ENNORSY *Neural Network Ozone Retrieval System*

First Result on Ozone Profile Retrieval From GOME-2 and IASI

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Outline

- What do we not need
- What do we need
- Collocation GOME-2 and IASI
- NNORSY-GOME-2 ozone profile retrieval
- First results on NNORSY-GOME-2/IASI

Not Needed for NNORSY

Compared to classical retrievals schemes based on Optimal Estimation

- No a-priori profiles
- No forward model
- No spectroscopic database
- No high performance computers for real-time application

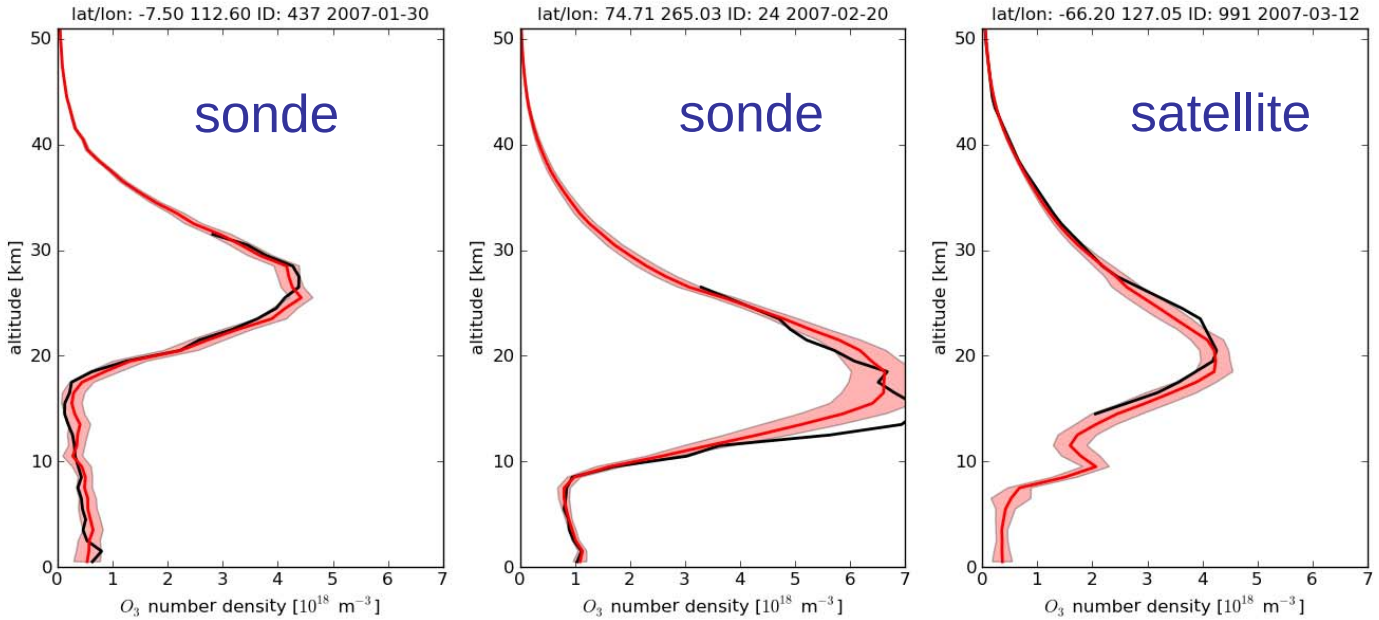
Needed for NNORSY

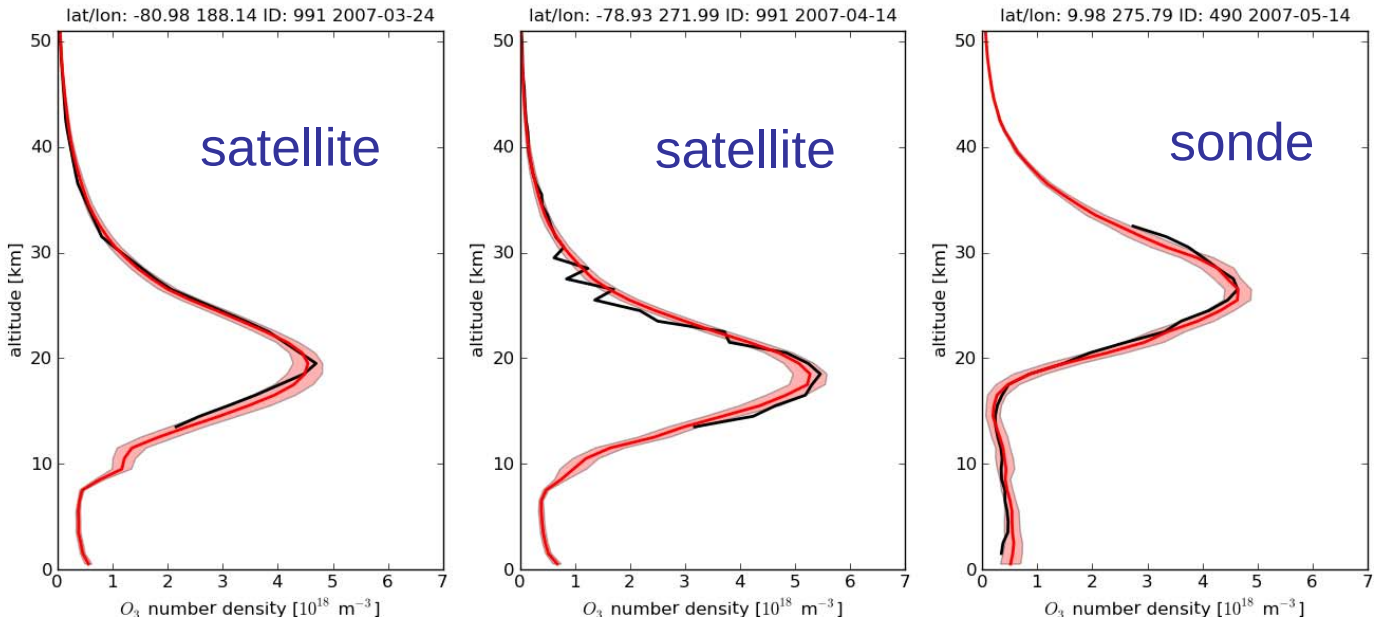
- **A representative training database**
- **A good neural network training algorithm**

Neural network input:

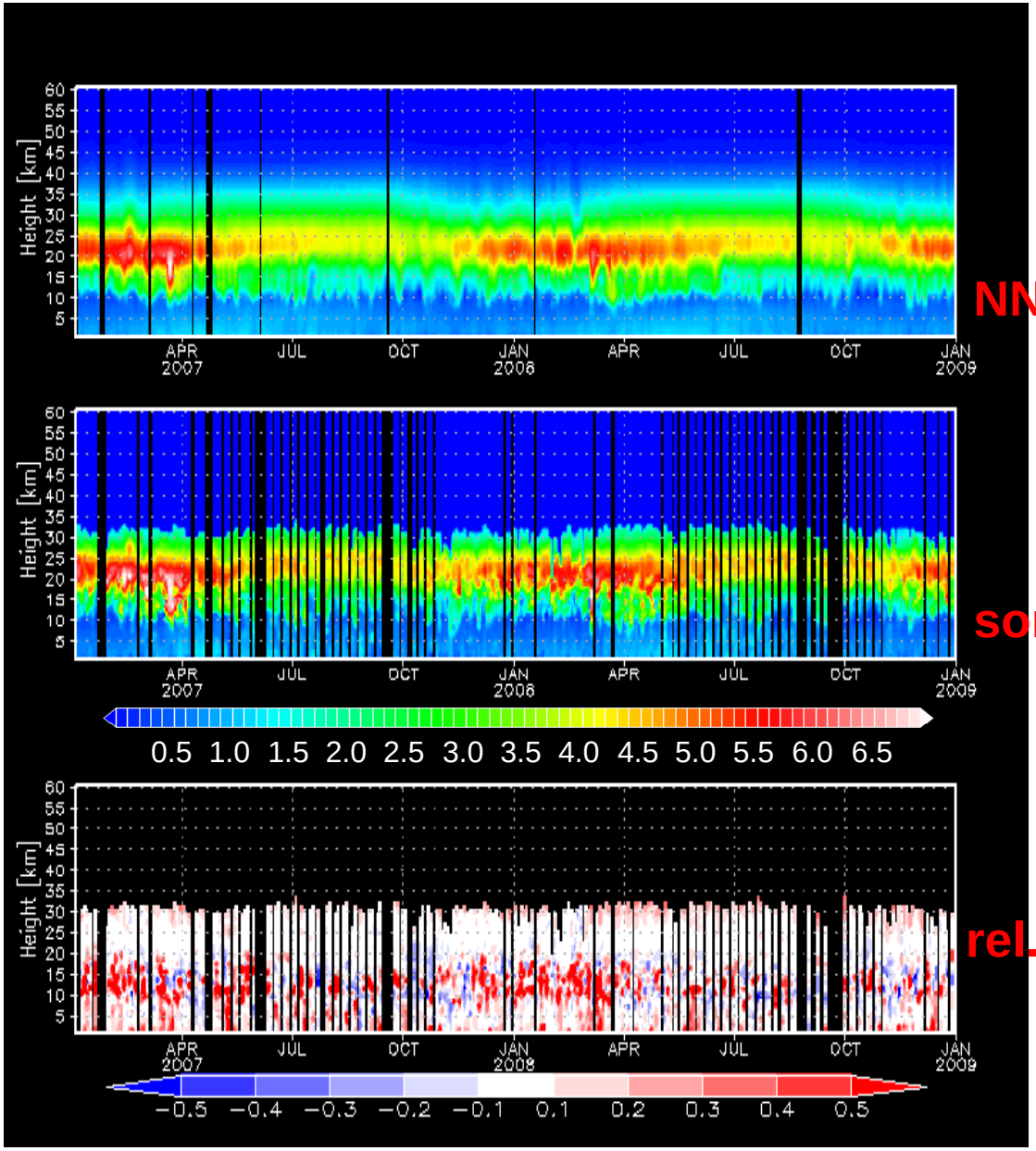
- selected parts of GOME-2 spectra
- selected parts of IASI spectra
- space-time info
- observation geometry
- *Temperature profiles data helps*

