GAIA-CLIM General Assembly

WP3, Task 3.2 and STAT4COLL

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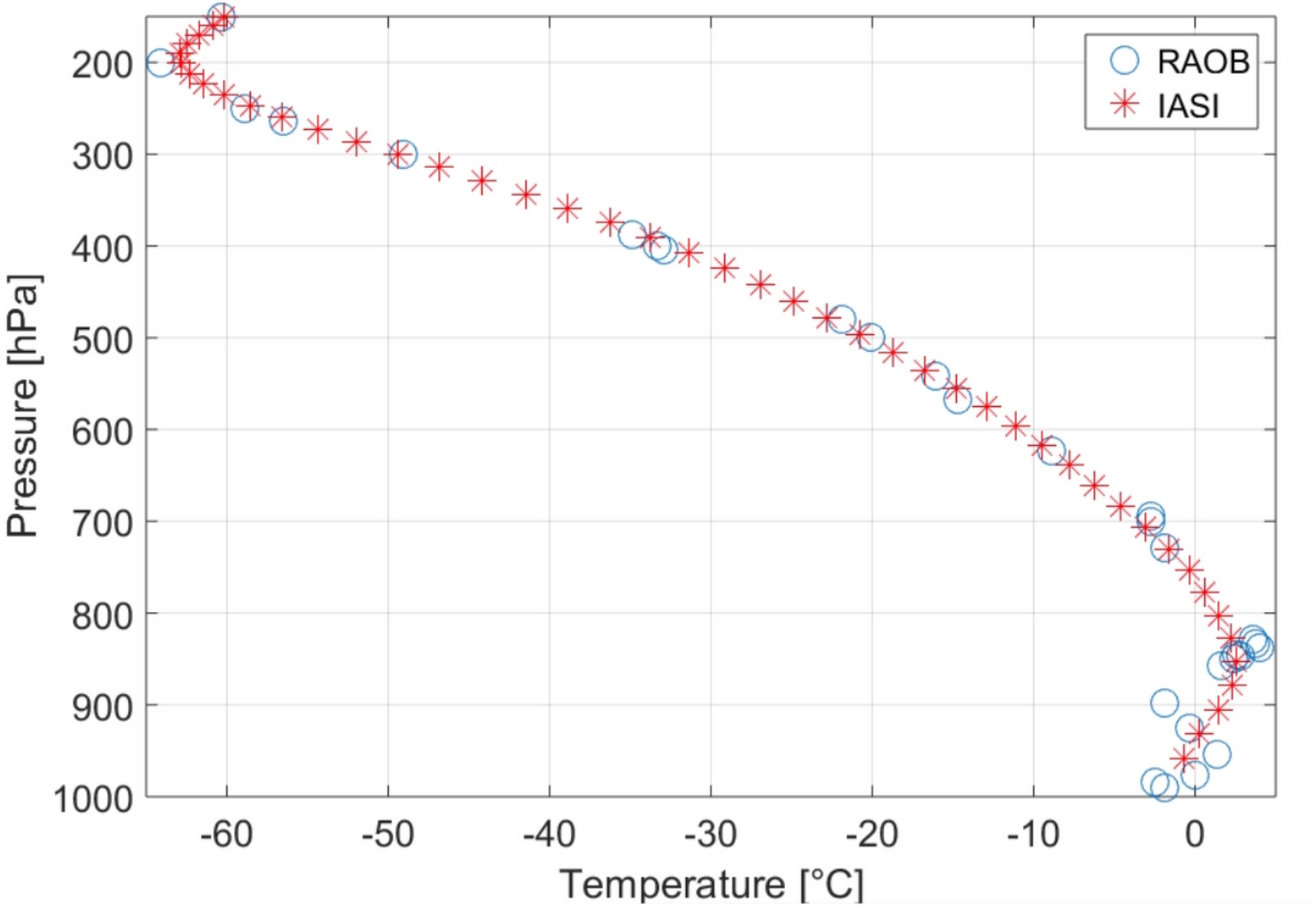
Temperature and humidity profiles: RAOB-IASI comparison

