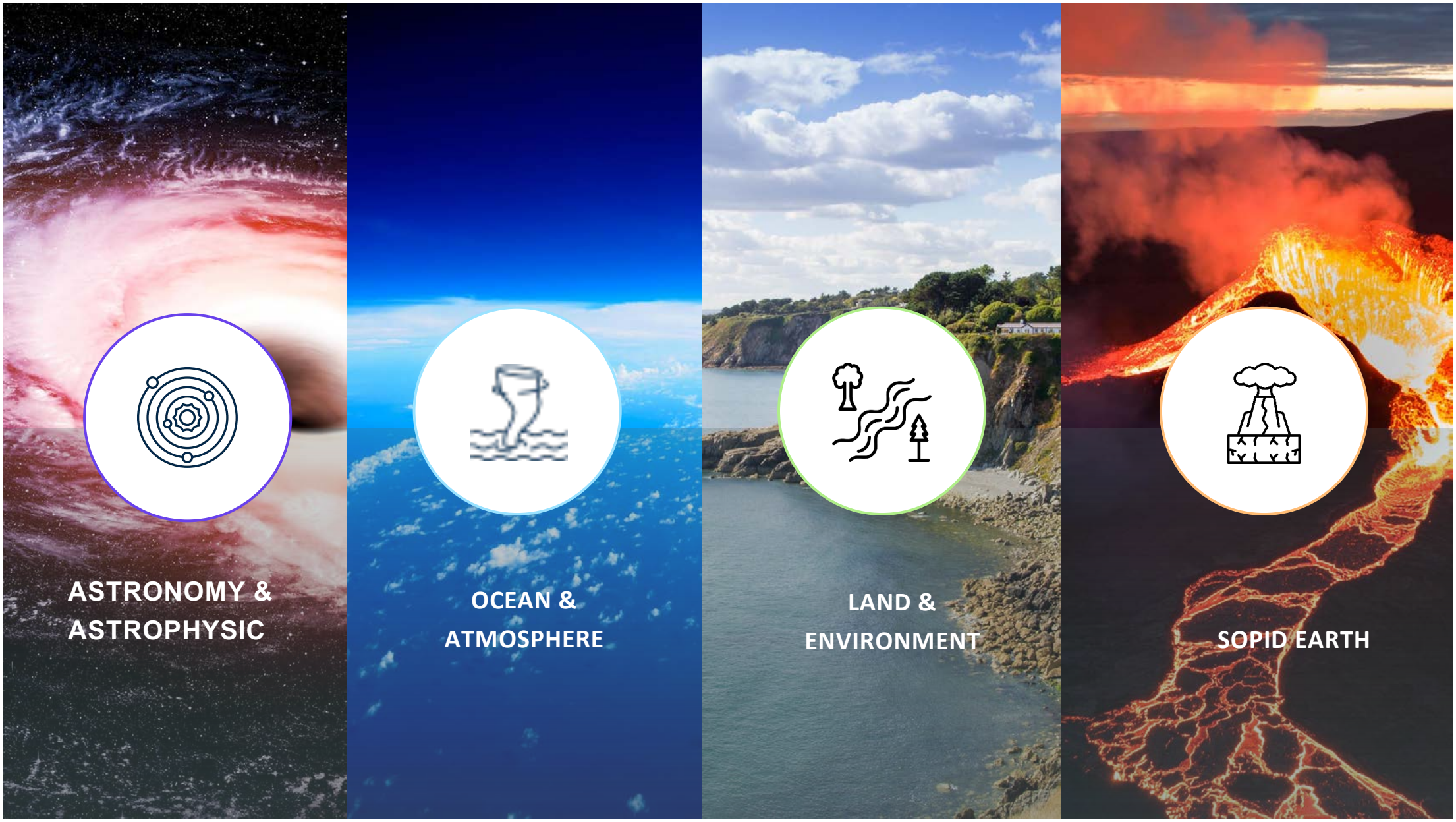
INSU

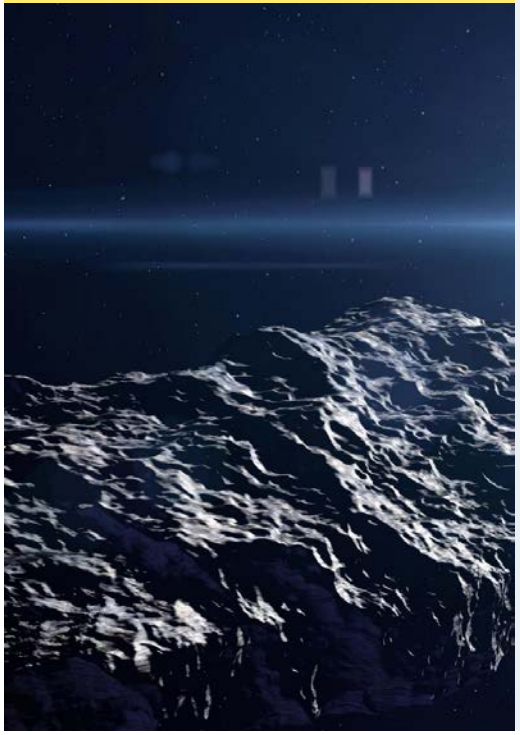
Institut National des Sciences de l'Univers

