

- **Associated team Comcausa.**

N. Brodu (Geostat), Inria@SiliconValley international lab, James P. Crutchfield.

[Link to Comcausa website.](#)

- **IMECO: Programme CNRS LEFE/MANU (2018-2020).**

Intermittence multi-échelles de champs océaniques : analyse comparative d'images satellitaires et de sorties de modèles numériques.

Participants: Laboratoire d'Océanologie et de Géosciences, CNRS UMR LOG 8187, INRIA Geostat, Laboratoire d'Etudes en Géophysique et Océanographie Spatiales CNRS UMR LEGOS, Laboratoire d'Océanographie Physique et Spatiale CNRS UMR LOPS.

- **Labcom with I2S company (2017-2022).**

H. Yahia (INRIA Geostat) and C. Lacroix (I2S).

[See INRIA announcement.](#)

Cavernom project. Regional initiative (ref. 9129): with Conseil Regional Aquitaine: Cardiac Arrhythmia Complexity and Variability by means of Robust Nonlinear Methods.

G. Attuel (Geostat).

- **Exploratory Action CONCAUST (Trajectoires causales multi-échelles).**

N. Brodu (INRIA Geostat).

This project proposes to develop a new class of predictive models, exploiting concepts from machine learning, statistical physics and finance. The estimation of these models from data, as well as their validation, are also covered. It is a question of identifying the causal equivalence classes of the system studied and then modeling their evolution by a stochastic process. Renormalization makes it possible to move from the continuum scale to the arbitrary scale where data is acquired.

- **VocaPnée.**

Teams involved in the project: INRIA (Geostat, Tau, SEd, DSI, DS and possibly other EPIs; AP-HP (Pitié-Salpêtrière); INSERM and Sorbonne Université (UMR-S 1158).

The objective of the VocaPnée project (initially CovidVoice) is to develop a vocal biomarker for the remote monitoring of home patients with acute (like Covid) or chronic (like asthma) respiratory disease. This biomarker will then be integrated into a telemedicine platform, ORTIF or COVIDOM for Covid, to assist the doctor in assessing the patient's respiratory status.

- **Generalization for land cover identification. Geostat and the Indo-French Centre For Applied Mathematics.**

Duration: 3 years. PIs: N. Brodu (Geostat) and D. Singh (IIT Roorkee, India).

Land cover classification from satellite imagery is an important application for agriculture, environmental monitoring, tracking changes foremergency, etc. The typical methodology is to train a machine learning algorithm to recognize specified classes (urban, forest, fields, etc...) over regions of interest and classify new images when they become available. Yet, the generalization ability of such systems often not accounts for spatial consistency. High scores are obtained on the reference points, but nearby points of the same class are incorrectly classified. Local context, pixels around the selected one, may help in recovering that spatial consistency and increase the recognition rate. This may also induce spurious patterns and overfit the learning algorithm, which is especially the case for with Convolutional Networks trained on limited number of data. This proposal investigates how to use local context and how to best sample the data in order to provide the best generalization ability. Data will be sampled on reference locations and used for training and validation.

- **GENESIS Project (Geostat, Laboratoire d'Astrophysique de Bordeaux, Physics Inst. (Köln University)**

GENeration et Evolution de la Structure InterStellaire (GENESIS) (GENeration and Evolution of Structure in the ISm).

3-year contract, 2017-2020. Other partners: Heidelberg (ZAH, Universitt Heidelberg): (numerical simulation, PDFs, C+ chemistry, radiative transfer), CfA Harvard, USA: (filamentary cloud structure, PDFs), Canberra, Australia: (numerical simulations, PDFs), IAS Paris: (Turbulence, Structure), CEA Saclay: (numerical simulations, filaments, Herschel).

[Link to GENESIS project.](#)

- **ANR Voice4PD-MSA**

Duration: 4 years. partners: Geostat, CHUB, CHUT (Bordeaux), IRIT, IMT (Toulouse). Led B. K. Daoudi (Geostat).