Some Results on NNORSY-GOME-2





NNORSY-GOME-2 Profile Comparison with Ozone Sonde Station



NNORSY

sonde

rel. comparison

HOHENPEISSENBERG
(mid latitudes)

GOME-2/IASI Collocation

- GOME-2 footprints are base grid for retrieval
- Collocation in cooperation with NWP-SAF (Nigel)
- Collocation of AVHRR with GOME-2 pixels for cloud mask

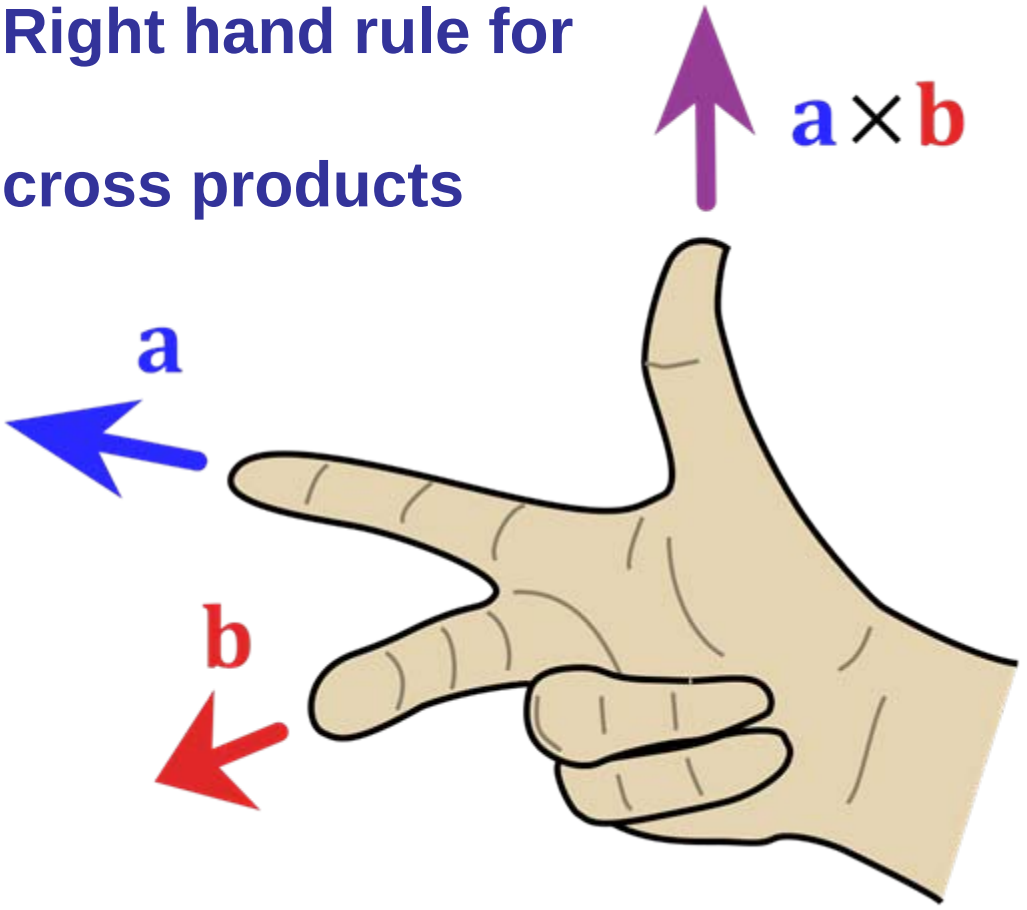
Scan characteristics

	pixels / scan line	scan time [sec]	time / pixel [sec]	forward scan viewing time [sec]
IASI	30x4	8	0.216	6.48
GOME-2	24	6	0.1875	4.5

