



Historic European non-CO₂ atmospheric greenhouse gas records: Harmonization and uncertainty assessment

S. Hammer, M. Lopez, M. Galkowski, D. Martin, T. Aalto, F. Apadula, P. Bergamaschi, Z. Barcza, H. Chen, E. J. Dlugokencky*, G. Forster, L. Hazan, L. Haszpra, J. Helle, O. Hermansen, C.C. Hoerger, J. Lavric, D. Lowry, G. Manca, A.C. Manning, F. Meinhardt, J. Moncrieff, J. Necki, S. O'Doherty, N. Paramonova, S. Piacentino, M. Ramonet, M. Schmidt, M. Steinbacher, A.T. Vermeulen and I. Levin

InGOS NA2 participants,

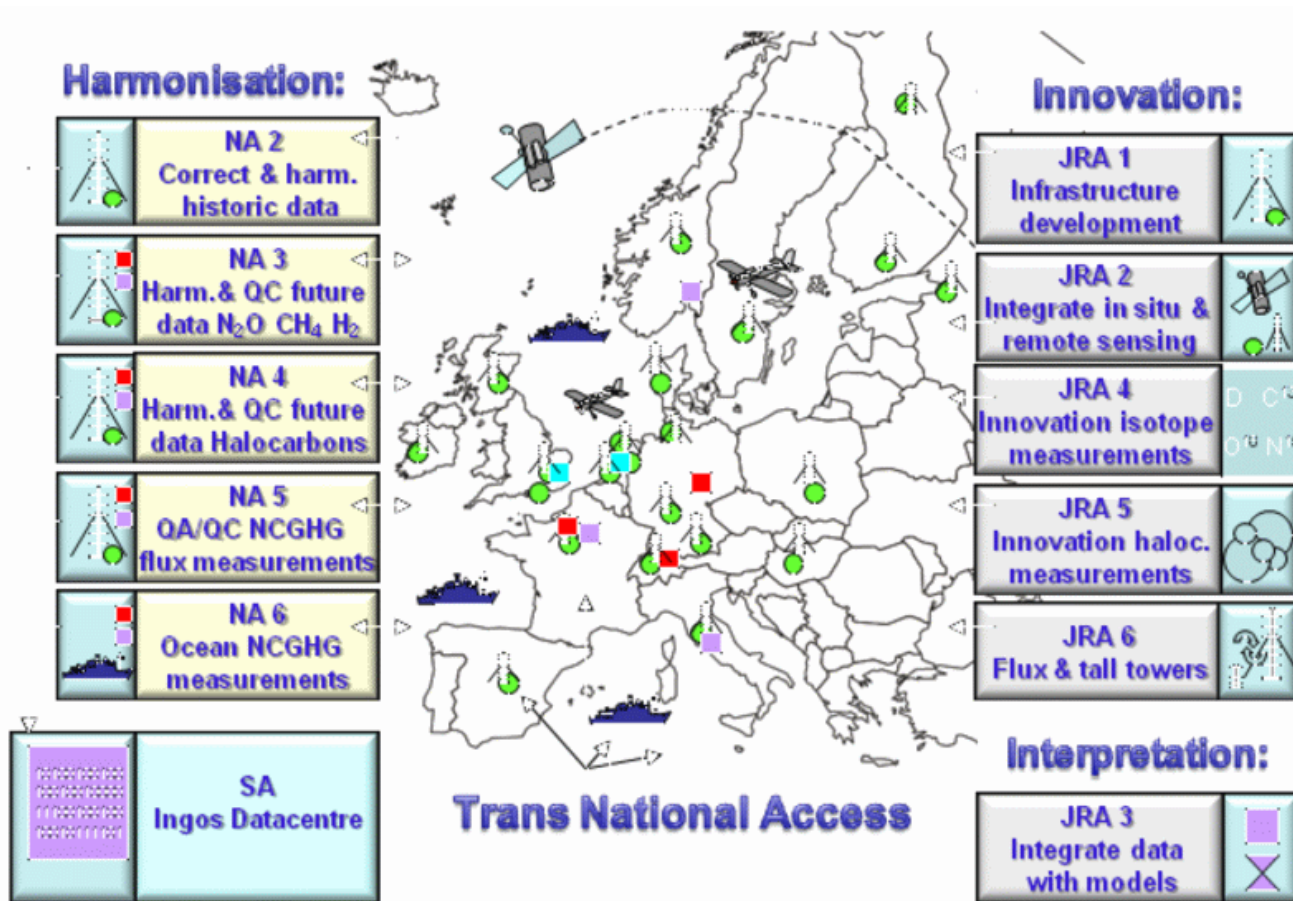
*NOAA Earth System Research Laboratory

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Boulder, CO

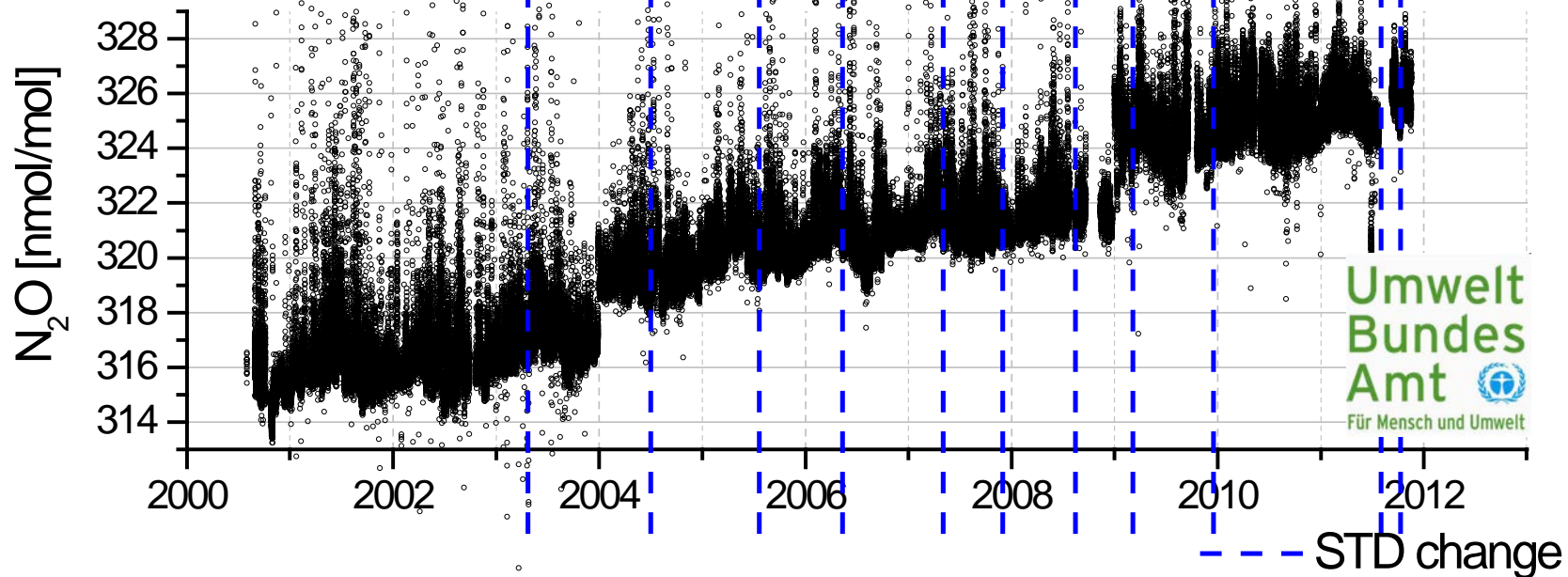


Introduction and background

InGOS: Integrated non-CO₂ Greenhouse gas Observation System (CH₄, N₂O, H₂, SF₆)



