

Interactive comment on “Snow cover dynamics in Andean watersheds of Chile (32.0–39.5° S) during the years 2000–2013” by Alejandra Stehr and Mauricio Aguayo

Anonymous Referee #2

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The authors present an extensive analysis on the use of snow cover information derived from MODIS imagery for five different watersheds in Chile. The paper evaluates the remote sensing product against detailed field measurements, and analyzes (inter)annual variability and change. Although the paper gives an interesting view on snow cover behavior over several basins in the country, I have the following general observations: 1) Elaborate field measurements were used to evaluate the performance of the MOD10A2 product over two watersheds, which is the most significant contribution of this paper. Nevertheless, the DGA has multiple data points with historical snow depth and snow water equivalent. Why were these not used in the validation exercise? Given that this data complements the current analysis, and can be freely obtained from

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the DGA, the authors are suggested to take these data into account. 2) The analysis of the Snow Cover Dynamic is rather limited, and should be further expanded to take into account previous trend analysis already published for Chile. Although most literature has focused on temperature and precipitation trends, this should provide relevant complementary information when comparing with snow dynamics. 3) The discussion on the influence of Niña or Niño years is also underdeveloped and more than observing apparent trends, the discussion should go more into depth why these ENSO years are markedly different with respect to snow cover. La Niña years are generally considered years with lower rainfall amounts in central Chile, which makes the observation that La Niña years provide more snow cover rather surprising. It therefore needs a more in depth analysis, why this apparent contradiction occurs. The timing of ENSO should also be taken into account, as ENSO is often strongest over the dry summer season in Chile, generating a delayed impact in the next winter season. The same is the case for the el Niño years, where you would expect significantly more snow volumes and higher snow cover as well, due to higher rainfall volumes. Specifically regarding snow cover, the influence of the Pacific Decadal Oscillation (PDO) has been shown to be a relevant factor, but this has not been addressed in the paper. 4) The selection of drought years was also done without providing sufficient detail in annual variability, especially considering that Chile has suffered a multi-annual drought in recent years (2010-2015). It is suggested to provide climatic information regarding the different years of study, by incorporating average rainfall amounts (as well as some additional meteorological indicators, such as minimum temperature) in the graphs or in a separate table. This should allow discussing more in detail what the different driver are for snow cover in those selected watersheds. 5) The paper has several English grammar errors and many typos, which should be corrected. It is strongly recommended that the paper is revised by an English native speaker for improved readability.

My additional comments are: P1-L14: typo P1-L15: not a sentence P1-L17: where is used instead of were in multiple occasions in the paper. Please correct them in all cases. P1-L21: this should read 'to' protect. P1-L26: where instead of were P3-L15:

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comma too much P4-L26: truism instead of tourism. P5-L30: these instead of this

P5-L30: use instead of used

P6-L13: 'done' is not very specific here. What was done?

P6-L15: 'SCA and clouds in was quantified. . .' – please reformulate sentence.

P7-L4: whit instead of with P7-L5: I think this should be 'MODIS images' instead of 'MODIS' P7-L24: This sentence is redundant, as you already mention that the Bio Bio watershed is the only showing a trend. P7-L25: In spring should be used instead of 'At spring' P7-L27: In summer should be used instead of 'At summer' P7-L28: this should be show instead of shows P8-L1: where instead of were P8-L2: This should tread 'these two periods' instead of 'this two periods' P8-L19: 'in all watersheds' instead of 'an all watersheds' P9 – L4: analyzed instead of analyze P9 – L12: 'where compared' should be 'were compared' Fig 2: 'Rivers' instead of 'Rvers' Fig 4: ENSO years should be clearly marked on the figures Fig 5: ENSO years should be clearly marked on the figures

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