Review of Discussion Paper www.earth-syst-sci-data-discuss.net/6/779/2013

„High resolution atmospheric reconstruction for Europe 1948-2012: coastDat2

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General comments:

The author introduces the dataset coastDat2, which is an upgrade of coastDat1.

The dataset is the result of the application of one of the recent versions of the Regional Climate Model (RCM) COSMO-CLM (CCLM), forced by NCEP1 reanalysis. The version of the model is appropriate for the tackled task.

For the entire region of Europe, including the Baltic and North Sea and parts of the Atlantic, 103 three variables have been stored hourly. All variables, which are available from the World Data Centre for Climate (WDCC), Hamburg, are indicated in Table 3. One exception exists, namely the variable TOT_SNOW. But I assume that it has not been stored on the server because it can be calculated as the sum of SNOW_CON and SNOW_GSP. Furthermore, all those three-dimensional data are available from WDCC, which are needed for further downscaling in order to perform more regional studies with even higher spatial resolution.

All data are stored in NetCDF format, which is state of the art.

The temporal extension until 2012 and the higher spatial resolution of 0.22° (≈ 25 km) are pointed out as the advantages of the coastDat2 dataset. From the point of view of the major users of such dataset (50% commercial, and 25% authorities, as indicated in the paper) these advantages might be sufficient. However, from a scientific point of view it would be interesting to discuss whether the higher spatial resolution improved the quality of the data (see also Specific Comments).

In summary, I recommend the publication of the paper after the processing of the specific comments and the corrections of typing errors.

Specific Comments

1. Coming back to the improvement of coastDat2 compared to coastDat1. Sure, the temporal extension and also the higher grid-spacing are relevant advantages of the coastDat2 dataset. However, a higher resolution of about a factor of two (coastDat1 has a resolution of 0.5°) does not necessarily imply an improvement of the quality of the data. It would be interesting to see whether the higher resolution gives an added value compared to the coastDat1 data. There are examples in the literature that, when looking at the climatology, there is hardly an added value due to the indicated increase of the horizontal resolution (see for instance Panitz et al., 2013). But the consideration of variability might show improvements. Thus, to my opinion, the author should at least comment on the aspect of “added-value”. I think, this is necessary in order to convince potential users to use the new dataset, since, as the author shows, there are still rather large deviations of the model results from observations.

2. The server from which the coastDat2 data can be downloaded is only indicated in the abstract in terms of a citation. It would be valuable for potential users if the Web-address of the server is pointed out explicitly at the end of the paper.
3. Abstract: at the very beginning, is it possible to describe with a few additional "adjectives" what kind of data coastDat data are as a whole, e.g. "combined ocean/atmosphere", if this is true?
4. Abstract line 2: what kind of long-term changes can be assessed? Climatic changes? Say what long-term changes you mean.
5. Abstract line 9: say here already that you used COSMO-CLM;
6. Abstract line 10: say here already which global reanalysis you used (NCEP1)
7. Motivation: Please, start this section with a short description of coastDat data as a whole. What do they represent? One or two sentences should be sufficient. As far as I understood coastDat as a whole is more than coastDat2 or coastDat1, which you denote as the atmospheric part of coastDat.
8. Motivation, page 780, line 20: the sentence starting with "The here described …" is hard to read. Please, reformulate. Is it really of interest to tell the reader which computing system you used? If you skip this, the sentence can be reformulated rather easily.
9. Page 781, line 2 (Model Setup): please, include the citation of Baldauf et al., 2011, which serves now as the official peer-reviewed reference for COSMO: *Baldauf, M., Seifert, A., Förstner, J., Majewski, D., Raschendorfer, M., and Reinhardt, T.: (2011): Operational Convective-Scale Numerical Weather Prediction with the COSMO Model: Description and Sensitivities. Mon. Wea. Rev., 139, 3887-3905, DOI: 10.1175/MWR-D-10-05013.1*
10. Page 781, line 9: include reference to COSMO Homepage as the source for the documentation: http://cosmo-model.org/content/model/documentation/core/default.htm
11. Page 781, line 21: indicate the temporal frequency of NCEP1 data
12. Page 781, line 24/25: is it really necessary to say that INt2LM has been used to interpolate the NCEP1 data? I think, no. Delete the sentence and the citation/reference Schättler (2011).
13. Page 782, line 4: What does "undefined" mean? Of course, the layers are defined. You use 10 soil layers. But the layers 9 and 10 do not belong to the hydrological active layers, and therefore they are not shown in Fig. 2. Say this, that's sufficient.
14. Page 782, line 7 till 16: This part, starting with the sentence "At the lateral boundaries ..." belongs to the description of the model setup, used parameterizations, and dynamics. Thus, delete it here and add it in page 781, line 13, directly after the description of spectral nudging.
15. Page 793, line 2 and 3 (Evaluation): why have corresponding variables, which the users demand for, not been evaluated? Lack of evaluation data?
16. Page 783, line 19 (Near surface air temperature): you describe the differences between coastDat2 and E-OBS. Do you have any idea on the reasons for the large differences over Iceland and North Africa (April till September)? For example, too low albedo values for North Africa? Please, comment on this.
17. Page 784, Section 4.3 "Precipitation": This section is the weakest one of the