Example: N₂O at Schauinsland Germany

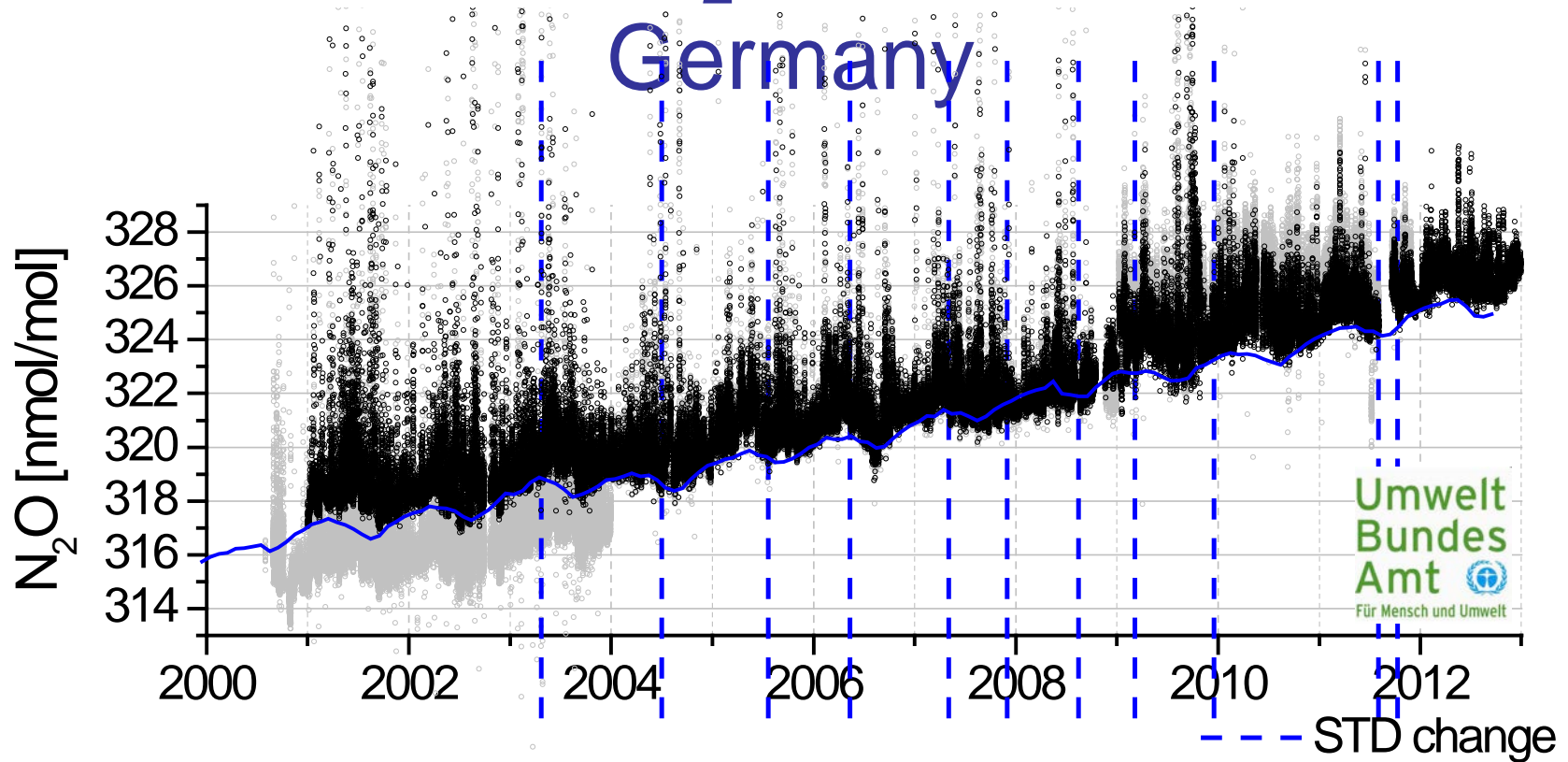


The InGOS harmonisation made use of:

- working STD re-assignments
- target gas information
- co-located flasks
- improved determination of instrument response func.
- assignment of long-standing quality control cylinders



Re-assessed N₂O at Schauinsland, Germany



As thin **blue line** the Mace Head monthly means:
selected for marine conditions

Uncertainties are needed to complete the re-assessed record.



