Interactive comment on "**3D surface properties of glacier penitentes over an ablation season, measured using a Microsoft Xbox Kinect**" *by* L. I. Nicholson et al.

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[General Comments]

Snow or ice penitentes are formed on some glaciers or snow patches at high altitudes in the low-latitude regions. Because accesses to these penitent fields with big precision instruments are in general not easy, only overview surveys and qualitative measurements on features or developments of penitentes have been made so far. Then, Nicholson et al. conducted laborious work at Tapado Glacier in the Andes during an austral summer of 2013-14, by measuring geometries of snow penitentes with a laser scanner and an infra-red sensor. These detailed results are valuable for various fields of the cryosphere research, so that this study should be highly evaluated.

However, I have to say that the present paper is not well structured and not sufficiently refined. In other words, the purpose of this paper is unclear, and the manuscript itself is quite long with lots of lengthy paragraphs and sentences (e.g., L74-78, L79-84, L111-114, and others: very hard to read).

I explain this concern more specifically. Abstract should state in principle very concisely, the purpose (in a short sentence), methods, results (findings), interpretations (discussion), and conclusions within one paragraph of 200-300 words. In the present manuscript, the first nine lines (L10-L18) may be moved to Introduction, and the last 12 lines (L27-L39) emphasizes only aerodynamic roughness parameters.

As expressed in the first part of Introduction (L41-L60), it is known that sublimation from the tips of penitentes and concentrated solar radiation in the hollows are essential to the formation of penitentes. On the other hand, turbulent heat flux, which is related with aerodynamic roughness heights, may play negative roles for penitent developments. In Introduction, following the albedo effect (L63-69), roughness parameters are described in detail from L70 to L96.

Thus I guess that the authors' largest interest may be the derivation and properties of roughness parameters. If so, the structure and the way of writing should be significantly modified in order for readers to understand easily the authors' statements.

Since the field measurements were made in an ablation season (of penitentes), typical data for formation of penitentes could not successfully be obtained. However, quantitative information collected on morphologies of penitentes and their changes in time should be precious, since they are typical, peculiar surface features of glaciers.

Issues on the penitent morphology and the aerodynamic roughness are not well harmonized in the present paper. Thus, I suggest now to divide the manuscript into two papers, such as, for example (only for authors' information):

a) "3D surface properties of snow penitentes and their evolutions in an ablation season

2013-14, at Tapado Glacier in the Andes"

[Fig.1, Fig.4, Fig.10, Fig. (meteorological condition), Fig. (heat balance)]

b) "Aerodynamic roughness parameters over a field of glacier penitentes derived from measurements with a Microsoft Xbox Kinect"

[Fig.1, Fig.2, (Fig.3), Figs. 5, 6, 7, 8, (9)] The manuscript b) needs to be reviewed by (an) expert(s) on boundary layer micrometeorology.

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