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ON THE USE OF DUAL-CO-POLARIZED TERRASAR-X DATA FOR WETLAND MONITORING

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Abstract. Today's SAR sensors provide a variety of different image modes particularly with regard to multipolarised acquisitions. Until now, each polarisation mode requires a special decomposition which is a severe drawback when designing processing chains. Therefore, a new description for multipolarized SAR data based on the well-known Kennaugh matrix was developed that enables the uniform description and processing of SAR data independent of its polarisation by separating backscattering strength from polarimetric information. This mathematical approach subsequently is extended to the processing of multitemporal SAR data in order to stabilize the polarimetric information over longer periods of time and to enhance temporal changes in the polarimetric backscattering. Because of the high sensitivity of the Kennaugh elements a novel multilooking technique based on the Gaussian pyramid is used that locally adapts the look factor and thus selects the optimal balance between radiometric accuracy and geometric resolution. This methodology is applied to two dual-co-polarized TerraSAR-X acquisitions over the RAMSAR testsite "Upper Rhine" in order to generate value-added products that help to map land cover and land cover changes in consequence of water level changes. The first results are very promising although the interpretation of the observed polarimetric changes is not yet validated. The aim of this paper is to present a further application of the (Differential) Kennaugh matrix which will be the kernel of a polarimetry and change detection processor to be implemented in the coming years.

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