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8th International Congress on Environmental
Modelling and Software - Toulouse, France -
July 2016

Jul 13th, 10:30 AM - 10:50 AM

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Linde, Felix, "Development of Data Fusion Methods for an Improved Estimation of Soil Moisture" (2016). *International Congress on Environmental Modelling and Software*. 36.
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Development of Data Fusion Methods for an Improved Estimation of Soil Moisture

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Abstract: This talk presents recent work on data fusion methods applied to the estimation of soil moisture by means of remote sensing. Particularly in research dealing with landscapes and agriculture there is a need for spatially and temporally resolved estimation of soil moisture from local to regional level and beyond. The methods to evaluate the water content of the soil range from direct measurements, optical and microwave remote sensing to modeling based on precipitation measurements. Usually the availability of the specific data defines the used method. The uncertainties connected to each way of estimation vary with weather conditions, region and data quality. Combination of continually improved measurements like the RADOLAN network by the German Meteorological Service (DWD) that can feed a model with precipitation data of very high resolution and the addition of knowledge from radar-satellites is one example of promising developments. The author presents his ongoing work in combining the different methods to reduce uncertainties, fill gaps in data and understanding the scalability of soil moisture measurements. The key idea is to treat remote sensing and simulations as equal partners in the model-data-integration. The strengths and weaknesses of each approach is briefly presented. The presentation develops ideas on how to combine the different information in a meaningful way to gain greater insight into the real state of the system with regard to soil moisture.

Keywords: *remote sensing, data assimilation, soil moisture, model-data integration*