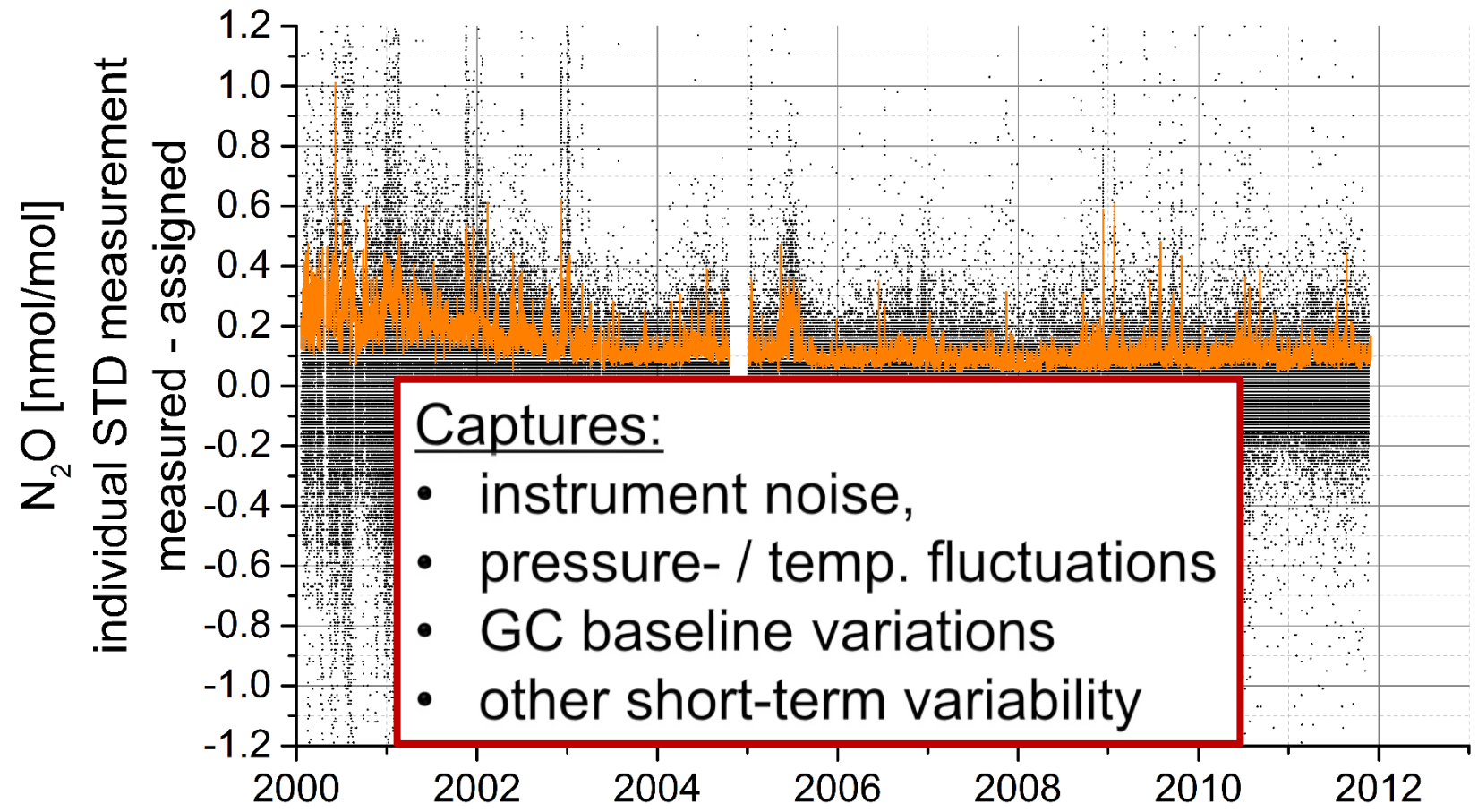
Uncertainty assessment

- Instrument and calibration uncertainties:
 - repeatability: Δ_{repeat}
 - scale transf. uncertainty: Δ_{trans}
 - lab int. scale consistency: Δ_{lisc}
 - reproducibility Δ_{reprod}
