

ON THE USE OF COMPACT L-BAND DICKE RADIOMETER (ARIEL) AND UAV FOR SOIL MOISTURE AND SALINITY MAP RETRIEVAL: 2008/2009 FIELD EXPERIMENTS

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1. INTRODUCTION

A light-weight L-band radiometer has been designed and implemented at the RS Lab of the Universitat Politècnica de Catalunya (UPC) to gather radiometric airborne data sets at low-cost. The design of the compact L-band Dicke radiometer (ARIEL) and a general overview of the self-designed aircraft were described in [1]. Preliminary results of the avionics and the radiometer have proven the system performance and capabilities [2] for soil moisture and sea surface salinity retrieval applications. Among other activities, ARIEL will be involved in the SMOS CAL/VAL activities that will take in the REMEDHUS site (Salamanca, Spain) during the second half of 2009 [3, 4].



Figure 1. R/C aircraft carrying the ARIEL radiometer during a flight.

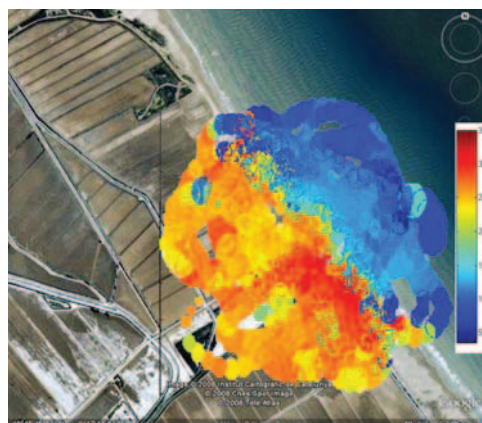


Figure 2. Geo-referenced antenna temperatures in Kelvin in a test flight over the Ebro river mouth, September 2008.

2. APPLICATIONS

The flexibility of this platform offers a wide range of applications such as precision agriculture, coastal monitoring, and scientific studies. On one hand the possibility to perform soil moisture measurements from a R/C aircraft can be exploited for agricultural applications like crop or marshes monitoring, but it can also be useful for other monitoring and prevention activities, such as fire risk. For coastal monitoring, the length of the fresh water plume can be monitored, since it presents a higher brightness temperature than the sea salt water. This is of special interest in areas such as the Ebro where there is a regression of the river mouth. On the other hand, the system will be used for scientific studies with application to satellite missions such as SMOS (or eventually SMAP as well) by obtaining soil moisture maps over mid-size regions by flying the radiometer at several altitudes, to provide a comprehensive data set for the development of pixel disaggregation techniques [4].

3. EXPERIMENTAL FIELD CAMPAIGNS

In order to retrieve soil moisture and salinity maps, a number of experimental field campaigns are being conducted over different scenarios during the time frame 2008-2009. Three main different scenarios have been selected: 1) Palau d'Anglesola (Lleida, Spain), for agricultural applications: land and crop monitoring, with different irrigation levels, 2) Ebro river mouth (Deltebre, Spain), for agricultural (rice fields) and coastal applications, and 3) the REMEDHUS site (Salamanca, Spain) for SMOS calibration and validation (CAL/VAL) activities.

4. CONCLUSION

The results of these field experiments will be presented and discussed at the conference.

5. REFERENCES

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