Introduction

Today, synthetic aperture radar (SAR) imagery is successfully used to assess the state of forests and monitoring their dynamics. In this study, the potential of C-band RADARSAT 2 for monitoring vegetation cover is investigated. The test areas are chosen so that we analyze two scenarios under different types of natural surfaces. Ocnele Mari salt mining area (Fig. 1), located in a hilly region, is affected by land deformations (landslide and subsidence) and vegetation degradation. The second is Braila agricultural area (Fig. 2) covered with crops and forest having a flat surface. PolSAR and PolInSAR were applied for a quantitative estimation of vegetation cover combined with coherent scattering modeling.

Results

The classification results are depicted in Fig. 3 and Fig. 4. It is observed that the SAR geometry effects and topography induce a relative mixture in the scattering mechanism (Fig. 3) whiles higher values of soil moisture content are obtained in Danube meadow by applying the SVM classifier. PolInSAR technique was applied to the interferometric pairs with short temporal baselines to extract vegetation height (Fig. 5). The interferometric coherence is optimized by using polarimetric correlations between polarizations so that the polarization which could yield highest coherence is obtained. Thus, vegetation height estimation is improved, but remains overestimated due to topography (Ocnele Mari case) and higher moisture content (Braila case).

Research

Polarimetric SAR allows as to extract information for identification and classification of different natural features since each polarization is sensitive to different surface characteristics (shape and orientation) and properties (soil moisture, surface roughness and vegetation cover). In the polarimetric SAR interferometry that combines interferometric and polarimetric SAR imaging techniques, information of different polarization channels are used to investigate the object structure and perpendicular layers of the scatterer. Polarimetric coherence optimization that implies maximization of the signal-to-noise ratio, usefully in more accurate topography estimation, is applied to vertically structured media for obtaining dominant scattering centers (Claude et al., 1998; Neuman et al., 2007). A set of Fine Quad and dual polarized RADARSAT-2 data, acquired in ascending and descending mode, in the joint ESA-CSA SOAR Europe-16605 scientific proposal framework covering July 2015 to May 2015 period, have been used in the study. Table 1 lists the image pairs with their respective temporal and perpendicular baselines used in this study.

Conclusion

The PolSAR, PolInSAR and multi-temporal SAR analysis were performed for vegetation cover monitoring. The classification accuracy is improved significantly if the Wishart classifier is applied on the multi-temporal dual polarized dataset. Since SVM classifier accuracy depends on training data, a Gaussian kernel function and a training parameters settled on 0.5 had been used in the soil moisture classification. It observed that the classification maps does not follow a specific pattern.

In the PolInSAR analysis, the best results were obtained at the beginning (April 2015—Braila case) and at the middle of the vegetation season (July 2014—Ocnele Mari case).

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