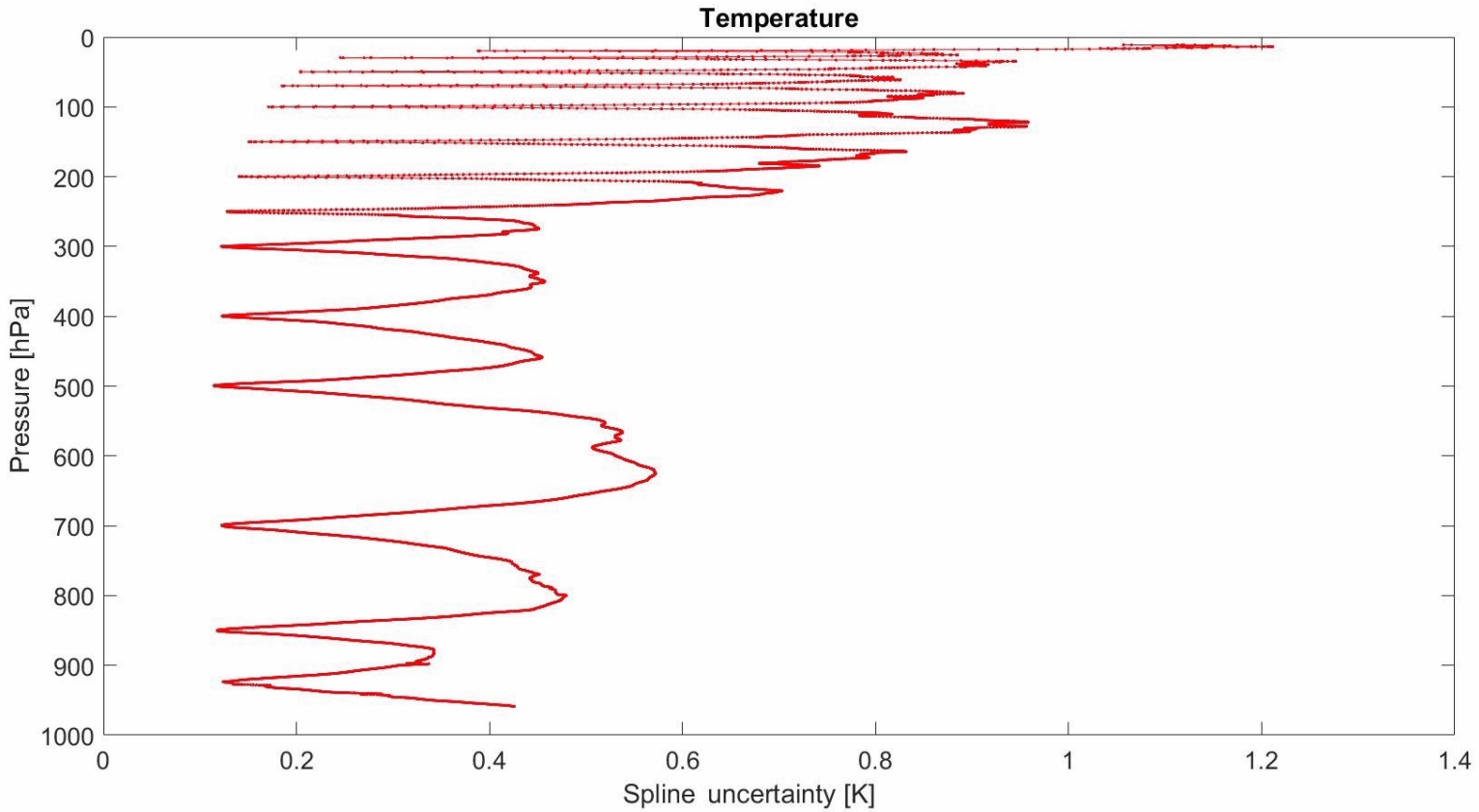
- We aim at describing the difference between co-located RAOB-IASI profiles
- Differences are due to
  - Random errors
  - IASI smoothness
  - Spatio-temporal mismatch
- The comparison is complicated by the data form
  - IASI data are provided at fixed pressure levels
  - ROAB levels change across launches
  - We use splines (continuous functions) instead of binning
  - Spline uncertainty?

Why splines?