 - flask comparison uncert.: Δ_{flask}
- Sampling uncertainties:
 - artefacts from pumps / drying systems
 - leaks or artefacts in sampling lines
 - temporal representativeness
 -



Repeatability:

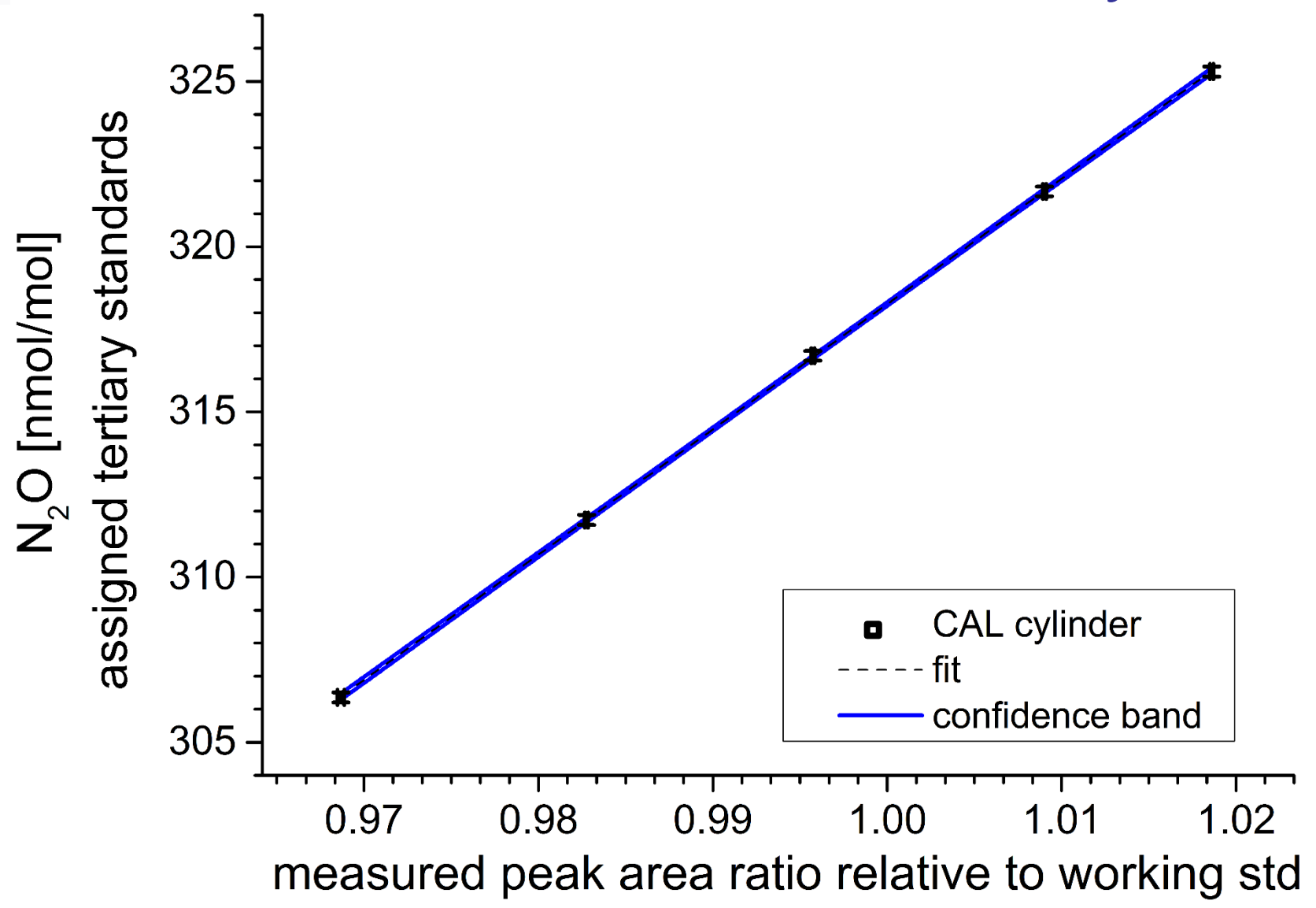
short term instrument performance (UHEI)



