

## ***Interactive comment on “Validation of farm-scale methane emissions using nocturnal boundary layer budgets” by J. Stieger et al.***

### **Anonymous Referee #1**

Received and published: 13 October 2015

The MS describes the application of nocturnal boundary layer (NBL) budgeting using tethered balloons and tower-based instrumentation to measure livestock methane emissions from a typical Swiss farmstead leading to a validation of inventory estimates of the emissions. The authors conclude that the NBL budgeting fluxes were in good agreement with local inventory estimates based on current livestock numbers and default emission factors, which provides confidence that the Swiss national inventory report reliably represents the national livestock methane emissions.

#### Specific comments

(1) The MS is well written and should prove to be very useful for those contemplating boundary layer budgeting as it brings out a number of problems in applying the tech-

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nique including changing atmospheric conditions, estimating the height of the inversion layer, advection, the sometime presence of more than one layer within the boundary layer, the differences in the concentration gradients between ascents and descents and mixing of the CH<sub>4</sub> concentrations in the vertical profiles.

(2) I think the numbers of the various livestock emitting CH<sub>4</sub> should be given

(3) I feel that there is a need to show, or at least comment on, the daytime methane fluxes before making assertions about verifying inventory emissions from just NBL measurements. The NBL estimates come from only 4 nights. There is no information on daytime fluxes (which might have been obtained from the methane gradients measured on the tower) but as I read it, the calculation procedure used by the authors to validate the inventory estimates assumes that the daytime mean flux equals that in the night.

#### Typographical errors

p.9, line 301: m s<sup>-1</sup> for m<sup>-1</sup>

p.11, line363: markedly for markably

#### Questions to be answered

1. Does the paper address relevant scientific questions within the scope of ACP? Yes
2. Does the paper present novel concepts, ideas, tools, or data? New insights into nocturnal boundary layers
3. Are substantial conclusions reached? Yes
4. Are the scientific methods and assumptions valid and clearly outlined? Sometimes require thought from the referee
5. Are the results sufficient to support the interpretations and conclusions? See my comment (3)

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6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? See my comment (3)
7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution? Yes
8. Does the title clearly reflect the contents of the paper? Yes
9. Does the abstract provide a concise and complete summary? Yes
10. Is the overall presentation well structured and clear? Yes
11. Is the language fluent and precise? (Yes)
12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? (Yes)
13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? (No)

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Interactive comment on Atmos. Chem. Phys. Discuss., 15, 21765, 2015.