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**, and **classicality 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 d'Astrophysique de Bordeaux, UMR CNRS 5804, Bordeaux, France.
- Institute for Astrophysics, University of Cologne. Link to GENESIS project.
- Laboratoire Onde et Matière d'Aquitaine, Bordeaux, France.
- ICM-CSIC, Department of physical oceanography, Barcelona, Spain.
- LEGOS Laboratory, UMR CNRS 5566, Toulouse, France.
- Laboratoire 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.

GeoStat is a member of GDR PHENIX.

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GeoStat is a member of GDR AMF.