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RÉPUBLIQUE FRANÇAISE
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The use of Pyrad for data quality monitoring
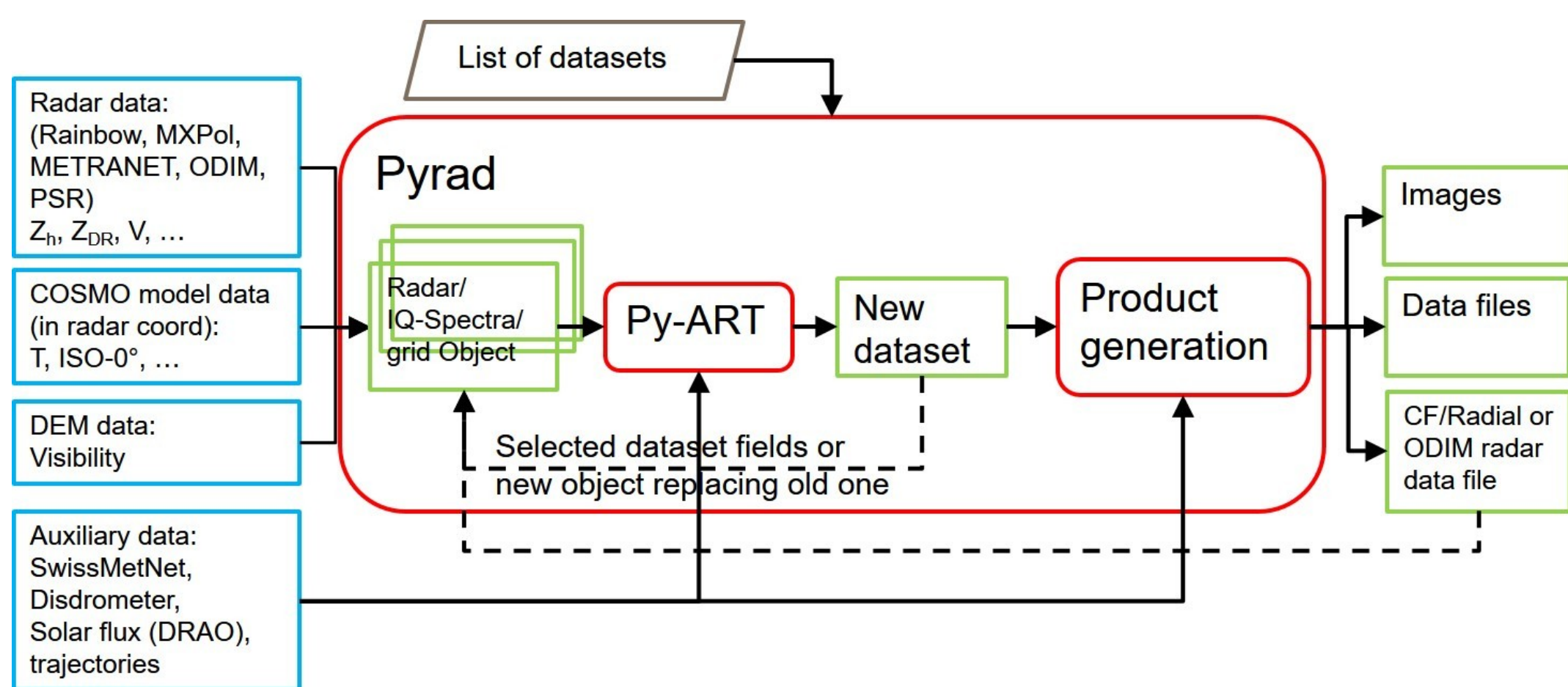
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What is Pyrad?

• Open source, python-based weather radar data processing framework

• Originally developed by MeteoSwiss. Currently co-developed by MeteoSwiss and Météo-France

• Processing and visualizing from IQ to gridded (radar) data products

• Capable of operating in real-time or off-line

• Core based on an extended version of ARM-DOE Py-ART

• Ingest all most common radar data file formats

Architecture

Usage

• As a library with a collection of useful algorithms. Online documentation:

• https://pyart-mch.readthedocs.io/en/latest/

• https://pyrad-mch.readthedocs.io/en/latest/

• As a full fledge processing framework:

• Data flow controled by 3 simple configuration files. Examples of config files:

• https://github.com/MeteoSwiss/pyrad-examples

• Installation:

• From source code:

• https://github.com/MeteoSwiss/pyrad

• PYPI packages at:

• https://pypi.org/project/pyart-mch/

• https://pypi.org/project/pyrad-mch/

• In a conda environment from conda-forge:

