



Spatio-temporal analysis of a long-term global soil moisture dataset

Angelika Xaver and Wouter A. Dorigo

Vienna University of Technology, Department of Geodesy and Geoinformation, Research Groups of Photogrammetry and Remote Sensing, Vienna, Austria (ax@ipf.tuwien.ac.at)

It is a well known truth that soil moisture plays an essential role within the hydrological cycle and the climate system. Therefore a deeper knowledge and understanding of soil moisture behaviour, changes and pattern is of major interest. This contribution introduces a statistical approach to recognize spatio-temporal patterns within a long-term global soil moisture data set.

The great potential of satellites to detect soil moisture on a global and continuous scale is well-known and in particular microwave remote sensing is recognized to work as the most efficient instrument for acquiring soil moisture information. The current study is based on a long-term global soil moisture data set, the ESA CCI soil moisture data set (<http://www.esa-soilmoisture-cci.org>). It was developed by combining data derived from active and passive microwave satellite-based sensors, profiting from the advantages of both retrieval techniques. The ESA CCI soil moisture data set provides soil moisture information for more than three decades and can easily be extended with products from current and future satellite missions. Relative dynamics and long term changes of the original satellite derived retrievals are preserved in the CCI product, thus a valuable basis for long-term analysis is given. By applying a cluster algorithm to monthly and seasonal means of the combined CCI data regions with similar temporal soil moisture patterns are created. The plausibility of the resulting groups is verified by comparison with land cover classifications and climate classes. Besides, special care has been taken of the treatment of missing values as their existences causes difficulties when statistical methods are applied. In this study various methods for missing value imputation are discussed to provide as much meaningful data as input for the following cluster analysis as possible.

Overall, the described analysis of soil moisture product is expected to improve our knowledge and understanding of soil moisture behaviour and the quality of the used product.