

GeoStat is an [INRIA](#) project located at [INRIA Bordeaux Sud-Ouest \(INRIA BSO\)](#), inside the theme: *applied mathematical computation and simulation, optimization, learning and statistical methods*

The team makes fundamental and applied research in the analysis of complex natural signals using paradigms and methods from Statistical Physics such as: **scale invariance, predictability, universality classes**

We study the parameters related to common statistical organization in different complex signals and systems, we derive new types of

sparse

and

compact representations

, and

machine learning approaches

. We are also developing tools for the analysis of complex signals that better match the statistical and geometrical organisation inside these data: as a typical example, we cite the evaluation of

cascading properties of physical variables

inside complex signals.

GeoStat's research thematics are centered on the following theoretical developments:

- **Signal processing using methods from complex systems and statistical physics,**
- **Sparse and compact representations, signal reconstruction, machine learning,**
- **Predictability in complex systems,**
- **Analysis, classification, detection in complex signals.**

and the following applied objectives:

- **Analysis of complex and turbulent signals in earth observation, universe sciences and remote sensing.**
- **Complex dynamics in the analysis of heartbeat signals.**
- **Speech analysis.**
- **Super-resolution.**
- **Non convex optimization methods (3 years contract with i2S company).**

Partners:

- [Laboratoire Ondes et Matière d'Aquitaine \(Soft matter and Biophysics team\), Bordeaux, France](#) .
- [Laboratoire d'Astrophysique de Bordeaux, UMR CNRS 5804, Bordeaux, France](#) .
- [Institute for Astrophysics, University of Cologne](#) . [Link to GENESIS project.](#)
- [ICM-CSIC, Department of physical oceanography, Barcelona, Spain](#) .
- [LEGOS Laboratory, UMR CNRS 5566, Toulouse, France](#) .
- [Laboratory of theoretical physics and condensed matter University Paris 6, CNRS UMR 7600, Paris, France](#) .
- [IRIT, UMR CNRS 5505, Toulouse, France](#) .
- [IIT Roorkee, India: since February 2014, GEOSTAT is an associated team with India IIT Roorkee's team of Prof. D. Singh.](#)
[Link to associated team "OPTIC" web page](#)

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GeoStat is a member of [GDR PHENIX](#) .

GeoStat is a member of [GDR ISIS](#) .

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