Approach for GOME-2/IASI Collocation

Right hand rule for

cross products



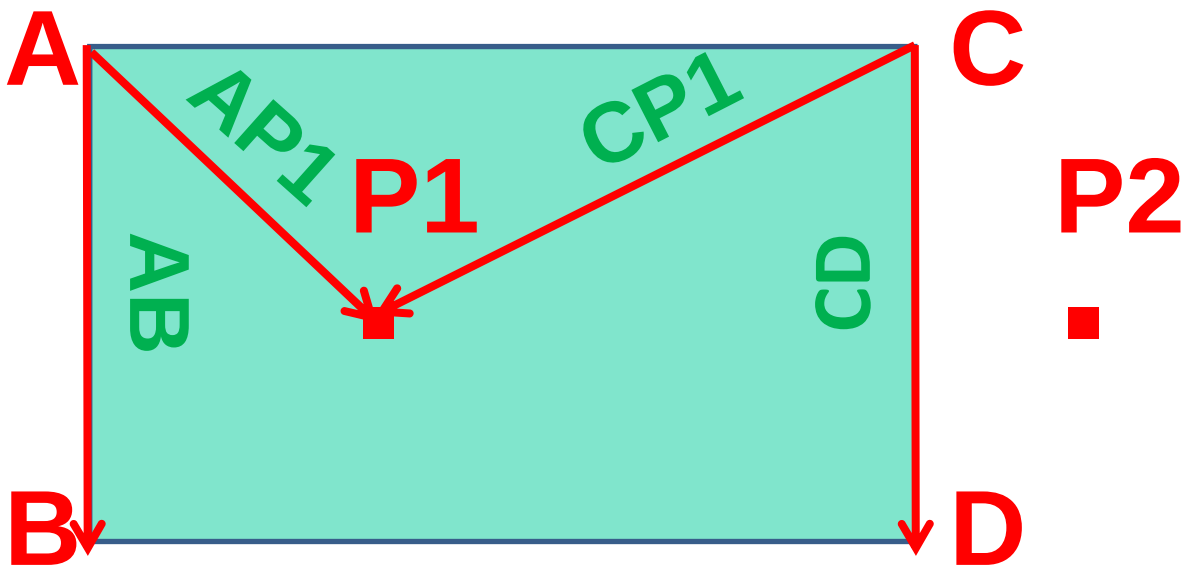
→3 steps
for
collocation

GOME-2/IASI Collocation: Step 1

Cross product AP1 x AB

Cross product CP1 x CD

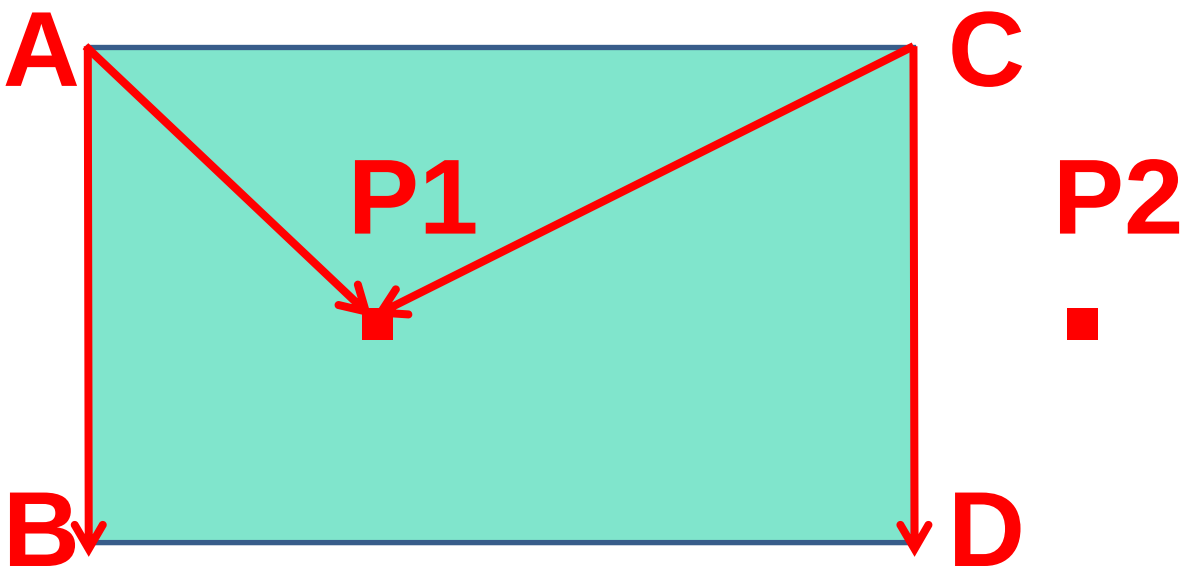
