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.

GeoStat is a member of GDR PHENIX.

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