• https://anaconda.org/conda-forge/pyart_mch

• https://anaconda.org/conda-forge/pyrad_mch

## Monitoring capabilities

Variable	Algorithms
Zh	• Ground clutter monitoring • 2 self-consistency algorithms • Radar inter-comparison • Bias correction
ZDR	• ZDR in moderate rain • ZDR in snow • Birdbath scan • Bias correction
RhoHV	• RhoHV in rain
PhiDP0	• PhiDP0 estimation
RX bias RX imbalance Antenna pointing Antenna beamwidth	• Sun check • Sun scan
Comparison with other sensors	• Point of Interest • Region of Interest • Data over a trajectory • Quasi-vertical profiles • Temporal statistics

Example 1: Temporal and spatial variability of noise
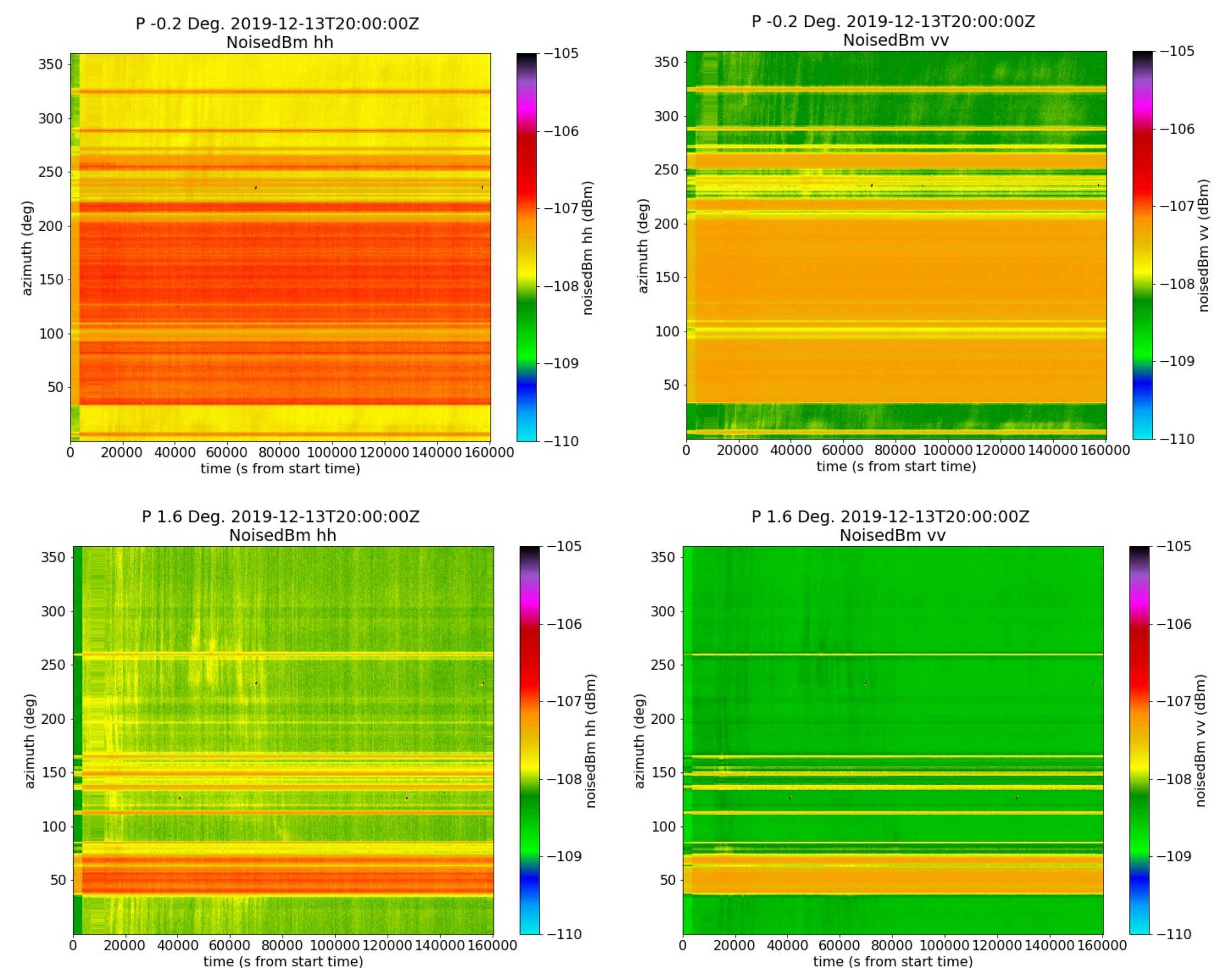
Example 2: Self-consistency