[Link to Voice4PDMSA project.](#)

- **PHC-TOUBKAL**

Duration: 2 years. Caractérisation multi-capteurs et suivi spatio-temporel de l'upwelling sur la côte atlantique marocaine par imagerie satellitaire.

Partners: GEOSTAT, Rabat University, CRTS ((Centre Royal de Télé-detection Spatiale), MERCATOR-OCEAN, Moroccan Ministry of Fishery. Funding of A. El Aouni PhD thesis.

- **CNES PhD funding**

Duration: 3 years. PhD grant provided by CNES and Conseil Regional Aquitaine, in collaboration with Laboratoire d'astrophysique de Bordeaux

. Starting: end 2016. Subject: understanding the dynamics of galactic dust clouds and their relation with star formation process.

- IFCAM**Duration: 3 years**

. PhD grant for G. Singh from IIT Roorkee, under co-supervision with D. Singh (IIT Roorkee).

- Indo-French Centre for Applied Mathematics (IFCAM) project [2014-2017]**Title : Optimal inference in complex and turbulent data.**

3-year contract, IFCAM funding, started 2014. Partners: GEOSTAT and IIT ROORKEE (INDIA).

- Icarode [2013-2016]**Participants : Hussein Yahia, Oriol Pont, Véronique Garçon, Joel Sudre, Antonio Turiel, Christine Provost [LOCEAN] .**

4-year contract, CNES-NASA funding, started 2013. Title: ICARODE: Integration and cascading for high resolution ocean dynamics.

Project leader: H. Yahia.

- Oceanflux ESA, Support to Science Element [2011-2013]

Participants : IWR (University of Heidelberg), LEGOS (CNRS DR-14), GEOSTAT (INRIA), KIT (Karlsruher Institut für Technologie, Frankfurt), IRD, Université Paul Sabatier.

High resolution mapping of GHGs exchange fluxes.

Project leader: **IWR**.

- **CRSNG Canadian Programme. Profilage à partir des données hétérogènes du Web pour la cybercriminalité [2011-2014]**

Participants : Concordia University (coordinator), University of Sherbrooke, E-Profile Company, S. d. Quebec, K. Doudi (GeoStat)

Use of various complex signals for cybersecurity.

- **Hiresubcolor [2008-2012]**

Participants : Hussein Yahia, Oriol Pont, Véronique Garçon, Joel Sudre, Antonio Turiel, Christine Provost [LOCEAN] .

4-year contract, CNES-NASA funding, started mid 2008. Title: HIRESUBCOLOR : Multiscale methods for the evaluation of high resolution ocean surface velocities and subsurface dynamics from ocean color, SST and altimetry .

Project leader: **H. Yahia**.

- **IHU LIRYC and CRA DIAFIL project [2012-2014]**

Post-doctoral fellow: B. Xu.

Project leaders H. Yahia and O. Bernus.

- **PHC Volubilis on coastal upwelling [2011-2013]**

Project leader: **K. Daoudi**.

- **ARC FIBAUR [2010-2012]**

Title: Fibrillation auriculaire: approches nouvelles pour l'analyse des signaux complexes du rythme cardiaque".

Participants : GeoStat, Unité de recherche INSERM EA3668 Electrophysiologie et Stimulation Cardiaque (Hôpital du Haut Léveque de Pessac, équipe du Professeur M. Haissaguerre) and ESPCI Paris-Tech (Laboratoire SIGMA).

ARC started March 2010. [Web site.](#)

- **RTRA-STAE**

Participants : Khalid Daoudi, Hussein Yahia, Véronique Garçon, Sylvie Roques, Régine Obrecht.

Proposal, started end 2008, whose title is: Approches géométriques et multiéchelles pour la prédictibilité et l'analyse de données complexes astrophysiques et géophysiques satellitaires.
Participating labs: **INRIA, CNES-LEGOS, LATT, IRIT.**

Project leader: **K. Daoudi.**

- **REGION AQUITAINE PROJECT "OPTAD"**

Participants : GeoStat members

Proposal, started end 2010.

Project leader: **H. Yahia.**