

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**, **universal**

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. 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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- [Comcausa associate team website.](#)

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

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

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