National Institute for Earth & Space Sciences

CRP JOINT SCIENTIFIC COMMITTEE
FRENCH SCIENCE SESSION - 12 MAY


ASTRONOMY &
ASTROPHYSIC
OCEAN &
ATMOSPHERE
LAND &
ENVIRONMENT
SOPID EARTH

Arrêté d'Institut national du
29 avril 2016



A National role of coordination for Eath & Space sciences

Mission

to develop and coordinate national and international research in the sciences of the Earth, continental surfaces and interfaces, the ocean, the atmosphere and astronomy.

National Head for

research in the sciences of the Universe, the planet and the environment, and CNES partner for the CNRS.

Leader of

national inter-organizational foresight in 4 major fields, with a shared approach to programs, incentive actions and structuring equipment (TGIR/IR).

An institute at the service of society and decision support: an institute with a mission...

Understanding to enlighten and prevent on the basis of our knowledge

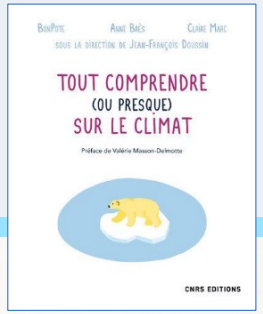
- CNRS (and INSU) a major contributor to the IPCC report
- Mobilization following various crises in Reunion (Cyclones) Mayotte (vocano) and Santorini (earthquakes)

Informing national and local players

- Teaching climate change to 18000 civil servants
- Construction of local IPCC groups in each region
- Agreement with local players from municpalities to Regions

Passing on the approach and the fruits of research

- Books, web and social networks
- Member of OCE



A few figures

6000

Researchers and technical staff in labs

2400

Researchers et technical staff from CNRS

72M€

Total with w/o slaries

250M€

salaries

1700

Docs/post docs

99

Labs and observatories

34M€

Dedicated to large scale research ifrastructures

The pillars of our action

Programs

Foresigh exercises

Research infrastructures

Observatories

A SPECIFIC SYSTEM

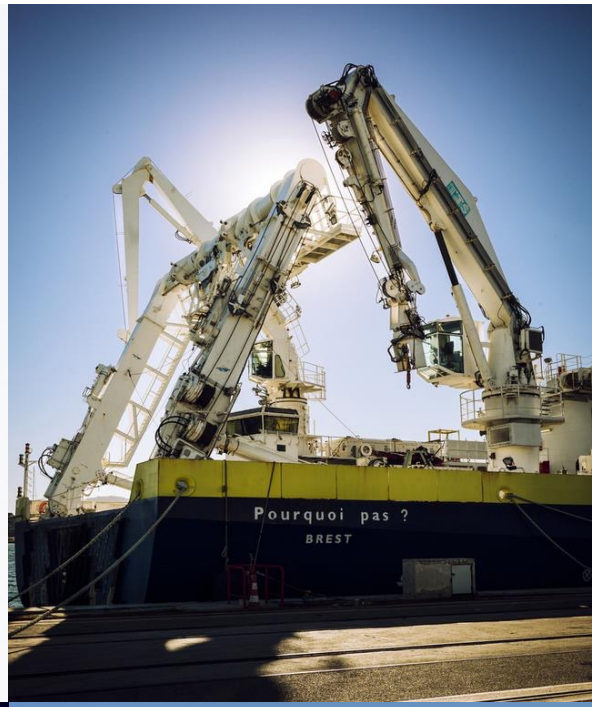
IN SUPPORT OF SCIENTIFIC EXCELLENCE

OFFERING MAJOR TOOLS, SUPPORT FOR EMERGENCE, COORDINATION AND SYNERGY FOR EVERYONE

STRUCTURING THE HIGHER EDUCATION AND RESEARCH LANDSCAPE FOR THE BENEFIT OF ALL PLAYERS

Large research infras.

