UnivEarthS

Science and outreach at the geo-astro interface

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Université Paris Cité

The LabEx UnivEarthS

Founded in 2011 as a joint partnership of 4 laboratories/institutes :



> One of the first « Laboratoires d'Excellence » funded

through the French Government « Investments for the Future » plan (35 billion €) Main aims:

- increase resources of research units with international visibility,
- attract researchers and teacher-researchers of international renown
- build an integrated policy research, training and development of high level.
- Supervising academic/research institutions:



The LabEx UnivEarthS

Main objective of UnivEarthS:

« To combine scientific and technical expertise, the experience in space programs and the HR of of the partner labs to develop interdisciplinary projects in the fields of Earth Sciences and Astrophysics »

Evolution – Catastrophes - Emergence









Stellar explosions Black holes Multi-messsenger astronomy...

Primordial Universe Inflation Dark energy Dark matter... Development of planetary systems Earth formation Mars exploration,...

Earth evolution Geological catastrophes Origin of life,...

Key figures and governance

Directors:



People involved in UnivEarthS

LabEx first phase: 2011 – 2019



Key figures and governance

Scientific Committee



George Smoot





Sotiris Loucatos

Vice-Chair



Anna Franckowiak



Carsten Dominik



David Shoemaker



Augusto Neri



Marianne Lemoine-Goumard



Liane Benning



Juan-José Hernandez-Rey



Donald Dingwell



Maud Boyet



Catherine Johnson



Fernando Ferroni



Christine Thomas

Scientific Work Packages



Some Interface projects

		UNIT OF CONTRACT OF CONTRACTO OF	+ international collaborators: J.Harms (INFN Florence), B.Whiting (Florida University), M.Ando (Tokyo University), F Sorrentino (INFN Genova)
Prompt Gravity Anomalies and Seismic/Newtonian Noise		! See talk by $ ightarrow$	JP.Ampuero (Caltech),
	Exploratory \rightarrow Interface Project (2013 - 2021)		

Next evolution: explore the possibility to build a laser interferometer on the Moon



- GW detection
- Lunar seismology

also developing within AHEAD2020 !



Strong impulsion by S. Katsanevas...

Some Interface projects



Gamma-ray bursts in the multi-messenger era



Study of GRBs as potential sources of gamma-rays, neutrinos, cosmic rays and gravitational waves & characterization of their environment



...triggered APC participation in the SVOM mission:



To be launched June 2024

Some Interface projects



Astroparticle Research Geology and Oceanography

UnivEarthS

T : concevoir un détecteur de neutrinos sous-marin est aussi un défi l'ingénierie mécanique



tif de ce télescope est de découvrir les sources des neu rchie de masse des neutrinos, de grandes qu

Key contribution of A. Iliioni (LabEx engineer) as **Technical Project Manager**



Exploiting the interdisciplinary potential of the KM3NeT detector:

- Marine instrumentation
- Earth tomography with atmospheric neutrinos

(see next talk!)

Test bench @APC



Calibration Base

Unit: environmental monitoring

Outreach and Education

UnivEarthS Fall Schools



- About 40 participants: PhD, postdocs, Master students, but also engineers & high-school teachers
- Lectures on Astroparticle Physics, Geo-science, Common tools
- Posters and mini-presentations by the students

Outreach and Education

Training in Space Sciences

IGOSat: Ionospheric and Gamma-ray Observation Satellite

Scientific Payload

GPS receiver for studying the electronic content of the ionosphere Scintillator for characterizing electrons and gamma-rays content

Mission profile

3U CubeSat (10 x 10 x 34 cm, <4kg, ~4W) Quasi polar orbit at 650 km altitude

Partnerships

Funding: LabEx UnivEarthS + CNES + Educational partnership with Universities of Hanoï and Ho-Chi-Minh City

Since the start of the project, >250 students have participated to the design, tests or simulations of the mission





Summary and Outlook

Since 2011, LabEx UnivEarthS has fostered the development of an active scientific community working at the interface of astro(particle) physics and geosciences under the « hat » of Université Paris Cité (UPC)

- More challenges ahead, including instrumentation
- UnivEarthS gave rise to other « spin-off » initiatives:
 - Merging of computing centers of APC and IPGP within an integrate platform hosted by UPC Space Campus
 - Doctoral School STEP'UP:
 (Earth and Environment Science and Physics of the Universe in Paris)
- > 2024: end of a cycle, new funding opportunities
 - Project of a Graduate School « Earth-Planets-Universe »
 - Increase/formalize participation of international partners (possibly through Circle U. Alliance)







Circle U. Alliance

Circle U. European University Alliance

About us

Circle U. is a research-intensive and interdisciplinary alliance working to provide outstanding education, research and innovation to contribute to more sustainable, democratic and healthier societies.

We are:

- Aarhus Universitet
- Univerzitet u Beogradu
- Humboldt-Universität zu Berlin
- King's College London
- UCLouvain
- Universitetet i Oslo
- Université Paris Cité
- Università di Pisa
- Universität Wien