paper and needs major revision.

- Fig 5 is mentioned and shown, but not described/discussed at all. Without any discussion it is meaningless.
- Why are Fig. 10 and Fig 11 denoted as appendices? There is no appendix in the paper. Include these figures in the main body of the paper, since they are interesting. The give a good opportunity to discuss in more detail the differences between the observational datasets, a fact, which you only mention in a sub-clause (page 784, line 19). Say a little bit more on these differences: range of differences; where do they differ most (geographically); is there any regional relation between large differences in observations and large deviations of CCLM results from observations. This could also be a good opportunity to relativize the strongest deviations between model and observation.

18. Page 786 Section “Total Cloud Cover”: Can you deduce any physical relations from results of cloud cover and those for near-surface air temperature and precipitation?
19. Page 787, line 5: do you really mean “beneath 213 m”? I see the maxima of observed noon-soundings clearly above 213 m. If “beneath” is correct, then I do not understand the meaning of the sentence.
20. Page 787, Section “Conclusion”: insert a clear

Technical corrections

1. Page 782, line 25, last word: use “are” instead of “was”
2. Page 783, line 17 and also in the rest of the paper: E-OBS data have been introduced as “E-OBS”. Why do you now write eObs? Please, be consistent, write E-OBS here and also in the remaining parts of the paper.
3. Page 785, line 15 (Wind): the duplication of citation “Winterfeld et al.” is not necessary. Begin the sentence with “They”.
4. Page 785, lines 26/27: please, reformulate sub-clause starting with “…., where the roughness …”. “…depends via Charnock relation.. “ is not a good style.
5. Include citation and reference for Charnock’s relation, e.g. Stull, 1988
6. Page 786, line 2: I assume, “form” has to be “for

References:

Baldauf, M., Seifert, A., Förstner, J., Majewski, D., Raschendorfer, M., and Reinhardt, T.: (2011): Operational Convective-Scale Numerical Weather Prediction with the COSMO Model: Description and Sensitivities. Mon. Wea. Rev., 139, 3887-3905, DOI: 10.1175/MWR-D-10-05013.1

Panitz, H.-J., Dosio, A., Büchner, M., Lüthi, D., Keuler, K. (2013): COSMO-CLM (CCLM) Climate Simulations over CORDEX Africa Domain: Analysis of the ERA-Interim Driven Simulations at 0.44° and 0.22° Resolution. Climate Dyn, DOI 10.1007/s00382-013-1834-5

Stull, R. B. (1988): An Introduction to Boundary Layer Meteorology. Kluwer Academic Publishers, Dordrecht, The Netherlands, ISBN 90-277-2769-4, pp. 666.