→ 2 resulting vectors orthogonal on pixel plain



GOME-2/IASI Collocation: Step 2

Scalar product of resulting vectors

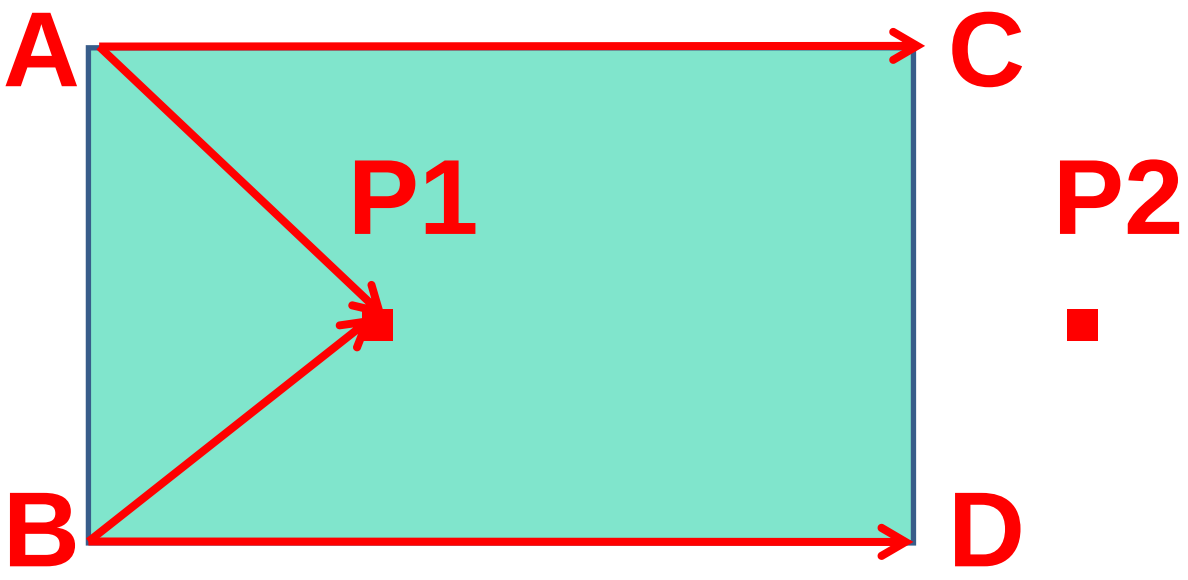
If parallel > 0 → **point is outside lines (e.g. P2)**
If antiparalle < 0 → **point is between lines (e.g. P1)**



