

Interactive comment on “Coupled decadal variability of the North Atlantic Oscillation, regional rainfall and spring discharges in the Campania region (Southern Italy)” by P. De Vita et al.

Anonymous Referee #1

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A review for Hydrology and Earth System Sciences Discussions

Manuscript: "Coupled decadal variability of the North Atlantic Oscillation, regional rainfall and spring discharges in the Campania region (Southern Italy)"

Overall comments

The manuscript shows how large-scale atmospheric patterns (winter NAO) may drive regional groundwater circulation (spring discharge). The study has a regional focus

(Southern Italy) and a multi-decadal horizon (1921-2010). The data and results of this study are worth to be considered for publication in a peer reviewed journal. However, this submission would require a great deal of attention and revision in order for it to be ready for publication. In particular, the way the results are presented is problematic.

Organization and illustration of the manuscript make it too difficult to review fairly. The manuscript suffers from many figures. This is due to the fact that the authors are looking at indices that they dragged in the results and discussions too. It is opinion of this reviewer that the paper would be better focused if built upon the relationship between NAOI and MADl, the latter depending on the difference between rainfall and actual evapotranspiration. This reviewer understands this is the main issue of the study, as evoked in the abstract (page 3, lines 14-17).

Moreover, the authors should avoid flooding their statements with many statistical details, which are not supportive of messages that are relatively simple to convey. This may also be misleading. Again, it is not clear why results from both Student-t and Fisher-F tests are given, since when both are applicable they convey the same information. Also, significance probabilities should not be reported with too many decimals (it is also of suspect validity that three-four decimal places are followed by a percent sign). Mostly, though, this reviewer objects to the fact that the authors show too much confidence in the statistical significance of Pearson's correlation coefficients (r). Statistical significance of a correlation coefficient only means that $r \neq 0$. Thus, for instance, in Fig. 4 $r = -0.422$ was significant, but $r^2 = 0.178$ means that the bivariate relationship between the winter NAOI and the MAPI accounts for only a little over 17% of the variance that is nothing to get excited about.

The writing also needs to be improved, for which this reviewer recommends the authors to seek help from an English language colleague.

Specific comments

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The abstract looks too vague and non-informative. The initial sentences are generic and there are no results mentioned quantitatively.

Introduction

Page 3, lines 21-22. “(e.g., World Climate Programme – WCP, World Climate Data and Monitoring Programme – WCDMP)”. You may add references or websites.

Page 3, line 27-page 4, line 1. (ICCP, 1990, 2001, 2007). This reviewer guesses that “ICCP” is “IPCC”.

Page 4, lines 13-19. “In recent years. . . Morán-Tejeda et al., 2011)”. The inclusion of too many references (14 in six lines) is questionable. Please, try to avoid the use of old citations that might have been superseded by more recent studies. “Van” (line 14): be consistent with rest of the text (“von”). Replace “Lopez” by “López” (line 16, line 21).

Page 4, line 24. “Demenocal”. Please be consistent with the rest of the rest (“deMeno-cal”).

Page 4, line 28. “(López-Moreno et al., 2007; Trigo et al., 2004; Moran-Tejeda, et al., 2011)”. Just arrange citations chronologically and replace “Moran” by “Morán”.

Page 5, lines 16-18. “The present research represents the continuation and the updating of previous studies conducted on the climatic variability of Southern Italy due to the NAO (De Vita and Fabbrocino, 2005, 2007)”. You may provide a summary of the points you made in any previous studies. Otherwise, it is not clear how far the authors have gone with respect to earlier contributions.

The outline of this manuscript does not follow a conventional format that parallels the format of full articles in most journals. Thus, it can be useful for the reader to know the structure of the paper by the end of the introduction.

The North Atlantic Oscillation

The feeling is that this section was developed around a number of old references (while

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recent efforts that have not been mentioned may be of interest).

Page 8, line 2. “Sheridan, 2003”. This reviewer failed to find this references cited in the reference list.

Page 8, line 12. “NAOI”. It is probably “NAO”.

Page 8, line 27. “affectedby”. It is “affected by”.

Page 9, line 5. “Greatbach, 2000”. Please check the spelling (“Greatbatch” in the reference list, page 25, line 25).

NAO Index time series

Page 9, line 9. “The data set were. . .” You may change into “The data set was. . .” or “The data were. . .”.

