



## **Inferring snow parameters using C-band data from ENVISAT/ASAR alternating polarization in alpine environment**

M. Niang<sup>1</sup>, A. Martini<sup>2</sup>, JP. Dedieu<sup>3</sup>, E. Paquet<sup>4</sup>, M. Bernier<sup>5</sup>, L. Ferro-Famil<sup>2</sup>, E. Pottier<sup>2</sup>, Y. Durand<sup>1</sup>, G. Guyomarc'h<sup>1</sup>, L. Mérindol<sup>1</sup> and C. Sergent<sup>1</sup>

<sup>1</sup>Météo-France/CEN, 1441 rue de la Piscine, Domaine Universitaire, 38406 St. Martin d'Hères cedex, France

Mohamed.Niang@meteo.fr

<sup>2</sup> IETR/CNRS, Université de Rennes1, Bât. 11D, 263 av Gén Leclerc, CS 74205, 35042 Rennes Cedex, France

<sup>3</sup> LGGE/CNRS, 54 rue Molière. Domaine Universitaire, BP.96, 38402 Saint Martin d'Hères cedex, France.

Dedieu@lgge.obs.ujf-grenoble.fr

<sup>4</sup> Electricité de France EDF/DTG, 21 av. Europe, 38000 Grenoble, France.

<sup>5</sup> INRS-Eau, Terre, Environnement (ETE), 490 rue de la Couronne, Québec (Québec), G1K 9A9, Canada.

ENVISAT /ASAR Alternating Polarization images were acquired in a north French Alps test site over the Romanche River basin, using ascending and descending orbits from February to May 2004. During each ENVISAT data acquisition, an intensive field measurement of snow pack properties (snow lines, snow pits) and weather conditions were gathered on bare fields.

In this project, we attempt to develop a new inversion technique for snow parameters (SWE, liquid water content, grain size etc) retrieval from ENVISAT /ASAR data by using ground-based experimental data and/or backscattering models. First, we will

examine the theoretical behaviour of the backscattering ratios using IEM, GO and SPM models; as function of the snow parameters and of the incidence angle in order to determine the most sensitive parameters. For these simulations, two assumptions will be tested: mono-layer and multi-layer for the snow model. For ENVISAT/ASAR data, a topographic processing will be done in order to determine the local incidence angles using a fine DEM.

Data sets will be analyzed by the way of statistical variation detection methods jointly applied to VH and VV polarization intensity images. Different backscattering ratios and multi-temporal ratios will be analyzed with respect to changes in the ASAR data as function of changing snow pack parameters.

Finally, a model for snow parameters retrieval will be established and the results will be compared to the distributed SAFRAN/CROCUS snow model (Météo-France) and the set of ground validation measurements simultaneous to the SAR image registration.

This research initiative is a collaborative investigation between different research laboratories and partnerships : CEN/Meteo-France, LGGE/CNRS, IETR/CNRS, EDF-DTG for France, and INRS-ETE for Québec/Canada.