



# SIGMAPhy

SIGNAL IMAGES PHYSIQUE

LEADER

**Barbara NICOLAS**

**2 researchers** (CNRS)

**5 professors** (Grenoble INP)

**1 engineer** (CNRS)

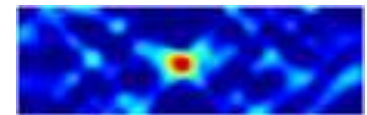
**23 PhD**

**4 postdocs**

## SIGNAL AND IMAGE PROCESSING COMBINED WITH WAVE PHYSICS FOR ENVIRONMENTAL KNOWLEDGE AND MONITORING

### RESEARCH TOPICS

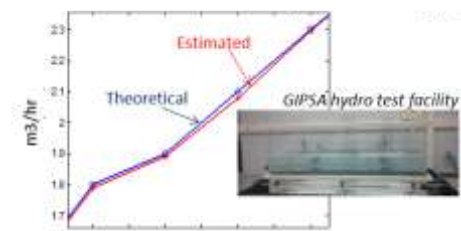
- ◆ Underwater Acoustics : active and passive tomography, localisation (source/target) in complex environments.
  - ◆ Optical / Radar Remote Sensing: segmentation, estimation, very high spatial / spectral resolution.
  - ◆ Imaging by transient signals : seismic waves, ultrasound transients, fluorescence signals.
- ➔ Monitoring and knowledge of oceanic, terrestrial and underground environments



*Target localisation*



*Spatio-spectral Classification*



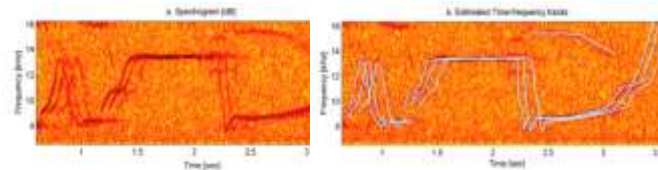
*Imaging by transient signals*





## APPROACHES

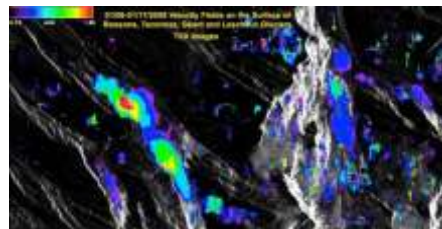
- ◆ Statistical signal processing
- ◆ Array processing
- ◆ Mathematical morphology
- ◆ Data fusion
- ◆ Supervised classification and kernel methods
- ◆ Multidimensionnal filtering
- ◆ Source separation
- ◆ Hierarchical approaches
- ◆ Time-frequency representations
- ◆ Sparse representations



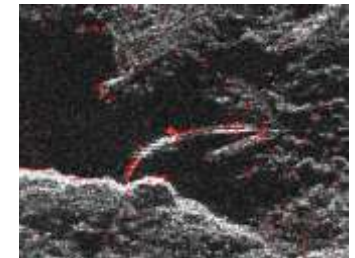
Identification of marine mammals songs



Underground detection



Methods of data processing SAR-HR for glacier monitoring



Tomography / Point Target SAR Interferometry

## KEY POINTS

- ◆ Member of **Labex OSUG@2020**
- ◆ Collaborations with scientists in Earth and Universe Sciences :
  - Local OSUG: ISTerre, LGGE, LTHE
  - National: IUEM, LEMAR, ENSTA-Bretagne
- ◆ **International collaborations** : PhD co-advising (Spain, Iceland, Italy), international... (Portugal, Iceland, Roumania, United States)
- ◆ **Implication**: creation of IEEE Whispers Conference, Editor-in-Chief of IEEE JSTARS, Institut Carnot "Energie du Futur"
- ◆ **Industrial collaborations** (PhD, projects) : DGA, EDF, Thales, Trixell, CEA LETI, CEA Saclay

Publications : *IEEE JOE, JASA, IEEE TGRS, IEEE TSP, EURASIP Adv. on SP, IEEE GRS Letters, Patter Recognition.*

