SMHI

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PPS Micro Wave Products and MW processing package for EPS-SG

NWC

The EUMETSAT Network of Satellite Application Facilities

NWC SAF

Support to Nowcasting and Very Short Range Forecasting

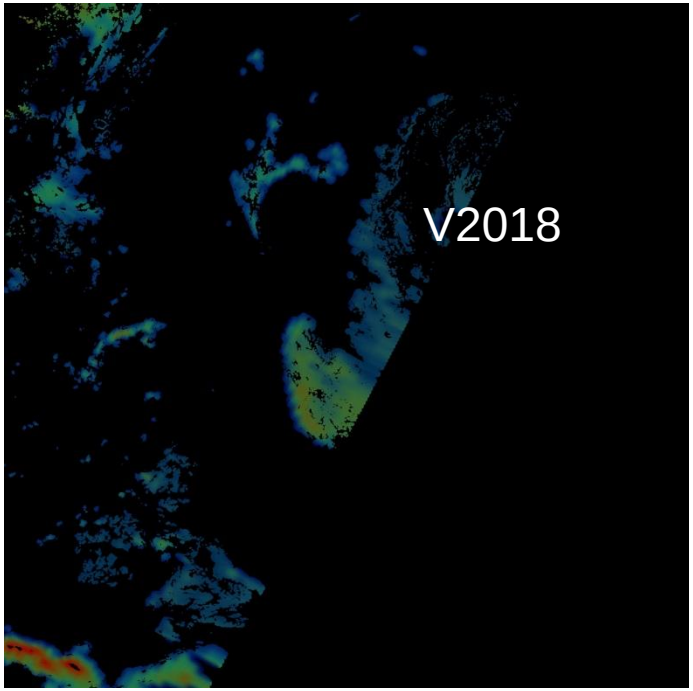
Overview

- PPS Precipitating clouds Product – to be discontinued
- New opportunities with EPS-SG–B MWI/ICI
- ICI Ice water path product
- New opportunities with MWS and AWS
- CDOP4: PPS MW processing package
  - Plans
  - Options
  - What do you need?

Precipitating clouds

- Probability of precipitation in intensity classes
- No scientific updates in CDOP3
- Uses MHS and AVHRR
- Few users and not a critical product for any operational production

- Will be removed in future versions of PPS



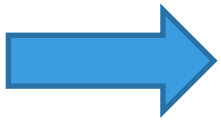
New opportunities with EPS-SG B

MWI:

- MW imager with 18 frequencies/ 26 channels
- 18.7 GHz – 183GHz
- Novel: 118GHz band
- For high frequencies (≥89GHz): 10km spatial resolution

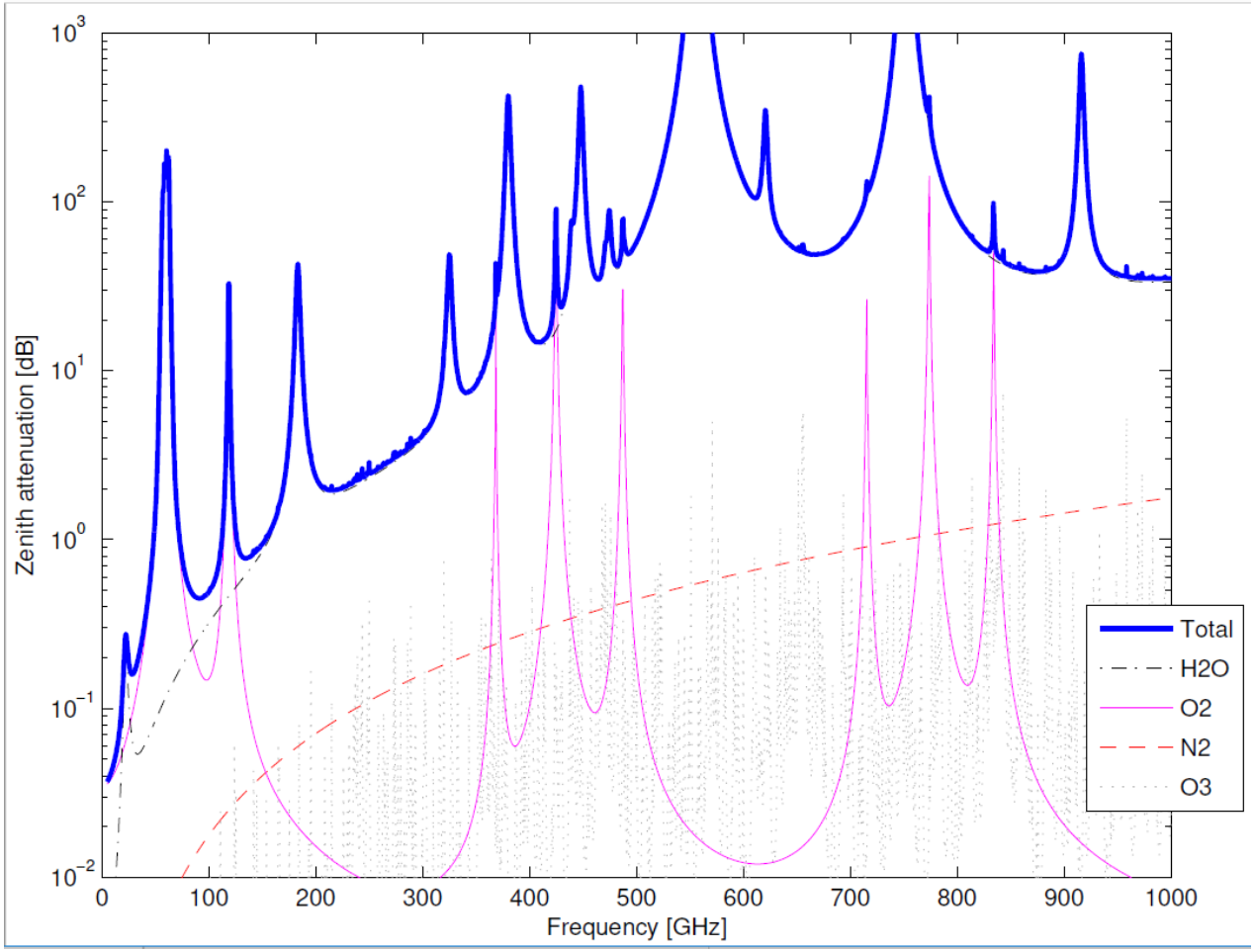
ICI:

- Novel sub-mm ice cloud imager
- 183GHz – 664GHz, 11 frequencies, 13 channels
- 3 WV sounding bands
- 2 ”window” channels (opaque to ground in most conditions)
- 16km spatial resolution



Precipitation
IWP
LWP

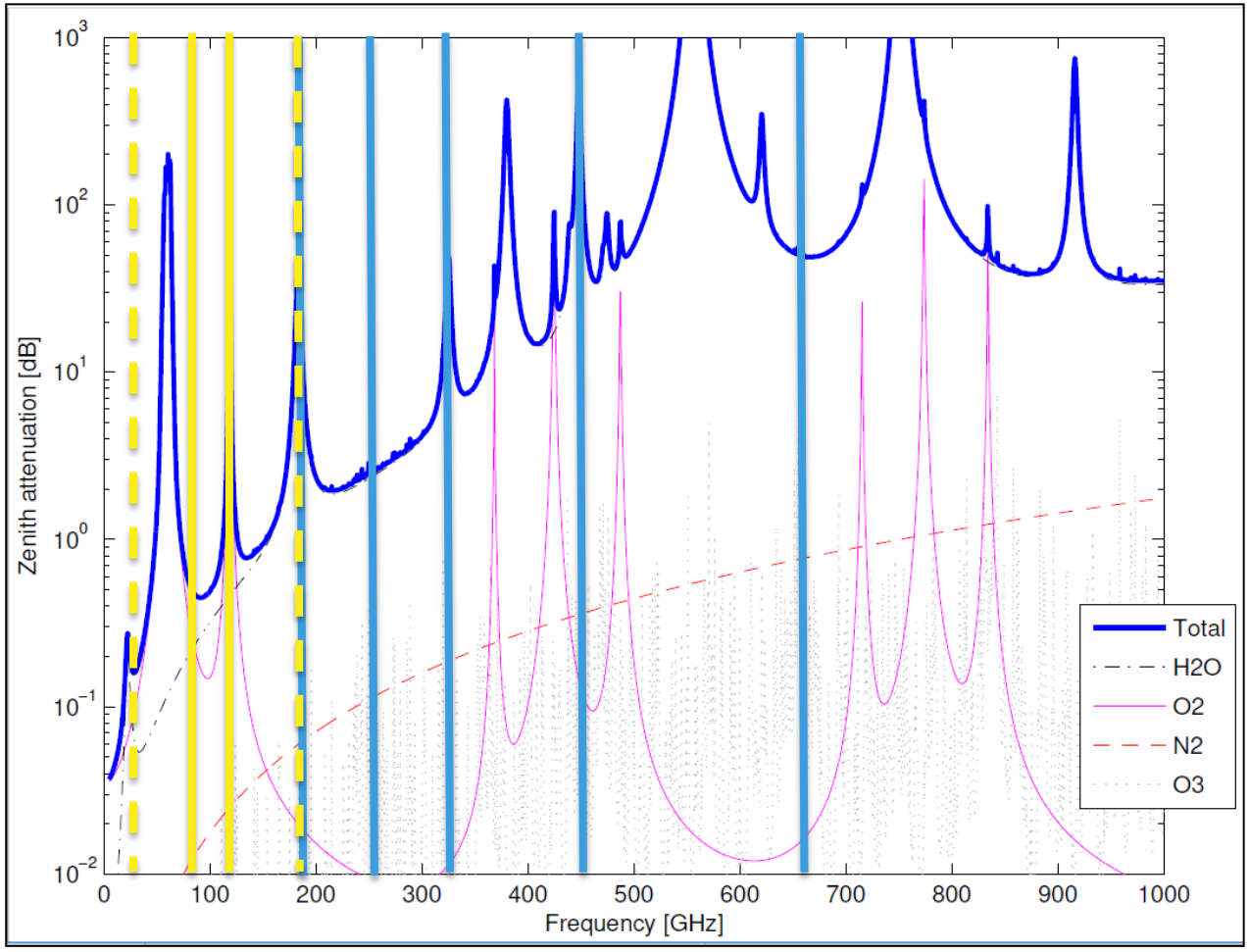
…and with time more?



