

Impact Assessment of Remotely Sensed Soil Moisture on Ecosystem Carbon Fluxes across Europe

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Abstract

While remote sensing stands alone in being able to provide spatially explicit datasets at regional to global scales, it has so far found only few applications in reporting and verifying ecosystem carbon fluxes within the context of the Kyoto Protocol. One of the problems is that new remote sensing datasets can only be used with new or adapted models and data assimilation schemes. In this study remotely sensed soil moisture data derived from ERS scatterometer measurements are used for the first time to model the carbon balance of Europe. By comparing the model results obtained with and without the use of the remotely sensed soil moisture data, the strong impact of soil moisture on the European carbon balance is demonstrated. For many parts of Europe, modeled net ecosystem productivity decreases when soil moisture is taken into account. A comparison with anthropogenic carbon emissions demonstrates that this effect is quite strong. Several European countries shift from being a carbon sink into a carbon source.

Key words:

Carbon sequestration, water limitation, net ecosystem productivity, soil water index, anthropogenic carbon emissions, coarse resolution satellite imagery