Author’s response - - -

- Removed the duplicate paragraph at the end of section 4, sorry for overlooking that before
- Changed fig. 6 into colorblind friendly color mapping
- reset color to blank in table 3 to comply with HTML conversion
-

AUTHOR'S RESPONSE - CHANGES MADE SINCE THE PREVIOUS VERSION

- Manuscript: Facility-scale quantification and monitoring of ammonia (NH3)
- emissions using ASTER multispectral thermal infrared observations
- Tijhuis, Wizenberg and Dammers
-
- Note: section, figure and table numbers below refer to the revised manuscript.
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- STRUCTURE
- - Results restructured. The subsections "Spectral sensitivity and band
- selection" and "Role of thermal contrast in NH3 detectability" have been
- removed from the Results and condensed into a single paragraph in Sect. 3.1.
- Their figures are now Figs. A1 and A2 in the new Appendix A.
- - Methods subsections consolidated. The masking description is now part of
- Sect. 2.3.2, so Sect. 2.3 runs 2.3.1 lookup table construction, 2.3.2
- scene-based radiance correction, 2.3.3 plume detection, 2.3.4 Integrated Mass
- Enhancement method.
- - New Appendix A (single-parameter sensitivity simulations) and Appendix B
- (uncertainty budget, Table B1) added.
- - Repetition removed throughout: the thermal-contrast dependence, the band 13
- and 14 pairing and the wind-field description are now each developed once and
- cross-referenced thereafter. The Discussion opening was shortened and the
- duplicate paragraph at the end of Sect. 4 removed; we apologise for
- overlooking that one previously.
- - The manuscript has been shortened substantially overall.
-
- FIGURES
- - All figures replotted from the current processing run.
- - Fig. 4 changed to a colourblind-friendly colour mapping.
- - Scene figures (Figs. 6, 8, 10) now state the display mask, the scale bar, the
- wind arrow convention and the source rate, and identify the residual detector
- calibration pattern where it is visible.
- - Time-series figures (Figs. 7, 9, 11) now show the detected-scene mean and

- interquartile range, mark insensitive and unusable scenes, and mark null
- detections as upper limits rather than zero emissions.
- - Figure numbering has shifted relative to the submitted version, because two
- Results subsections moved to the appendix.
-
- TABLES
- - Table 2 refilled from the current processing run: scenes acquired, scenes
- remaining after cloud pre-screening, and successful detections.
- - Table 3 now reports the median as the central value with the arithmetic mean
- in parentheses, and includes the published box-model estimates rescaled to a
- common NH3 lifetime. Cell colouring reset to blank so that the table converts
- correctly to HTML.
- - New Table B1 lists every identified uncertainty term, its magnitude and type,
- and whether it enters the reported 1-sigma bars.
-
- CONTENT AND ANALYSIS
- - Reported statistics changed from the mean to the median, because the Tolyatti
- distribution is strongly right-skewed and its mean lies above the upper
- quartile.
- - A five-way scene classification is now defined in Sect. 2.3.3: detected,
- enhancement not connected to the source, null detection, insensitive and
- unusable.
- - Source rates are now stated explicitly as instantaneous per-scene estimates
- rather than annual or facility-average emissions.
- - Uncertainty reporting corrected: the three terms actually propagated are named
- in Sect. 2.3.4, the remaining identified terms are listed as unpropagated, and
- the Conclusions state that the bars are not a complete error budget.
- - New quantified sensitivity tests added: vertical plume distribution over a
- true depth of 200-1000 m, prescribed air temperature per kelvin, and a
- water-vapour profile scaling of plus or minus 30 per cent.
- - New diagnostics of the scene radiance correction added to Sect. 2.3.2: the
- magnitude of the residual relative to the noise-equivalent column, its sign
- across the record, a 3x3 disjoint-tile refit testing the scene-constant
- assumption, and the absence of any relationship with the retrieved source
- rates.
- - The lookup-table temperature profile is now described as it is actually
- constructed, rather than by a nominal lapse rate.
- - The meteorological source is now correctly identified as the ECMWF operational
- IFS forecast archive throughout, including the Data availability statement and

- the Acknowledgements, with the change in horizontal resolution across the record stated.
- - The ASTER acquisition strategy is now explained in Sect. 2.1, so that the scene counts in Table 2 can be read against the nominal 16-day revisit.
- - A paragraph on livestock sources was added to the Discussion, stating that they were not searched and why.