

CLOUD SCREENING WITH COMBINED MERIS AND AATSR IMAGES

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1. INTRODUCTION

One innovative element of the Environmental Satellite (ENVISAT) is its large number of complementary Earth observation (EO) instruments. However, up to date the integrated analysis of data from more than one instrument has not been explored in detail by the scientific community, leaving a large potential for increasing our knowledge about the Earth unexploited. Two optical instruments onboard ENVISAT are the Medium Resolution Imaging Spectrometer (MERIS) [1] and the Advanced Along Track Scanning Radiometer (AATSR) [2]. These instruments provide similar products (resolution, swath) but complementary information (different spectral domains, different viewing geometries). New generation EO satellites, such as GMES/Sentinel-3, will continue the same instrument concepts and thus the synergistic use of MERIS and AATSR data will be also of paramount relevance.

One of the key preprocessing tasks before extensive exploitation of optical multispectral images is the cloud screening step since clouds impair multitemporal monitoring and biophysical parameter estimation in a reliable way. Images acquired by both MERIS and AATSR instruments, which work in the visible and near-infrared and in the visible and infrared ranges of the electromagnetic spectrum respectively, may be affected by the presence of clouds [3]. In this sense, the objective of this research is to explore the synergistic use of MERIS and AATSR data.

2. PROPOSED METHOD

The developed cloud screening scheme relies on the extraction of meaningful physical features (e.g. brightness, whiteness, temperature), which is combined with atmospheric absorption features at specific spectral band locations (oxygen and water vapor absorptions) to increase the cloud detection accuracy [4, 5]. The method is based on simulated data generated from coupled surface and atmospheric radiative transfer models. In particular, several situations covering a wide range of real scenarios are simulated and then are used for developing supervised cloud classifiers (classification trees, multilayer perceptron, and support vector machines). The second part of the cloud-screening algorithm consists in a refinement of the obtained supervised cloud mask that is based on real MERIS/AATSR images. All these features are inputs to a cloud screening algorithm, which also provides a cloud product indicating the cloud contamination per pixel instead of binary flags.

3. RESULTS AND CONCLUSIONS

The proposed algorithm is validated by means of processing synthetic data and extensive experimental results are shown on real remote sensing data consisting of a set of MERIS/AATSR images for a number of representative sites worldwide. Results and analysis of the algorithmical proposal will be shown at the time of the conference. Summarizing, the paper describes a synergetic cloud-screening processing scheme aimed at combining information of both AATSR and MERIS instruments in order to improve current cloud masking products for both sensors.

4. REFERENCES

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