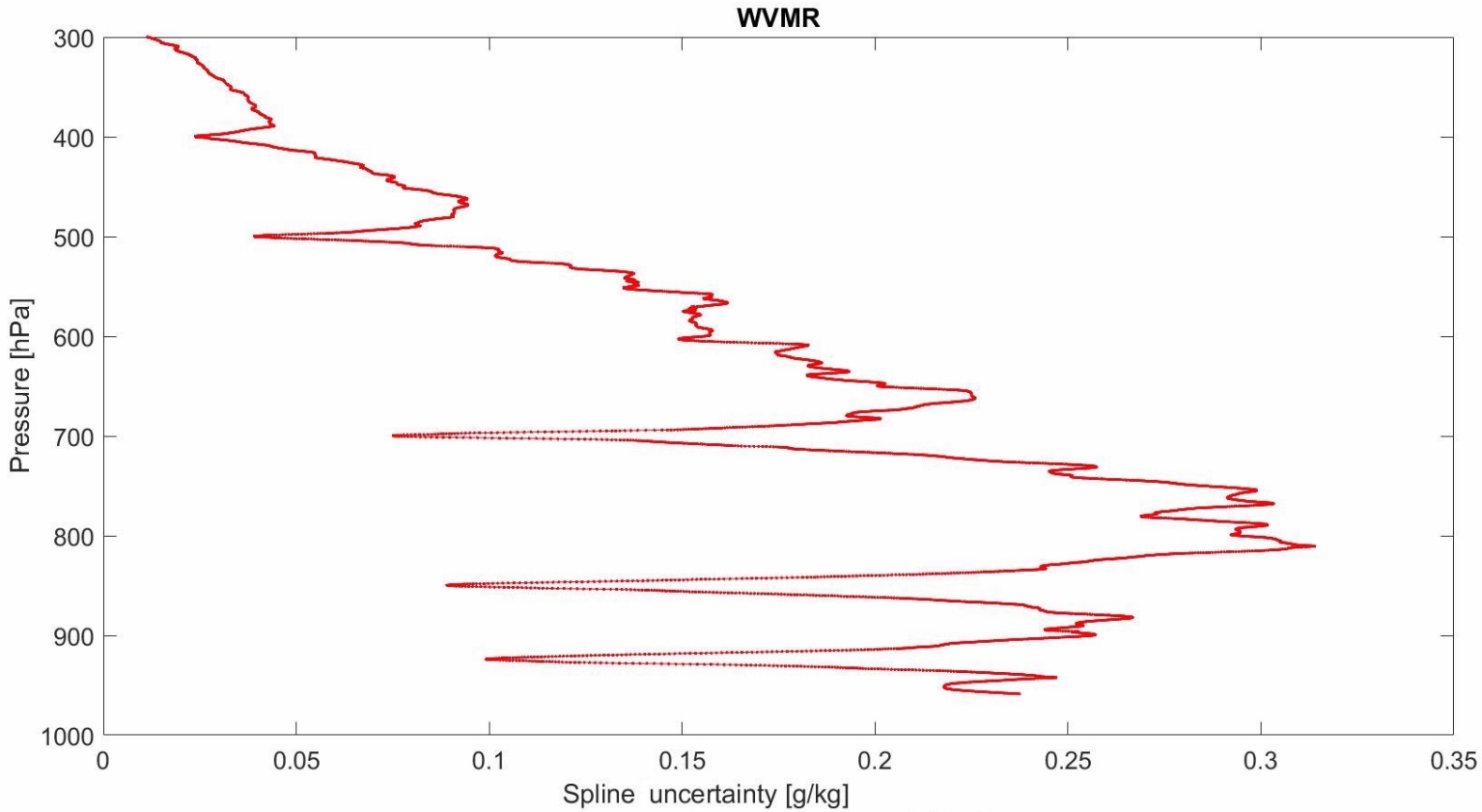

RAOB
IASI
Pressure [hPa]
200
300
400
500
600
700
800
900
1000
-60
-50
-40
-30
-20
-10
0
Temperature [°C]