GOME-2/IASI Collocation: Step 3

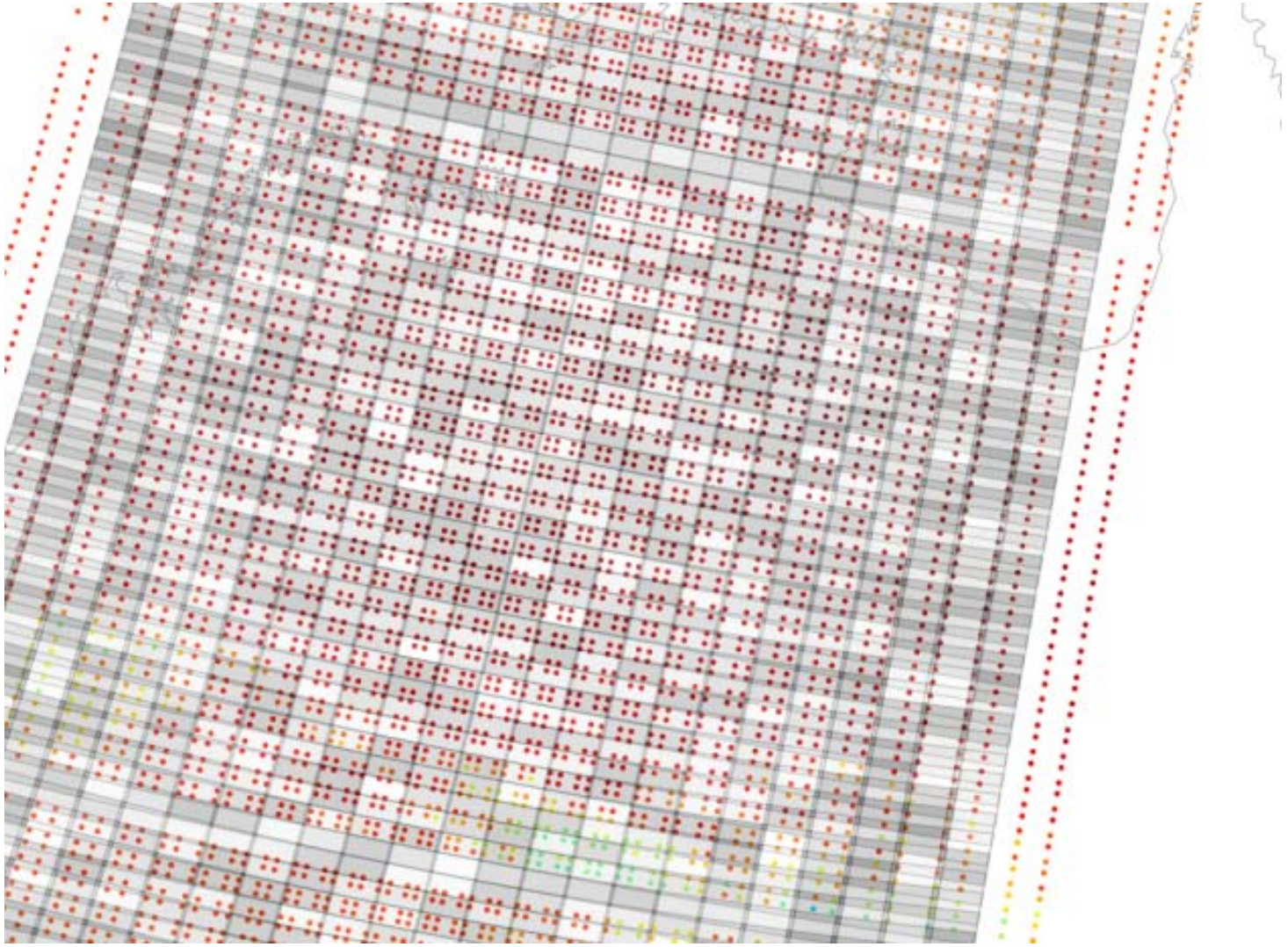
Same procedure for vertical line pair

P2 is outside the first line pair, further investigation is therefore not necessary