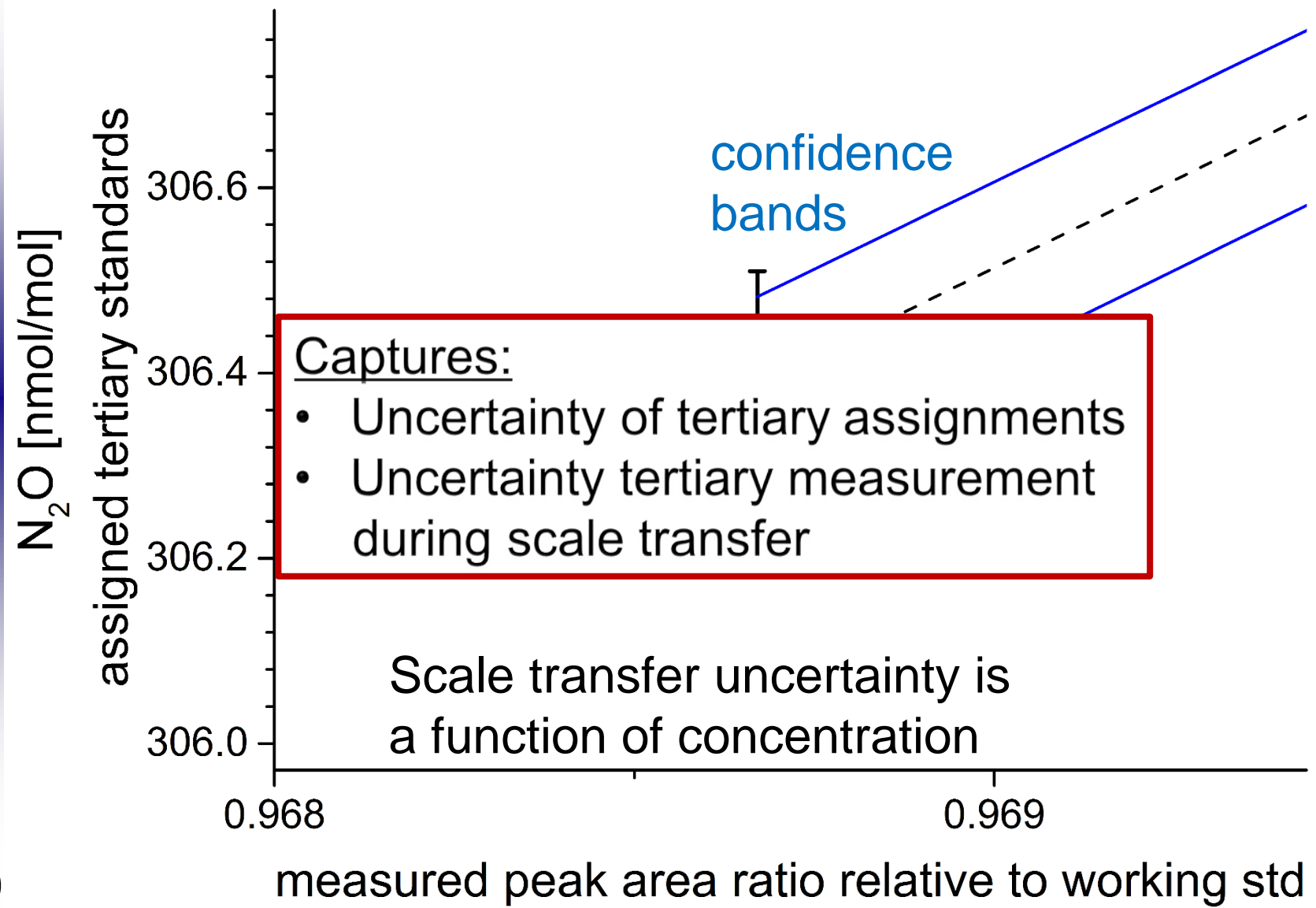
24 hour running 1σ standard deviation of bracketing working standard measurements