Spline uncertainty - Temperature

- Spline uncertainty on RAOB is assessed using GRUAN data



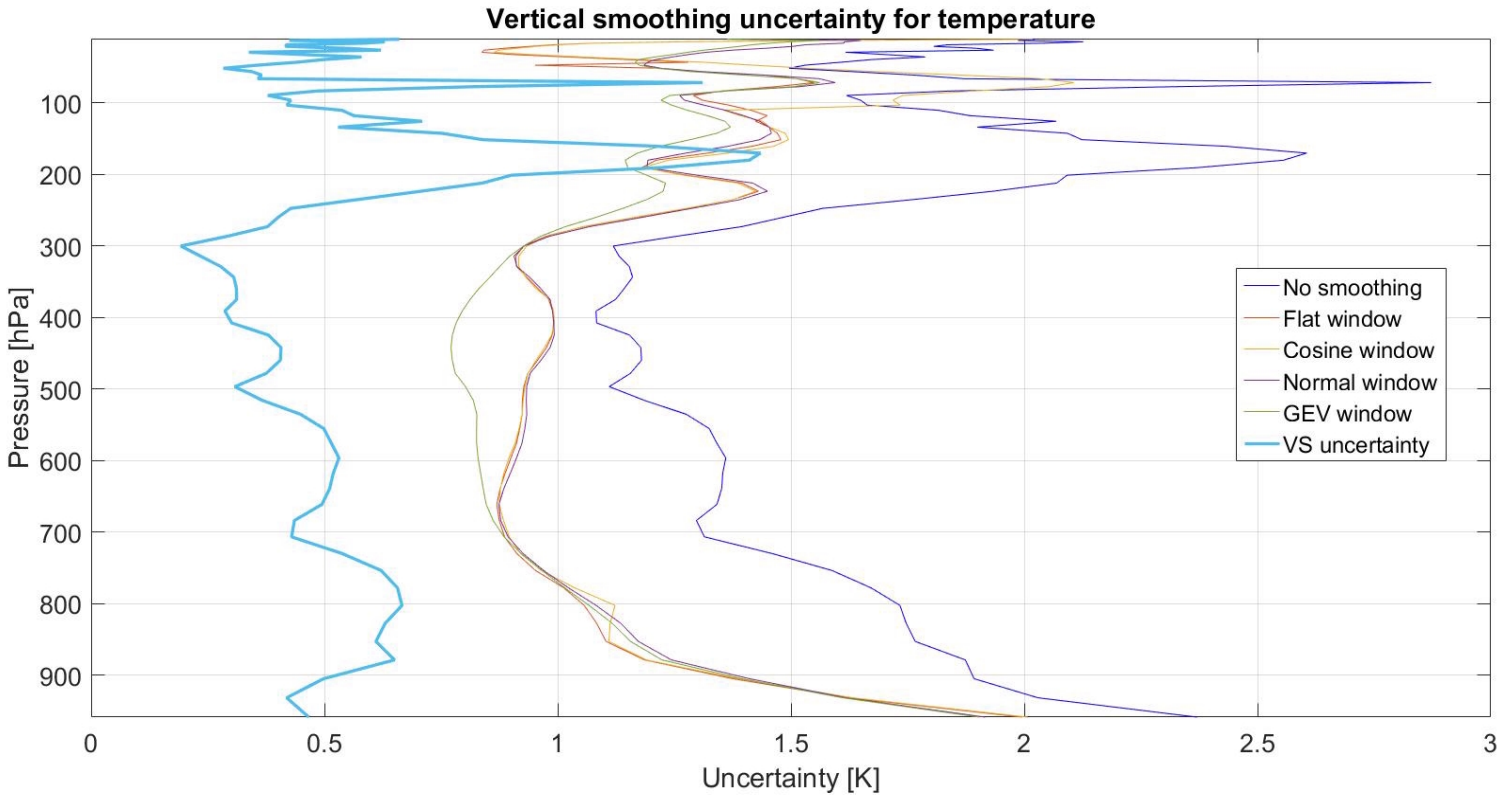
Spline uncertainty - WVMR



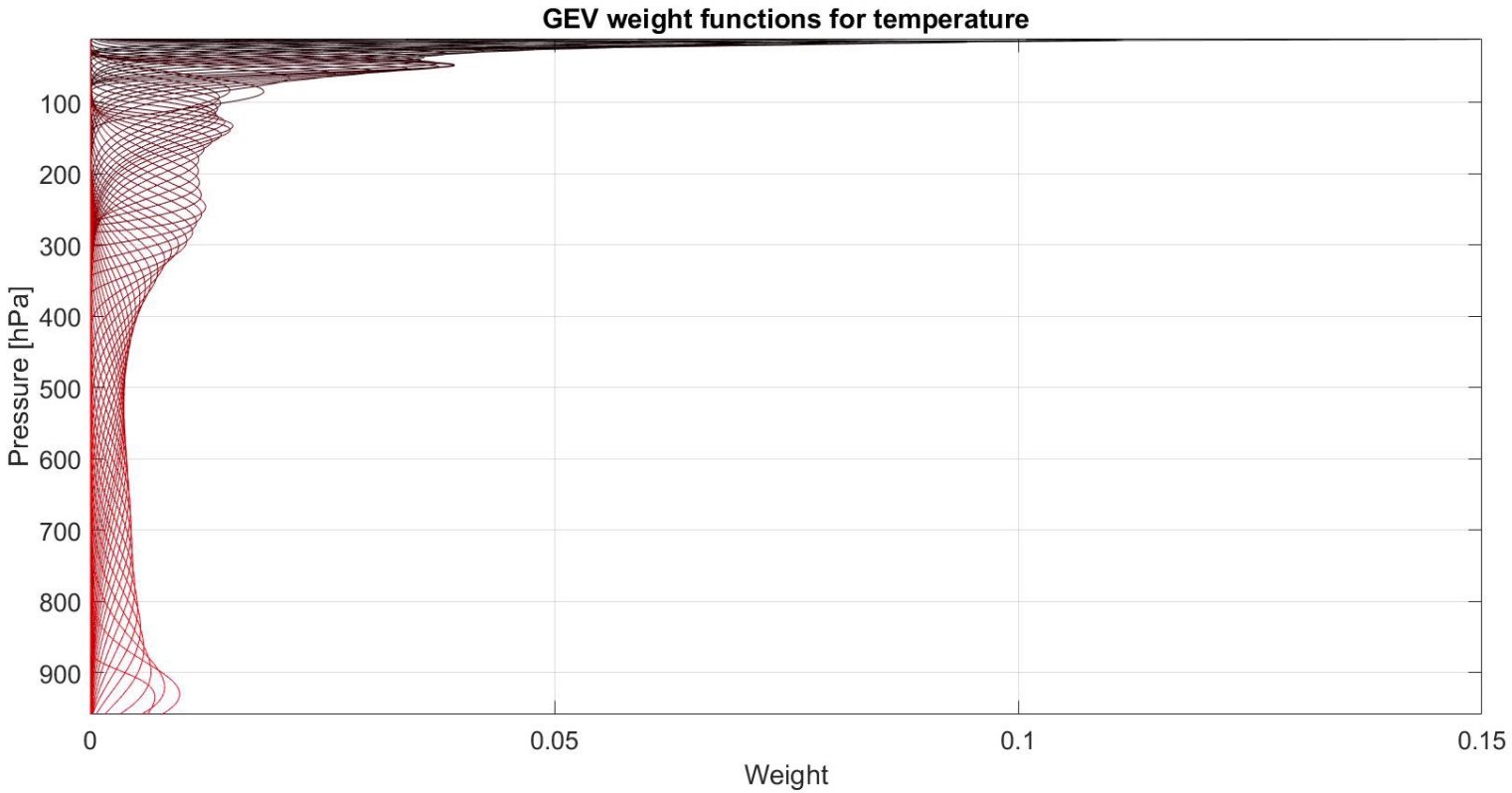
IASI smoothness

- The uncertainty component due to IASI smoothness is assessed by data harmonisation
- RAOB data are harmonised to be comparable with IASI data
- In pratice, RAOB data are smoothed using weight functions that mimic averaging kernels (AKs)
- NPROVS dataset does not include AKs
- AKs may not be the best weight functions when there is a space-time mismatch

Temperature data harmonisation



Weight functions



Spatio-temporal mismatch

- Harmonised data are subsequently analysed to assess the impact of the space-time mismatch between RAOB and IASI profiles on uncertainty
- Uncertainty is expected to increase when the spatial and/or temporal mismatch increases
- We adopt an isotonic regression approach
- Regression covariates are temporal mismatch and air distance
- A regression model is provided for each IASI pressure level and for day/night

Spatio-temporal mismatch - Regression model