Zenith attenuation [dB] calculated for
mid latitude winter atmosphere using ARTS
Courtesy P. Eriksson

ICI instrument characteristics

Channel	Frequency [GHz]	NEΔT [K]	Bias [K]	Polarization	Footprint Size at 3 dB [km]
ICI-1	183.31 ± 7.0	0.8	1.0	V	16
ICI-2	183.31 ± 3.4	0.8	1.0	V	16
ICI-3	183.31 ± 2.0	0.8	1.0	V	16
ICI-4	243.2 ± 2.5	0.7	1.5	V, H	16
ICI-5	325.15 ± 9.5	1.2	1.5	V	16
ICI-6	325.15 ± 3.5	1.3	1.5	V	16
ICI-7	325.15 ± 1.5	1.5	1.5	V	16
ICI-8	448.0 ± 7.2	1.4	1.5	V	16
ICI-9	448.0 ± 3.0	1.6	1.5	V	16
ICI-10	448.0 ± 1.4	2.0	1.5	V	16
ICI-11	664.0 ± 4.2	1.6	1.5	V, H	16



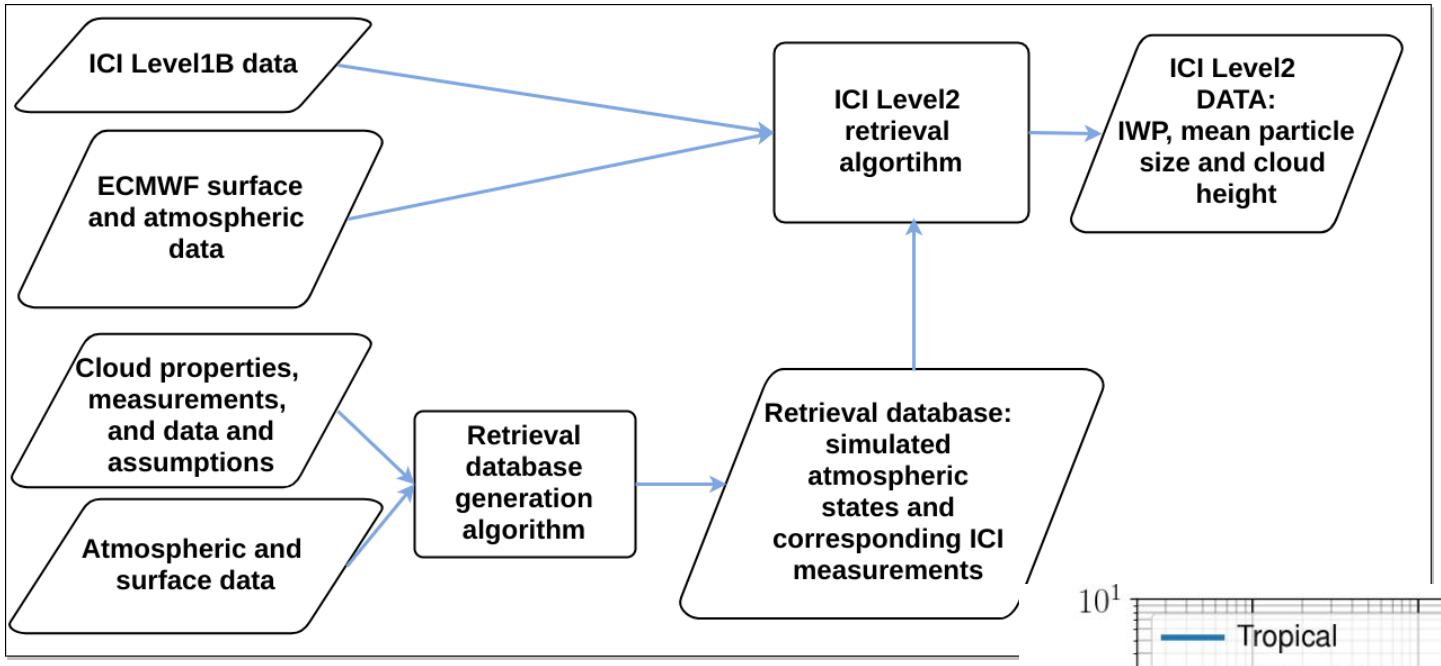
Zenith attenuation [dB] calculated for mid latitude winter atmosphere using ARTS
Courtesy P. Eriksson