Hydrologic data and methods of analysis

Page 9, lines 26-27. “In this approach we used the moving average over 11 yr centred on the sixth year”. You may justify why 11-yr moving average is appropriate, considering that 11-yr periodicities were not found.

Precipitation and air temperature time series

Page 10, lines 15-16. “(Italian Hydrographic and Tidal Service) and national agencies (APAT-ISPRA) to regional Civil Protection agency”. Please provide references (the web pages can be enough).

Page 11, lines 20-22 and Equation (4). Please check consistency between the text (“18 rain gauge stations”) and the equation (nine is the number of temperature stations).

Effective precipitation time series

Page 13, Equation (7) and lines 8-9. AEP is not defined.

Spring discharge time series

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You may identify each location (Sanità, Mount Cervialto, Caposele, ...) by their geographic coordinates.

Correlation of the NAOI and regional climatic indexes

Page 15, lines 6-8. “This analysis... probability of null hypothesis >5 %...”). There is no reason to speculate (“This analysis showed a general linear decreasing trend...”) on non-significant findings. The terminology is also inappropriate: “no high statistical significance (probability of null hypothesis >5 %”. Conventionally, 5% set the limit for “significance”, and 1% for “high significance”.

Page 15, lines 24-25. “. . . clearly . . . clearly . . .”. Please avoid using “clearly” (or similar), which makes readers feel like they are not up to the authors’ careful analysis.

Acknowledgements

Page 23, line 1. “AQP S.p.A.”. Please make the acronym explicit. You may add a website link.

Page 23, line 3. “Department of Civil Protection of the Campania region”. You may add a website link.

References

Page 23, lines 27-28. “Brunetti, M., Maugeri, M., and Nanni, T.: Variations of temperature and precipitation in Italy from 1866–1995, *Theor. Appl. Climatol.*, 65, 165–174, 2000”. According to alphabetic order, this reference goes after “Brunetti M., Maugeri, M., Monti, F., and Nanni, T.: . . .”.

Page 24, lines 6-20. “Celico, F. and Mattia, C.: . . . *Mezzogiorno*, 4/2, 1–203, 1983”. Please arrange six references alphabetically.

Page 24, lines 23-24. “Cohen, J., Frei, A., and Rosen, R. D.: The role of boundary conditions in AMIP-2 simulations of the NAO, *J. Climate*, 18, 973–981, 2005”. This reviewer failed to find this reference cited in the text.

Page 25, line 33. “EOS”. Perhaps this journal is cited as “EOS, Trans. AGU”. Please check for it.

Page 26, lines 1-2. “Hurrell, J. W. and van Loon, H.: Decadal variations in climate associated with the North Atlantic oscillation, *Climatic Change*, 36, 301–326, 1997”. According to alphabetic order, this reference goes after “Hurrell, J. W., Kushirn, Y., Ottersen, G., and Visbeck, N.: ...”.

Page 26, lines 6-12. “ICCP – International Climate Change Partnership: Climate Change, The IPCC Scientific Assessment (ISBN052140360X), edited by: Houghton, J. T., Jenkins, G. J., and Ephraums, J. J., Cambridge University Press, 1–414, 1990. ICCP – International Climate Change Partnership: The scientific basis, Contribution of working group I to the third assessment report of the Intergovernmental Panel on Climate Change (ICCP), edited by: Houghton, J. T., Ding, Y., Griggs, D. J., Noguier, M., Van der Linden, P. J., and Xiaosu, D., Cambridge University Press, 2001”. This reviewer guesses that ICCP stands for IPCC.

Page 27, lines 24-26. “Rodriguez-Puebla, C. and Nieto, S.: Trends of precipitation over the Iberian Peninsula and the North Atlantic oscillation under climate change conditions, *Int. J. Climatol.*, 30, 1807–1815, 2010”. According to alphabetic order, this reference goes after “Rodriguez-Puebla, C., Encinas, A. H., Nieto, S., Garmendia, J.: ...”.

Fig. 2, Fig. 8, Fig. 12 These graphs are too dense and it is difficult to gain any useful information from them.

Fig. 5 Please specify what the two boxes indicated with 1 and 2 mean.

Fig. 11 “Statistical significance tests (t-Student and F -Fisher) have given probability values lower than 0.00001% for the null hypothesis”. It is a long and complex (and not necessarily correct) sentence just to say that the relations were significant. The graphs appear with neither scales nor units indicated.

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Fig. 14 Peaks are visible but a significance threshold is not given.

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