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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Attribution of European precipitation and temperature trends to changes in circulation types" *by* A. K. Fleig et al.

Anonymous Referee #1

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The topic of this paper is very interesting and relevant when analysing climate change. The publication covers a large spatial scale, thus spatially involves areas with very contradicting observed and projected precipitation (and temperature) trends. Common yearly, half-yearly and seasonal periods may miss important trends because of partly contradicting trends within those periods. Using fixed smaller periods like months does not solve such problems, but contributes to a better understanding of climatic trends. Relating found climatic trends to atmospheric circulation helps understanding causes for such developments.

P12802/L26: sources should be arranged in logic order, either by year of publication (2011 to 2007 or other way around) or author first letter (A to Z); comment relevant for whole paper

P03/L8: more precise is that variations occur on monthly and even shorter time periods, but a monthly resolution is an important step to higher temporal resolutions compared to previous studies

P03/L20: why that time frame? 2001 was 13 years ago, aren't there more up-to-date datasets available? (they are...). I'd suggest to update the time frame at least until 2010, also considering that the SynopVis GWL are available up to recent years.

P05/L14ff: I understand the choice of dataset and time frame given here, but again, in terms of usability, 2001 is too far in the past to create useful up-to-data trend conclusions. For averages the time frame would be totally OK, but for trends it is outdated. Adding recent years may produce very different trend results. In case a prolonging of the time frame is not possible, recent developments (weakening of the NAO etc.) should at least be mentioned and discussed in the text, based on publications of recent years. Just as an example: there was a considerable April drying (and warming) in Central Europe since the 1990 (still continuing), which is not visible at all here, but is very relevant for agriculture, forestry etc. here due to its location at the beginning of the vegetation cycle (P10/L7). Also, drying signals in August may not be visible if including recent years with very high precipitation amounts in CE (2002, 2010 etc.; P10/L13).

The SynopVis GWL has been applied already in various other studies, thus the performance of this classification method has been tested and compared to other circulation classifications before. References of those studies and their evaluation of the SynopVis method should be added.

Chapters 4.3 to 4.5 (fig. 3-5) explain well the developments described in chapters 4.1 and 4.2 (fig. 1). [only drawback is that results are not up-to-date, see previous comment]

It should be mentioned that months are, as seasons and other fixed temporal frames, artificially fixed periods within the annual cycle, and that strongest trends may occur at different positions within a 30day cycle and that opposing trends within a specific

month may lead to only a weak or no signal, while strong developments are actually present.

The definition of wet/dry CT′s based on the annual mean precipitation of each CT (P19/L1) is critical, as CT′s may behave very differently between the seasons. As an example: CT′s with a rather easterly inflow are mostly drier than average precipitation amounts in Central Europe during the winter (also those defined as cyclonic), while the separation in anticyclonic and cyclonic works very well during the summer

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 11, 12799, 2014.