Approximate location ICI channels

Approx. location selected MWI hannels

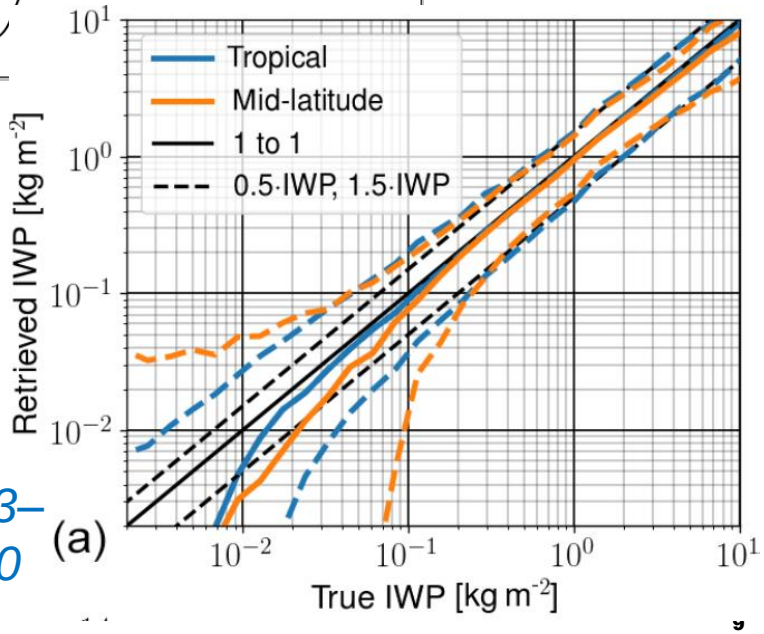
ICI ice water path product

- Developed in CDOP3 within NWCSAF
- Work carried out by Patrick Eriksson, Chalmers University of Technology and Bengt Rydberg, MolFlow
- Product will be run at EUMETSAT central facilities as day-1 product
- Output IWP and additional parameters
- NWCSAF will validate product but further work towards day2 is planned be done within a NWCSAF MW software package
- Retrieval relies on a state of the art retrieval database utelizing Cloudsat data for more realistic cloud ice input, RTM with ARTS
- Completely new sensor and many open science questions!

