**Atmospheric
Measurement
Techniques**
Discussions

Interactive comment on "A study of turbulent fluxes and their measurement errors for different wind regimes over the tropical Zongo glacier (16 S) during the dry season" *by* M. Litt et al.

Anonymous Referee #2

Received and published: 3 April 2015

Review of AMT-2014-377 "A study of turbulent fluxes and their measurement errors for different wind regimes over the tropical Zongo glacier (16°S) during the dry season" by M. Litt, J.-E. Sicart, and W. Helgason

General comments:

The observational study by Litt et al. focuses on the analysis of the direct and bulk sensible and latent heat fluxes collected over the tropical Zongo glacier (16 deg S) during the dry season for different wind regimes. The study is intimately associated with the papers recently published by authors, Sicart et al (2014) and Litt et al. (2015)

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for the same dataset. Special attention of this study is associated with measurement errors in three different wind regimes. I think this paper can be a useful contribution to the discussion on this subject. My overall recommendation is accept for publication in the Atmospheric Measurement Techniques (AMT) subject to minor revisions. My specific comments are listed below.

Specific comments:

Page 1056, Abstract and through the text. "Upslope" flows are also referred as "anabatic flows" (e.g., Fedorovich and Shapiro 2009).

Page 1056, Abstract and page 1081, Conclusions. Authors wrote: "On average, both fluxes exhibit similar magnitudes and cancel each other out." It's interesting to estimate contribution of water vapour (latent heat) flux in the net buoyancy term in your case.

Page 1063, Eq. (2). Did you use Eq. (23) from Webbet al (1980, QJRMS) for corrections? Specify and provide estimations of the Wrl term in your Eq. (2). I guess, it should small.

It might be of interest to provide a plot for Bower ratio, Bo = H/LE based on the turbulent and bulk estimates.

Pages 1091-1096, References: Important papers by Vickers et al. (2010) and Salesky et al. (2010) on the random errors of turbulent fluxes have been missed. I would have liked to see a comparison of typical errors/uncertainty for turbulent fluxes from these papers and current study.

Technical corrections

Update reference of your paper Litt et al (2015) BLM instead Litt et al (2014) in the text and the reference list.

Additional references:

Fedorovich E, Shapiro A (2009) Structure of numerically simulated katabatic

and anabatic flows along steep slopes. Acta Geophysica 57(4):981–1010, doi: 10.2478/s11600-009-0027-4

S.T. Salesky, M. Chamecki and N.L. Dias (2012) Estimating the random error in eddy-covariance based fluxes and other turbulence statistics: the filtering method, Boundary-Layer Meteorol. 144(1):113-135. (see also MatLab code: http://www.meteo.psu.edu/~muc28/media/random_error.m)

Vickers, D., Gockede, M., Law, B.E. (2010) Uncertainty estimates for 1-h averaged turbulence fluxes of carbon dioxide, latent heat and sensible heat. Tellus B, 62(2), 87-99

Interactive comment on Atmos. Meas. Tech. Discuss., 8, 1055, 2015.

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