Scale transfer uncertainty



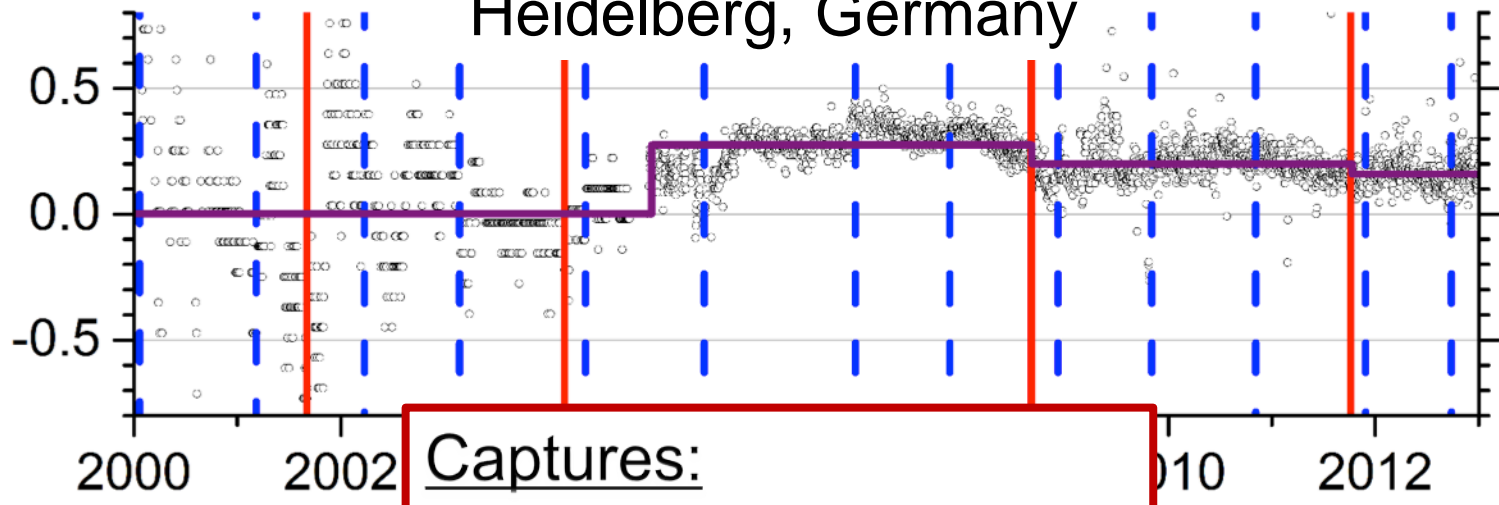
Scale transfer uncertainty



Lab internal scale consistency (changing bias)

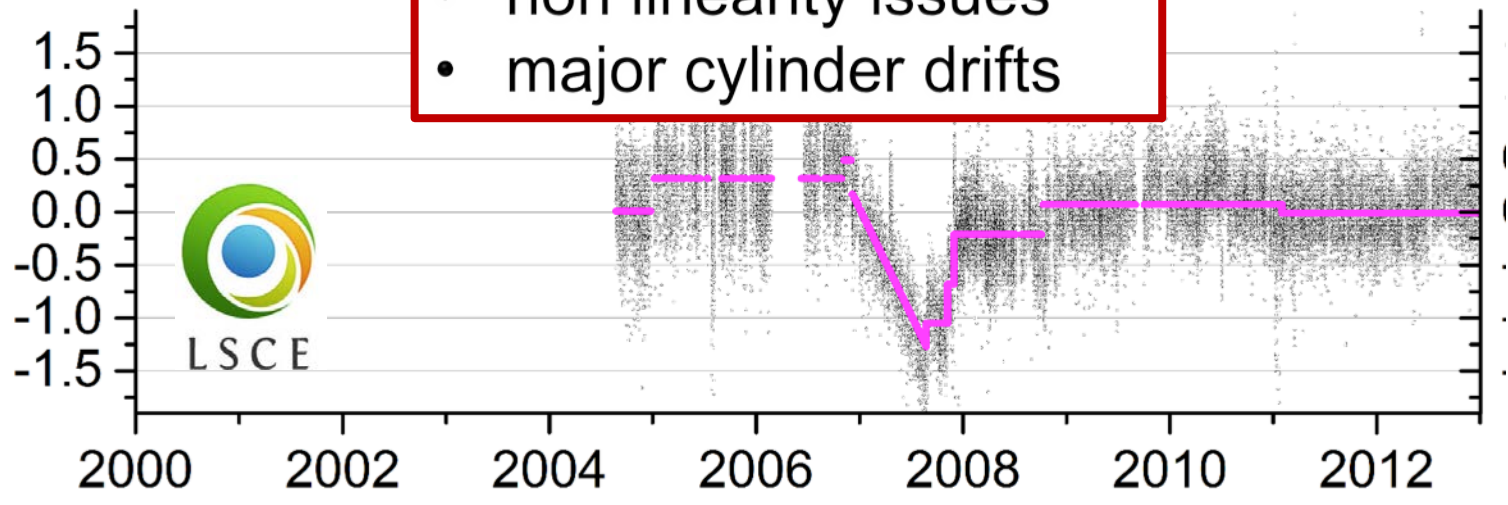
Heidelberg, Germany

N_2O target [nmol/mol] measured - assigned



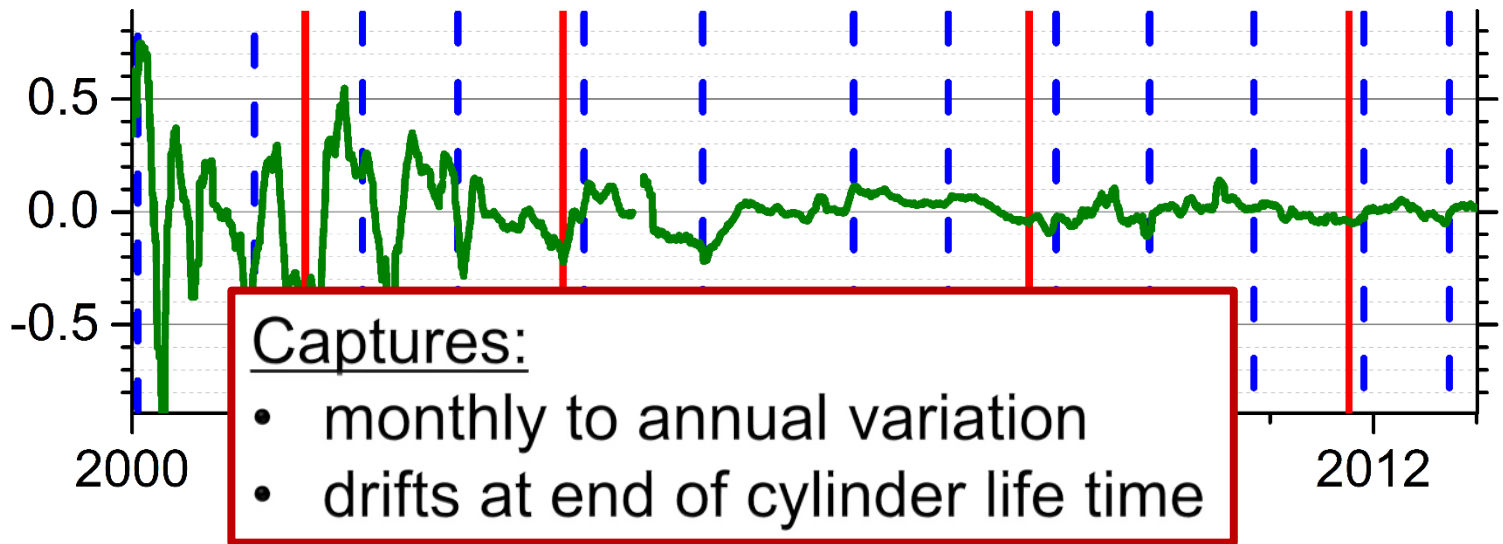
Captures:

