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The Cryosphere Discussions

Interactive comment on "Snow cover thickness estimation by using radial basis function networks" *by* A. Guidali et al.

Anonymous Referee #2

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Overall, the manuscript presents a fairly interesting study of the use of radial basis function networks, a class of artificial neural networks, in estimating snow cover thickness and snow covered area. The manuscript would be greatly improved by the inclusion of a summary of the use of neural networks to predict snow cover, snow thickness, and SWE to date using remote sensing data in combination with field measurements (i.e. Tedesco et al., 2004 and Brubaker et al., 2005). The manuscript seems to offer an new addition to the existing literature in the use of radial basis function networks with a limited data set of met stations (although radial basis function networks have been used in conjunction with radar data to determine snow accumulation in previous work (i.e. Rongui and Chandrasekar, 1997), and so the novelty of this work would need to be better explained), but a more comprehensive literature review of snow thickness estimation using such models is warranted. There are several primarily technical issues

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with the manuscript as well, some stemming from the translation of a computer science field to snow science, and others strictly grammatical. I think if some of these issues are addressed, the clarity of the manuscript would be improved. The grammar issues are too numerous to address entirely, and I would be happy to provide more detail if I am asked to review the paper again. Below, I have a detailed list of the errors I think most helpful to address, but I would suggest the authors revisit the entire paper and try to improve the readability of the manuscript further.

Introduction, line 8, I think that the authors mean "hybrids of soft computing frameworks" as I do not know what the phrase "hybrids soft computing frameworks" means. Although this might be an example of computer science or neural network jargon that I am not familiar with. Page 2440, line 23, The word "researches" should be research. Also, as a very minor note, in this sentence "feedforward" is written as one word, but in the next sentence is written "feed forward." On page 2441, the phrase is written "feed-forward." There are other instances of inconsistency of terminology as well, that I won't go into in this list. I would suggest the authors do a search for this term, and examine the manuscript for other similar instances. Page 2242, line 9, I do not think that the last sentence of this paragraph belongs here in the description of the study area, but instead in the introduction of the problem, ideally with a description of previous work examining snow cover distribution. Page 2443, Lines 3-5, I think, but am not sure, that the authors might intend for the items listed as input variables to read, "f. Mean of measures in 1a within interval T; g. Mean of measures in 1b within interval T; etc." Otherwise, I do not understand the list as written, and as a reader would require further explanation of what the variables f-h are. Page 2443, line 10, I would suggest defining T here, again, as "a given temporal interval,"even though it is previously defined in the list of input variables. This is only a suggestion, as I tend to look in the paragraph immediately following an equation or list for a definition. Perhaps this is a personal tic. Page 2443, line 19, I suggest adding a sentence either here or in the last paragraph of the introduction perhaps about the importance estimation of the snow cover height for permafrost stability. Otherwise, this sentence comes at the reader with no context

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of why this step is being taken, and it is not until page 2450 that it becomes clear why these classes are being set up in the model. Page 2444, I am not sure if the word "incompleteness" is a term commonly used in computer science, or if this is a typo. I am not familiar with the word, at least, and would suspect that other readers of The Cryosphere might not be as well. Page 2445, line 2, The article "a" should be deleted in front of the phrase "radial basis function networks." Page 2447, line 13, The word “arbitrary” should be “arbitrarily.” Page 2447, lines 18 and 20, I am not familiar with the terms, “reconducted” (line 18) and “belongingness” (line 20). If these are terms common in computer science, I think that they should be defined, and if they are typos, or other terms more familiar to a larger audience should be substituted in their place. Page 2447, line 19, The word “describe” should be “describes.” Page 2447, line 24, I think that overall accuracy, producer accuracy and user accuracy have to be defined here. I am not sure what they mean from the description, and what the differences among the different terms are. Similarly, I think that Cohen’s kappa coefficient should be better defined here, as it is merely defined as being “a more robust measure” and that it “takes into account the agreement occurring by chance.” If the authors are going to go to the trouble of defining RMSE, NRMSE and MAE, which are commonly used in many science fields, I would think that defining these four terms would also be important. Page 2447, line 26, Cohen’s kappa coefficient is later referred to as the “K-coefficient” on page 2450 line but is not defined as such here. At least I am assuming that the K-coefficient is the Cohen’s kappa coefficient. Page2448, line 17, What do the authors mean by “K-means clustering algorithm?” I am not sure if I missed a definition of it earlier in the text, but can’t seem to find any mention of what this is previous. Page 2449, line 15, The word “medelled” should be “modeled.” Page 2450, line 4, As I mentioned in an earlier comment, I think that the notion of modeling snow thickness for the application of permafrost stability monitoring should be introduced sooner. Page 2450, line 18, As I mentioned in an earlier comment, “K coefficient” is not defined. Page 2450, line 21, Again, I am not sure what the term “reconducted” means. Page 2450, line 26, “Showed” should be “shown” and “level” should be “levels.” Page 2451, line 5,

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“potentialities” should be “potential” Page 2451, line 21, Further definition of Voronoi tessellation is warranted here. Page 2451, line 26, I think that the authors mean “set” instead of “setted” unless setted is another term I am not familiar with. Page 2452, line 4, “An” should be “a” and “on” should be “of” Page 2452, line 6, Again, as with the previous use of the word “incompleteness” unless this is a specific term commonly used in the field of neural networks and computer science, I think this should be better defined earlier or another term should be used. Page 2452, line 11, “level” should be “levels”

Interactive comment on The Cryosphere Discuss., 6, 2437, 2012.