Hydrol. Earth Syst. Sci. Discuss., 6, C2563–C2565, 2009
www.hydrol-earth-syst-sci-discuss.net/6/C2563/2009/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Technical Note: Comparing and ranking soil-moisture indices performance over Europe, through remote-sensing of vegetation" *by* E. Peled et al.

Anonymous Referee #1

Received and published: 10 November 2009

The authors provide a comparison of the interannual variations of soil moisture indices with those in vegetation as captured by NDVI. The aim is to validate soil moisture indices for spring and summer seasons in Europe.

The technical note is well organized, but there are conceptual questions that should be clarified by the authors. Also the aim of the study and methodology are not clear, leading to a difficult interpretation of the results. Thus, a major revision of the paper is suggested before publication according to the following comments.

1) The SPI has been introduced to quantify drought and wetness of a region in relation

to climatological mean; thus, in the international literature it is known as a drought index. PDSI is based on a soil moisture algorithm calibrated for relatively homogeneous regions and has been introduced as a meteorological drought index. They are the most widely used drought indices both operatively and in climate research. Obviously, drought is related to soil moisture but it involves a different concept. Thus, I think that in the paper the authors should refer to PDSI and SPI as drought indices. As a consequence, the aim of the study becomes the investigation of the co-variability of a soil moisture index (NSM) and drought indices (SPI, PDSI) with NDVI;

2) In the introduction, the motivation of the study, which is the "validation" of soil moisture indices through correlation with NDVI, is confused. The authors recognise that NDVI captures variations in vegetation induced by soil moisture, but not only. However, they say, in some seasons and areas we may have high correlation between soil moisture indices and NDVI. Which are these seasons and areas in Europe? It should be demonstrated or some references provided. In addition, the word "validation" means making "valid" the measurements results obtained by a method (in this context soil moisture index). Due to the complex relationship between soil moisture and vegetation variations (NDVI), I think that the authors cannot refer to validation. Again, in my view, the authors are investigating the relationship between drought indices and soil moisture index with changes in vegetation as captured by remote sensing;

3) The authors consider only summer and spring, and compute the normalized seasonal anomalies of the indices. This step is not clear, since the average of an index is different from the index of the average conditions. For example, the SPI or the PDSI values for a given location and month of the year are associated to particular drought/wetness classes; when the time mean is computed over the three months this feature is lost and the associated standardized anomaly does not make sense. Why the authors do not consider the whole time series of the indices and correlate them with NDVI? Or just particular seasons, but taking into account single months;

4) Previous considerations hold also for the area-mean time series of the indices.

Which is the meaning of an area-mean of an index?

5) Why the authors use the SPI on 3-month time scale and not the SPI on 1-month time scale? A study by Lei and Peters (Remote Sensing and Environment, 2003) proved that for northern Great Plains the SPI-3 has the best correlation with NDVI. In the present paper some motivations should be provided.

Based on the questions above, the final interpretation of the results remains not clear to a reader, even if it appears reasonable.

Point-to-point comments:

i) Line 1, abstract: Why starting with “climate change”? I know that it is trendy, but it is not always necessary to invoke climate change to justify any investigation!

ii) Page 6250, lines 16–18: the local available water content of the soil (AWC) is an external parameter in PDSI, this should be clearly stated;

iii) Page 6251, line 13: the SPI can be computed for any time scale not only 1, 3, 6. Usually, 1–3 months are used for assessing meteorological drought, 6–12 months for agricultural drought and 12–48 months for hydrological drought. This should be clarified in the text;

iv) Page 6251, line 14: it is not clear the meaning of the sentence;

v) Page 6252, line 14: Hansen et al. (2003a) is missing in the references;

vi) Page 6254, line 8: why low correlation with NDVI is expected in spring?

vii) page 6255, line 13: it appears greatly exaggerated to write in a scientific journal that a correlation of 0.19 is greater than a correlation of 0.13!

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 6247, 2009.