- internal scale transfer
- non linearity issues
- major cylinder drifts



Monthly reproducibility monthly moving median filter

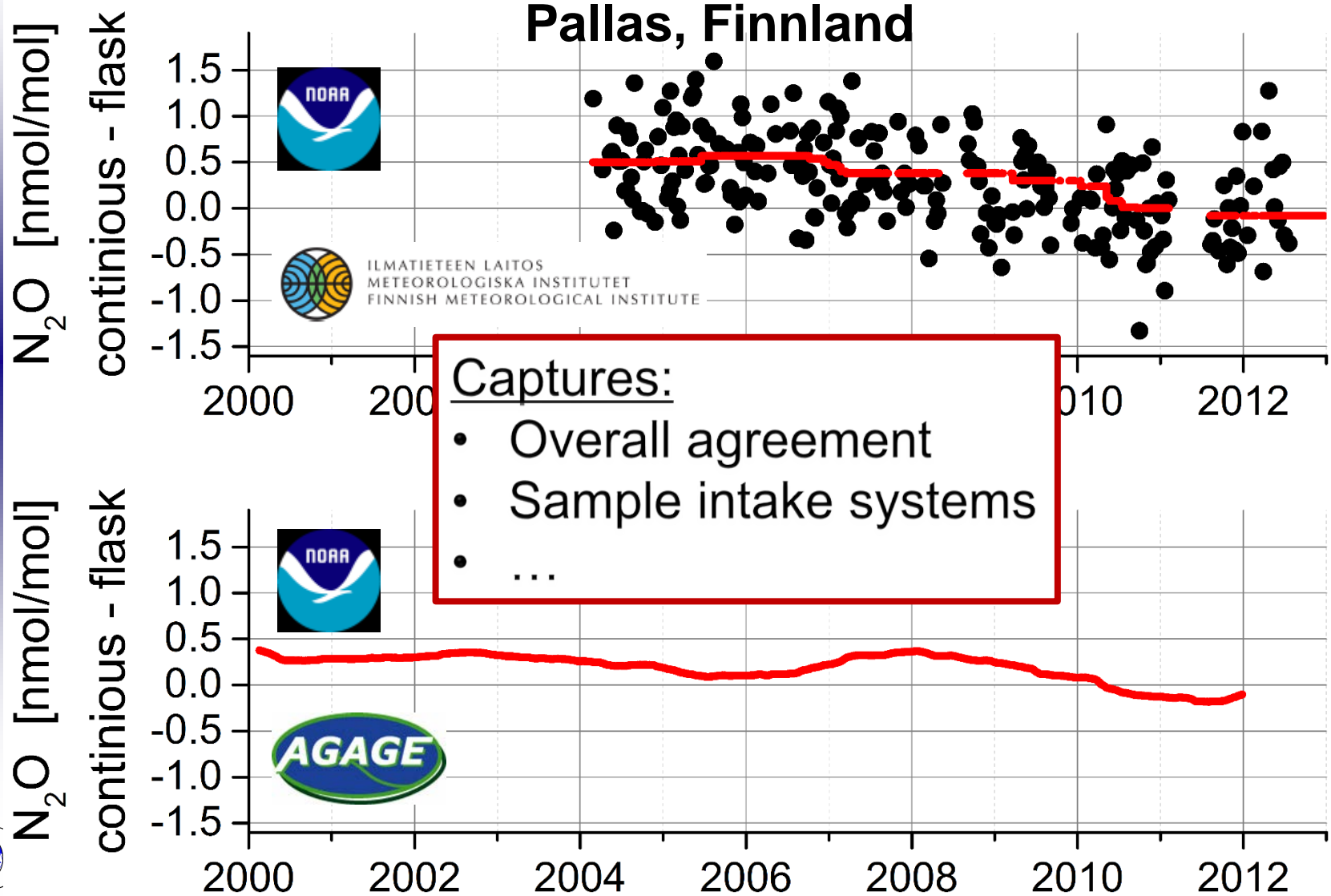
N₂O target [nmol/mol]
measured (lisc corr.) - assigned