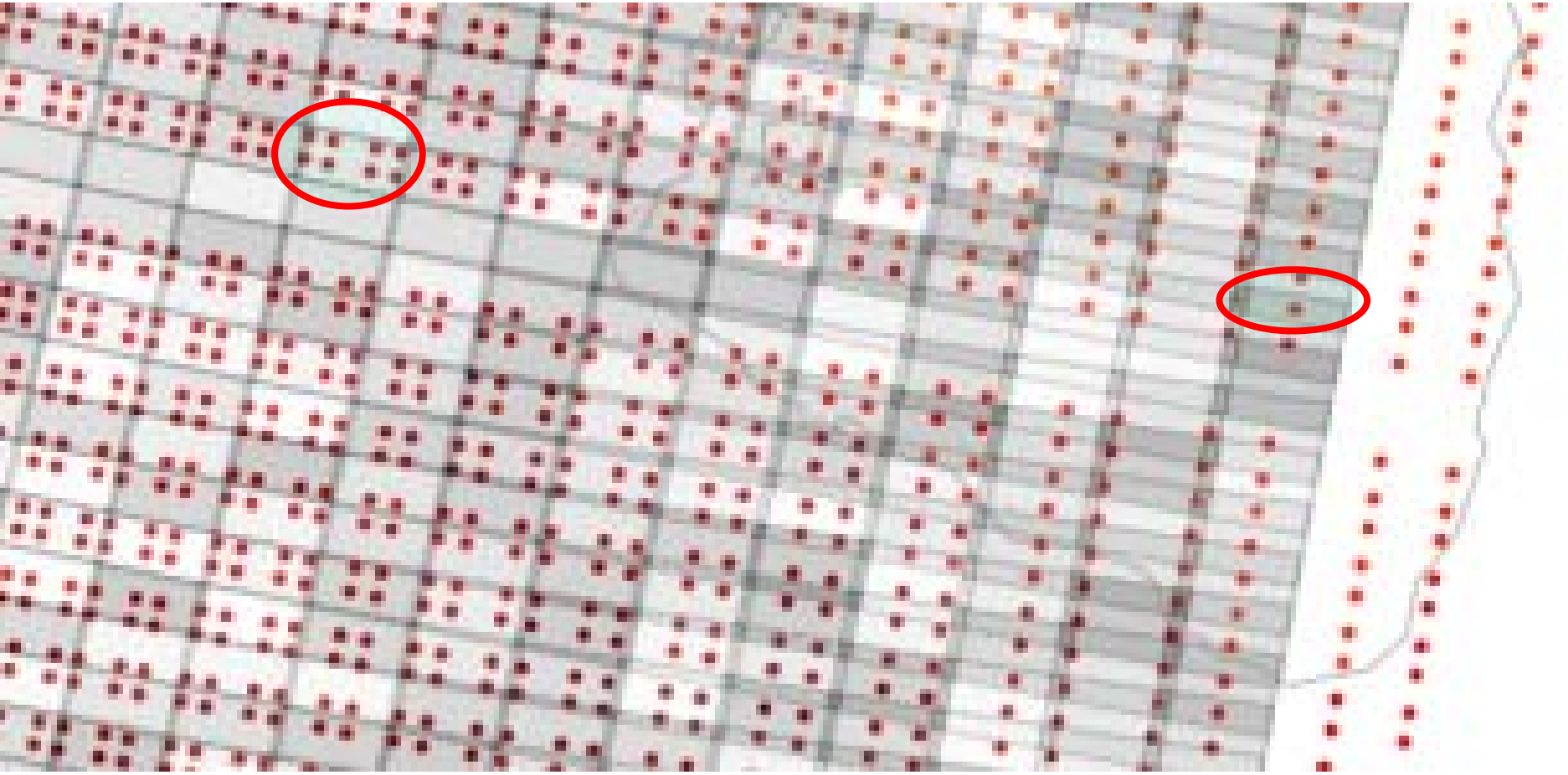


Collocation is 5x faster than file reading (updated EUMETSAT readers)