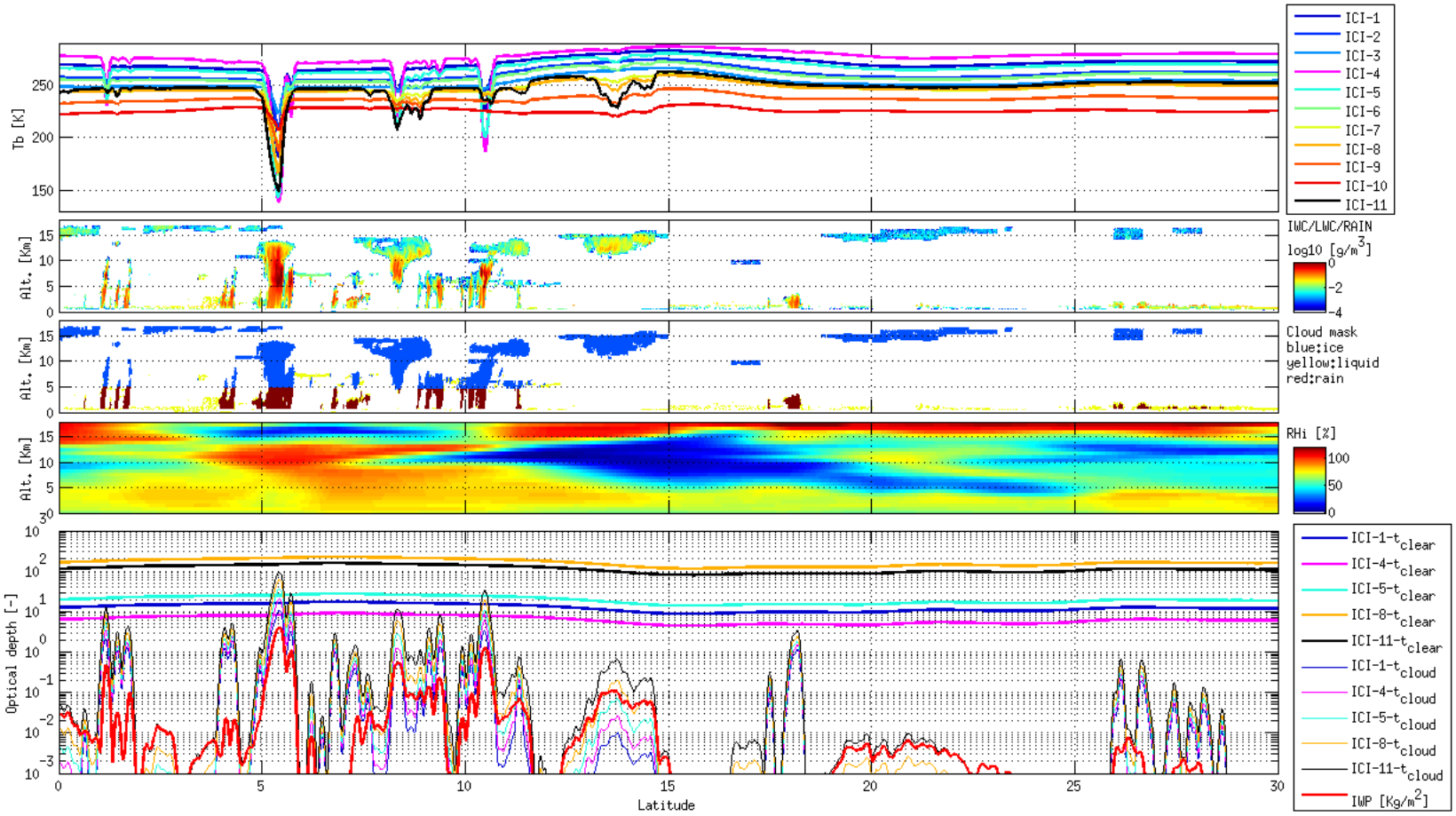


Schematic retrieval for ICI IWP

Estimated retrieval accuracy



Eriksson et al. 2020, Atmos. Meas. Tech., 13, 53–71, 2020 https://doi.org/10.5194/amt-13-53-2020



Example of simulated ICI scene (tropical conditions)

New opportunities with MW sounders?

MWS onboard EPS-SG A:

- MW sounder with 24 frequencies/channels
- 23.8 GHz – 183GHz
- For high frequencies (≥89GHz): 17km spatial resolution at nadir

AWS = Arctic Weather Satellite:

- Prototype for a small MW sounder, launch 2024 (TBC)
- 89GHz, ca 166GHz, 183GHz and two additional bands (TBD)
- Option also for sub-mm bands at 5km nadir resolution

- If prototype successful, we might have a fleet of ”AWS” available in the future for nowcasting and NWP ensuring MW observations at 1h intervals or less!

CDOP4 MW Processing Package: Plans

- Planned for EPS-SG-B satellite as early day 2 release
- Will interface to level 1 data (processed direct readout and EUETSAT distibuted level 1
- Precipitation and LWP (over sea) primarily from MWI
- NN aproach/approaches trained with GPM data (GMI/DPR) and Nordic radar data
- Scientific collaboration with Chalmers and HSAF?
- IWP from ICI based on previous work, synergistic retrieval only later
- **Processing package needed to fulfill NWC timeliness requirements!**

CDOP4 MW Processing Package: Options

- Including sounding data for precipitation retrieval from more satellites?
  - MWS (EPS-SG-A)
  - ATMS (JPSS, NOAA20) (89GHz not adequate resolution)
  - MWHS-2 (FY-3 series) (only 183GHz adequate resolution)
  - AWS (operation only planned for 1 year 2024/2025 but potentially high resolution sub-mm channels and follow upp satellites)

Any questions, wishes, requirements, ideas?
Please let us now!