

# Open PhD position

## Fusion of high resolution remote sensing data for snow monitoring

### Context

Remote sensing acquisitions have complementary characteristics in terms of spatial and temporal resolution and are able to measure different aspects of snow cover (surface physical properties, type of snow, etc.). By combining several acquisitions, it would be possible to obtain a precise and continuous monitoring of the snow. However, this approach is still an unresolved scientific challenge.

This thesis proposes to address this problem by developing innovative methods of data fusion in the specific context of the monitoring the snow. Developing techniques able to automatically monitor the snow is of fundamental importance for many scientific fields (such as hydrology, climate studies, risk prevention, etc.) allowing for a better understanding of our environment.

### Objectives

This thesis is placed at the crossing point of methodology and application. The candidate is expected to carry out a methodological development within the data fusion domain and to transfer these developments in the operative scenario devoted to the characterization of the snow. Specifically, the objective of this thesis is the implementation of an automatic monitoring system of the snowpack and its properties by integrating remote sensing data with different characteristics, ground measurements and auxiliary data. Research will be conducted on three main axes:

- retrieval of the snow properties using approaches based for example on spectral unmixing
- fusion of optical images with different characteristics in order to improve the spatial, spectral and temporal resolutions of the available observations
- integration and exploitation of ground measurements

The outcomes of the analysis will be integrated in the system used for monitoring and predicting changes in snow cover developed at CNRM-GAME, MeteoFrance (Safran-Crocus-Mepra chain, <http://www.cnrm.meteo.fr/spip.php?article555&lang=fr>).

**Supervisors:** Jocelyn Chanussot (director, GIPSA-lab), Mauro Dalla Mura (advisor, GIPSA-lab) and Marie Dumont (advisor, MeteoFrance)

**Location:** Département Images et Signaux, Gipsa-LAB, Grenoble and CNRM, MeteoFrance, Grenoble

**Duration:** Start in October 2015 for 3 years

**Salary:** According to French standards (about 1500 € net/month)

## Required skills

- Scientific masters degree (completed before the PhD start)
- Background in signal and image processing
- Notions and interest in remote sensing
- Programming skills (e.g., in Matlab, Python, C/C++ or Java).
- Good English proficiency

## To apply

In order to apply, interested candidates should send their application (CV, transcript of academic results, motivation letter and a list of references) to [jocelyn.chanussot@gipsa-lab.grenoble-inp.fr](mailto:jocelyn.chanussot@gipsa-lab.grenoble-inp.fr), [mauro.dalla-mura@gipsa-lab.grenoble-inp.fr](mailto:mauro.dalla-mura@gipsa-lab.grenoble-inp.fr) and [marie.dumont@meteo.fr](mailto:marie.dumont@meteo.fr).