Testorbit GOME-2/IASI Collocation

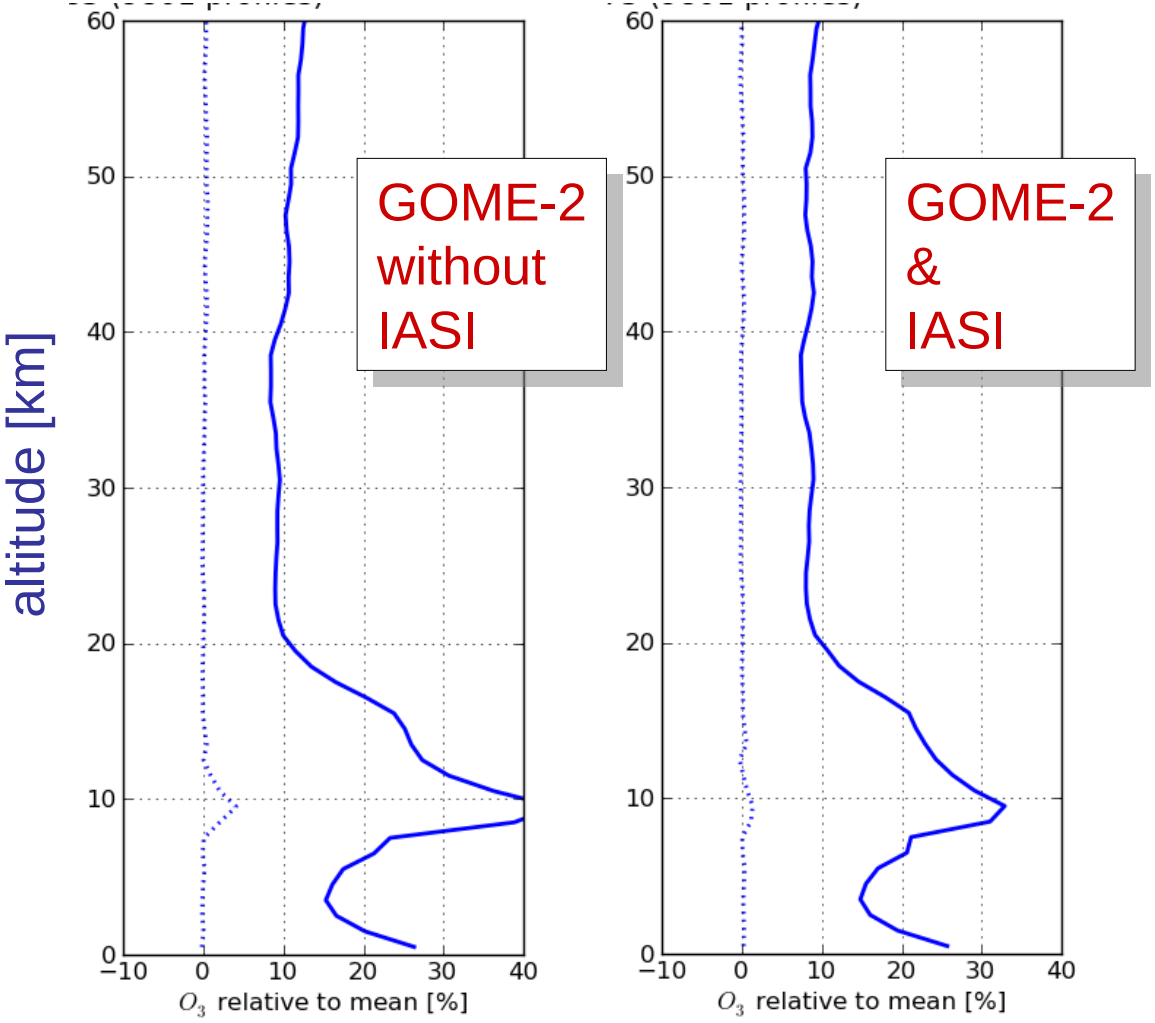


Testorbit GOME-2/IASI Collocation (magnified)



GOME-2/AVHRR collocation almost finished

First Results on Combined Retrieval



relative bias and stddev

- Plots show relative errors on test data set
- No ECMWF temperatures were used here
- IASI improves retrieval mainly below ozone peak
- Probably obviates need for temperature profiles from NWP analyses

Conclusion

- NNORSY-GOME-2 ozone profile retrieval available
- New fast collocation scheme for GOME-2/IASI
- Collocation GOME-2 with AVHRR for cloud mask
- Combined one-step NNORSY-GOME-2/IASI retrieval improves ozone profile quality
- Easily adaptable for real-time application