Gourley 2009

Ryzhkov 2005
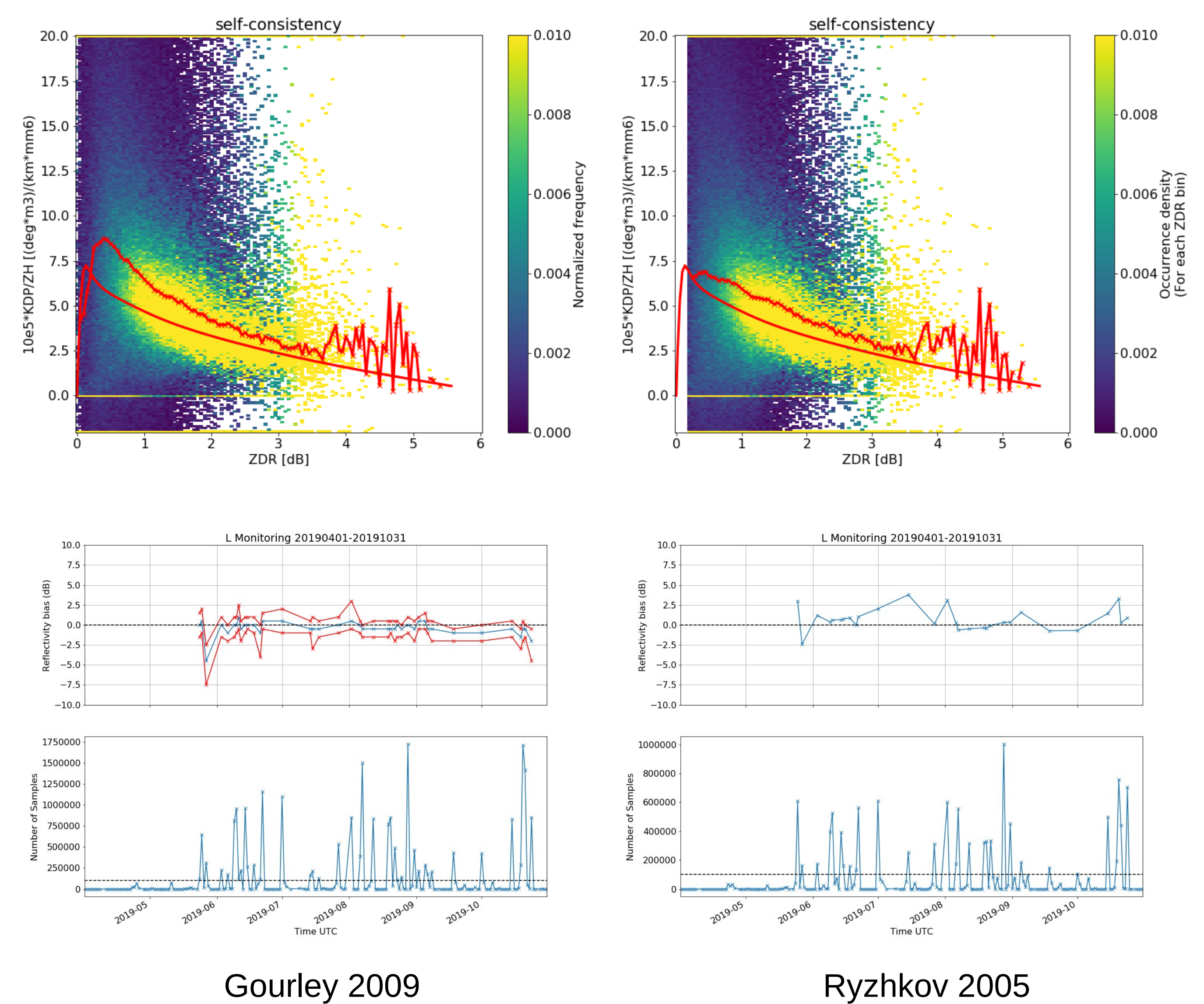
Conclusion and future work

• Pyrad at a mature stage and can be used for most weather radar data processing tasks

• Used operationally at MeteoSwiss for operational (polarimetric) data quality monitoring and for data processing of mobile X-band radar

• Ease of installation and use thanks to conda packages, online documentation and config file examples

• Constant bug correction and performance improvement, inclusion of new algorithms

• Improvement of user support: better documentation, more config files examples