30 day moving median filter on lab internal scale consistency-corrected target gas measurements



Flask comparison uncertainty

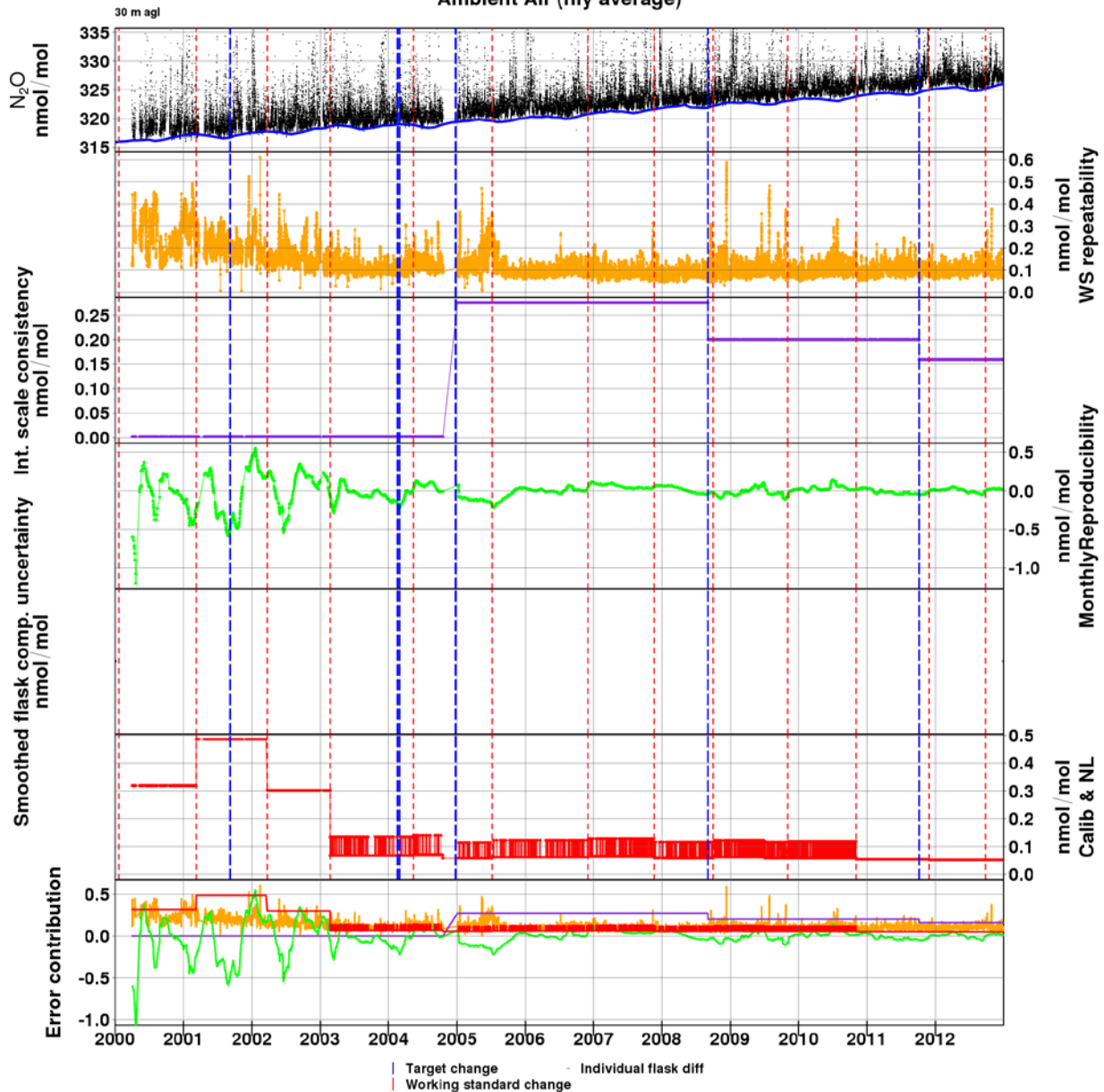


Application of uncertainty estimates

- **repeatability:**
robust uncertainty value of individual data points which **must** be considered in all inversion estimates
- **scale transfer uncertainty:**
quantitative estimate of maximum bias correction in models
- **lab internal scale consistency and monthly reproducibility:**
indicator for internal consistency of long-term records
should be used for data selection only, not quantitative
- **flask comparison uncertainty:**
indicator for compatibility to external measurements
should be used for data selection only



Results





Results

www.ingos-atm.lsce.ipsl.fr/dataproduct



InGOS

Integrated non-CO₂ Greenhouse gas Observing System - Atmospheric Data Center

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Data Pro

Thank you for your attention!

File Name	Size	Date	Time
P0013.1_CBW_170_200_ch4.png	350.93 KB	17.05.14	05:35:32
P0013.1_CBW_170_200_n2o.png	351.43 KB	17.05.14	05:36:17
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Introduction and background

- InGOS: Integrated non-CO₂ Greenhouse gas Observation System
- WG 2: harmonizing historic greenhouse gas (GHG) observations
- Situation: Each European country has its own institution monitoring atmo. GHGs
- Aim: re-assesse and quality control European in-situ CH₄, N₂O and H₂ observations

