AUTOMATIC GENERATION OF EMISSIVITY MAPS ON A EUROPEAN SCALE

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The remote sensing measurement of the land surface temperature from satellites provides an overview of this magnitude on a continuous and regular basis. The study of its evolution in time and space is a critical factor in many scientific fields such as weather forecasting, detection of forest fires, climate change, and so on.

The main problem of making this measurement from satellite data is the need to correct the effects of the atmosphere and the surface emissivity. In this work, these corrections have been made using a split-window algorithm. The aim was to define and implement an application to automatically calculate and generate maps of land surface emissivity from images of the AATSR (Advanced Along Track Scanning Radiometer) onboard the Envisat satellite [1].

For the production of these emissivity maps, the geometric model described in [2] was used. This model is summarized in the following equation:

(1)

$$\varepsilon = \varepsilon_v P_v + \varepsilon_s(1 - P_v) + 4 < d\varepsilon > P_v(1 - P_v)$$

where ε_v and ε_s are, respectively, the vegetation and soil emissivities, $< d\varepsilon >$ is the effective cavity term and P_v is the vegetation cover fraction. It calculates the effective emissivity in a heterogeneous surface from a land use map (such as [3]) and vegetation cover fraction image.

To estimate the vegetation cover fraction (P_v), from the AATSR visible and near infrared channels, the following equation can be used:

(2)

$$P_v = \frac{1 - \frac{i}{i_s}}{\left(1 - \frac{i}{i_s}\right) - K\left(1 - \frac{i}{i_v}\right)}$$

where *i* is the NDVI (*Normalized Difference Vegetation Index*), i_s and i_v are the NDVI values obtained for a full vegetated surface and for a bare soil one, respectively, and K is given by:

(3)

$$K = \frac{\rho_{2v} - \rho_{1v}}{\rho_{2s} - \rho_{1s}}$$

ρ_{2v} and ρ_{1v} being the near infrared and red vegetation reflectivities, respectively, and ρ_{2s} and ρ_{1s} the same measurements made on a bare soil.

Finally, the validation of the monthly emissivity composite was made by comparing the results of the application, and the values obtained in previous campaigns [4] carried out in the area of rice fields of Valencia, Spain.

The importance of this work is that no maps for this specific sensor were available until now. Initially, this article was focused on Europe, but we hope to be able to produce the same for the whole world in the next future.

REFERENCES

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