

## ***Interactive comment on “Low-level jets and above canopy drainage as causes for turbulent exchange in the nocturnal boundary layer” by T.-S. El-Madany et al.***

**Anonymous Referee #2**

Received and published: 23 April 2014

### GENERAL COMMENTS

The manuscript in review describes fourteen nocturnal short duration (30 – 110 minutes) turbulent events observed during a 17 consecutive night experiment in mountainous terrain of Taiwan. Turbulent fluxes were investigated using point measurements of eddy covariance and CO<sub>2</sub> vertical profiles at two heights above the canopy coupled with remote sensing (SODAR) techniques. This allowed the authors to divide nocturnal turbulent events into two categories (low level jets or above canopy drainage flows) based on the elevation of maximum wind speed encountered for the event. Sources of nocturnal mass and energy fluxes in any terrain are difficult, yet important to define and characterize. This manuscript presents a well organized and thoughtful treatment

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of nocturnal turbulence events caused by low level jets or above canopy drainage flows. Thus, I recommend publication with modifications.

Mixed tenses (past and present) are used throughout the manuscript and occasionally present tense is used to describe the observations at the field site during this study. This implies that you believe your findings over 17 specific nights are valid for all nights in any given year. Please use past tense only when discussing your observations.

### SPECIFIC COMMENTS

Page 4696, line 7: add “, then” after the word “site”

Page 4696, lines 19 -20: “. . . eddy-covariance data presenting higher quality. This was particularly indicated by spectral analysis and stationary tests.” This statement seems vague. Thus, I suggest to specifically name what components of the EC data were improved in quality.

Page 4697, line 3: remove comma after word “turbulence”

Page 4697, line 20: “It plays a major role. . .”, What is “it” specifically?

Page 4697, line 27: “. . . intermittent turbulence in very complex terrain”. The word “very” is qualitative, please define the terrain in more quantitative terms.

Page 4697, line 28 and page 4698, line 1: Is there a reference for this preliminary study?

Page 4698, line 6: define “SODAR” as this word is first encountered on this line.

Page 4698, line 12: remove “SODAR” definition

Page 4698, lines 17-18: are these trees deciduous? Evergreen? This could impact turbulence depending on seasonal phenology of the trees.

Page 4699, line 13: Is the sample air stream pulled by a pump through the 15m length tubing? How was condensation in the tubing addressed?

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Page 4699, line 18: “negative influence of ground clutter” What does this mean specifically?

Page 4699, line 20: replace “used.” With “used –“

Page 4700, line 27: “. . .and backscatter are available.” Do you mean “were used”?

Page 4702, lines 9-10: “stable boundary conditions prevailed throughout the entire nights”. Do you mean “night” singular or are you referring to all nights of the 14 events?

Page 4704, line 24: define ITC

Page 4709, line 19: “It flows. . .” replace “It” with exact word

#### TECHNICAL COMMENTS

Page 4697, lines 10 -11: “. . .while gravity waves are usually caused by topographic changes or irregularities of the canopy top”. There is no discussion within the manuscript about why gravity waves could be ruled out, thus a couple of sentences to this effect may be of value.

Page 4703, lines 23 – 24: CO<sub>2</sub> mixing ratios are also a function of photosynthesis, which is not occurring during these nighttime events.

A few sentences in the site description (section 2.1) or in the data selection (section 2.4) sections discussing precipitation/storm events or lack thereof should be included.

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Interactive comment on Biogeosciences Discuss., 11, 4695, 2014.