Geophysical Research Abstracts
Vol. 13, EGU2011-7935, 2011
EGU General Assembly 2011

Multi-temporal COSMO-Skymed data for landcover classification

Giuseppe Satalino, Francesco Mattia, Anna Balenzano, Antonella Belmonte, and Donato Impedovo
ISSIA-CNR, Bari, Italy (satalino@ba.issia.cnr.it)

1. Introduction

Land cover/use maps are an important information layer for a number of applications requiring a spatial knowledge of land classes, such as for instance crop yield forecasting. Thanks to the improved spatial resolution and the reduced revisiting time of the new generation of spaceborne SAR systems, such as Cosmo-SkyMed, an increasing interest in exploiting SAR data for land use classification is emerging as an alternative or an integration to the use of optical data where the cloud cover is a problem.
Several past studies have assessed the sensitivity of SAR data at C and L band to various crop or land classes and their use for crop mapping or land classification [Ferrazzoli et al., 1997; Le Toan et al., 1997; Mattia et al., 2003; Stankiewicz, 2006, Skriver et al., 2010; Satalino, 2010]. On the same themes, relatively little work has been however conducted by using X-band SAR data due to the lack of long series of data. Nowadays, the availability of spaceborne SAR systems operating at X-band and characterized by a short revisiting time represents a good opportunity to deeper explore the use of this frequency for land cover classification. With this view, the objective of this paper is to investigate the potential of multi-temporal series of X-band SAR data acquired over an agricultural area in Souther Italy for land cover classification.

2. experimental data

The investigated agricultural area is located in the Capitanata plain close to the town of Foggia (Puglia region, Southern Italy). The site has been monitored since 2006 in the framework of national and international projects. The principal crop cultivated in the monitored area is durum wheat (approximately 54% of the agricultural area). Other important seasonal crops are tomato and sugar beet. From March to September 2010, measurements of agronomic and structural parameters (e.g. soil moisture content, fresh and dry biomass, LAI, plant height, etc.) were collected, on 23 sampling dates, over 15 selected fields. In the same period, 2 SPOT images and 13 X-band COSMO Sky-Med images (Stripmap PingPong product, with HH and HV polarization) were acquired. SAR data were calibrated, coregistered and spatially and temporally filtered.

3. Data analysis and classification scheme

The study, firstly, investigates the radar signatures of various crops, during their entire phonological stages, as a function of radar polarizations, incidence angle and the level of filtering (in terms of Equivalent Number of Looks) employed. Then, a classification scheme based on the maximum likelihood algorithm is applied to the multi-temporal data set and its accuracy illustrated with respect to a reference map obtained by means of SPOT data.

4. References

-Ferrazzoli P., Paloscia S., Pampaloni P., Schiavon G., Sigismondi S., Solimini D. (1997). The Potential of Multifrequency Polarimetric SAR in assessing Agricultural and Arboreous Biomass. IEEE Trans. Geosci. Remote Sens., Vol. 35, No. 1: 5-17.
-Le Toan T., Ribbes F., Wang L.F., Floury N., Ding K.H., Kong J.A., Fujita M., Kurosu T. (1997). Rice Crop Mapping and Monitoring using ERS-1 Data based on Experiment and Modeling Results. IEEE Trans. Geosci. Remote Sens., 35: 41-56.
-Mattia, F., Le Toan T., Picard G., Posa F., A. D'Alessio, C. Notarnicola, A.M. Gatti, M. Rinaldi, G. Satalino, G. Pasquariello (2003). Multitemporal C-band radar measurements on wheat fields. IEEE Trans. Geosci. Remote Sensing, vol. 41, no 7, pp 1551-1560, July 2003.
-Stankiewicz K. (2006) - The Efficiency of Crop Recognition of ENVISAT ASAR Images in Two Growing

Seasons. IEEE Trans. Geosci. Remote Sens., 44(4): 806-814.
-H. Skriver, F. Mattia, G. Satalino, A. Balenzano, V. R. N. Pauwels, N. E. C. Verhoest, and M. Davidson (2010). Crop Classification using Short-Revisit Multitemporal SAR Data. Accepted for classification on IEEE Journal of Selected Topics in Applied Earth Observation and Remote Sensing.
-G. Satalino (2010). Discrimination of wheat crop by using co-polarized ratio derived from ASAR data. AIT - Rivista Italiana di Telerilevamento, N. 42-1, pp. 27-36, 2010.

Acknowledgement
This work was supported by the Italian Space Agency (COSMOLAND project, contract nr. I/051/09/0).