \int_{r1}^{r2} [Z_a(s)]^b ds / f(\Delta\phi_{DP}) + 0.46b \int_r^{r2} [Z_a(s)]^b ds}$$



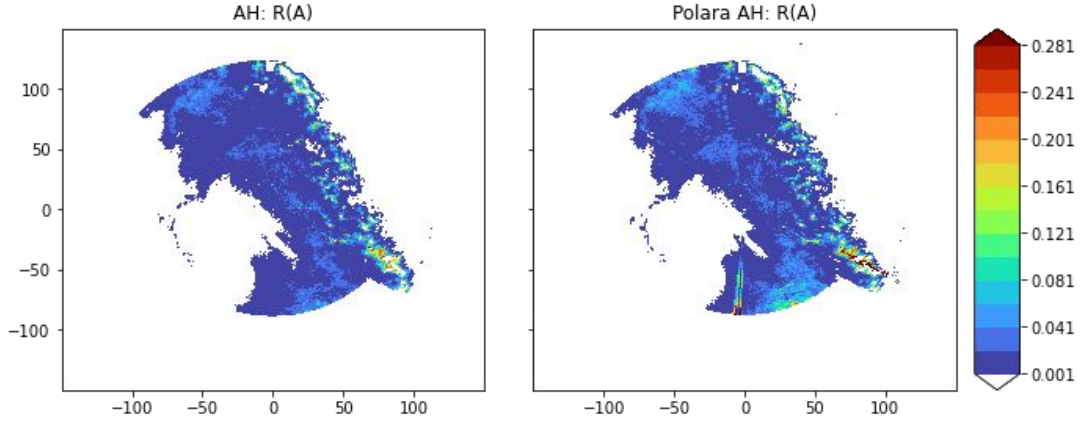
$$RKDP = 20.4 * KDP^{0.75}$$

$$R_{AH,KDP} = 307 * A_H{}^{0.92}$$

$$R_{AV,KDP} = 452 * A_V{}^{0.98}$$

$$R(Z) = 0.052 * Z^{0.57}$$

Time: 20170719 19:30
Radar: HNR
Melting layer: 2600 m



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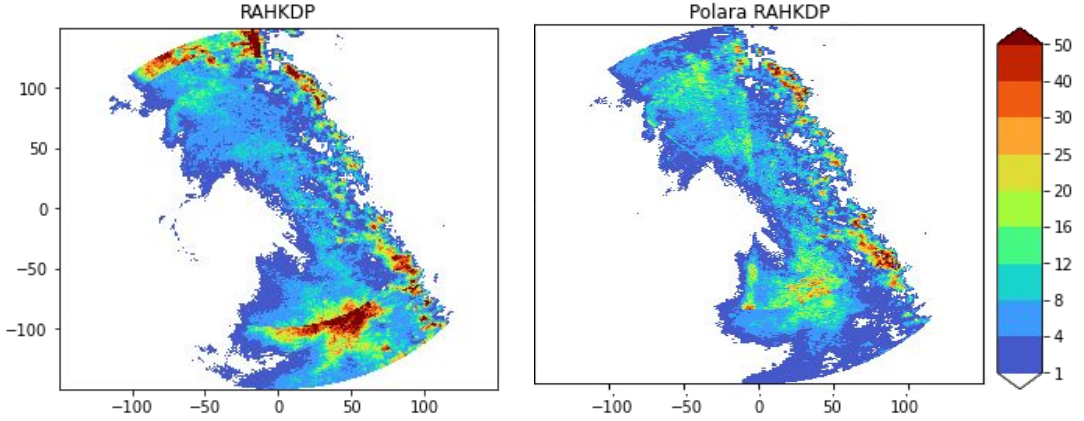

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$$R_{AH,KDP} = 307 * A_H{}^{0.92}$$

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$$R(Z) = 0.052 * Z^{0.57}$$

Future Work

- Need to improve Second trip echo problem in Polara.
- Complete QPE Alg. implementation.
- QPF implementation in POLARA.
- Deploy QPN Alg. into POLARA.
- Execute full QPE, QPF, QPN with 4 months data.
- Update Nowcasting Alg. with PredRNN.

Thank you for listening …