Offering acess to unique systems and an ecosystem of instrumental innovation and dedicated community resources



450 M€

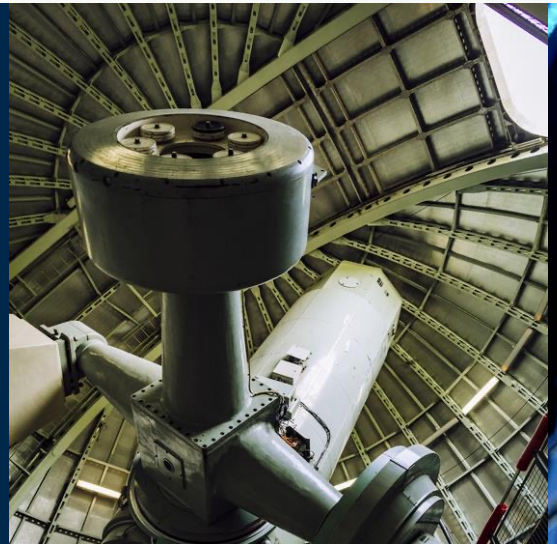
Annual Total cost

75

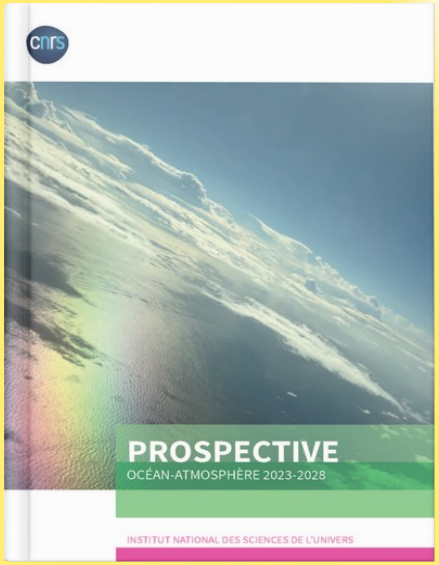
Partner countries

18000 To

Of raw acquisition per year



CNRS-INSU Ocean & Atmosphere foresight effort (2024-2029)



This foresight exercise was conducted with many partner organizations: Météo-France, IRD, Cnes, Ifremer, Ademe, Shom, CEA, Inria, and Universities

understanding, forecasting and supporting society in a changing climate

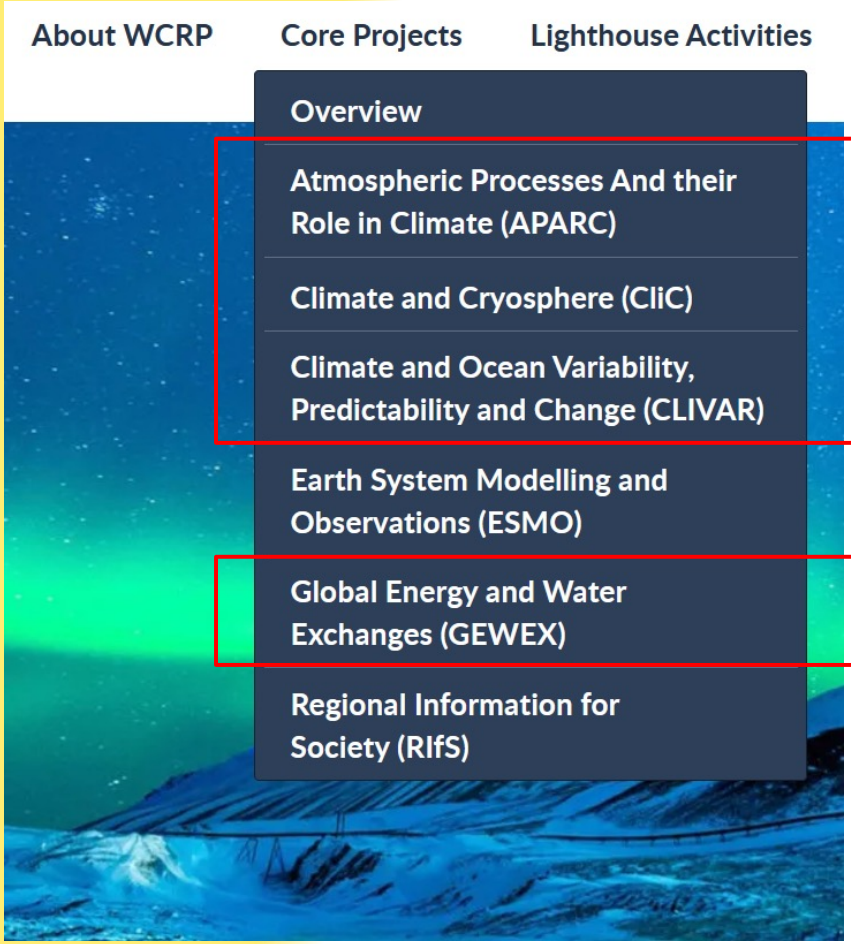
6 scientific challenges:

- Climate system variability, trends and tipping points
- Extreme events
- Atmospheric convection
- Living diversity & biogeochemistry
- Anthropization of environments and pollution
- Couplings and scale interactions

4 priority areas:

- Urban
- Tropics
- Poles
- Continent-ocean continuum

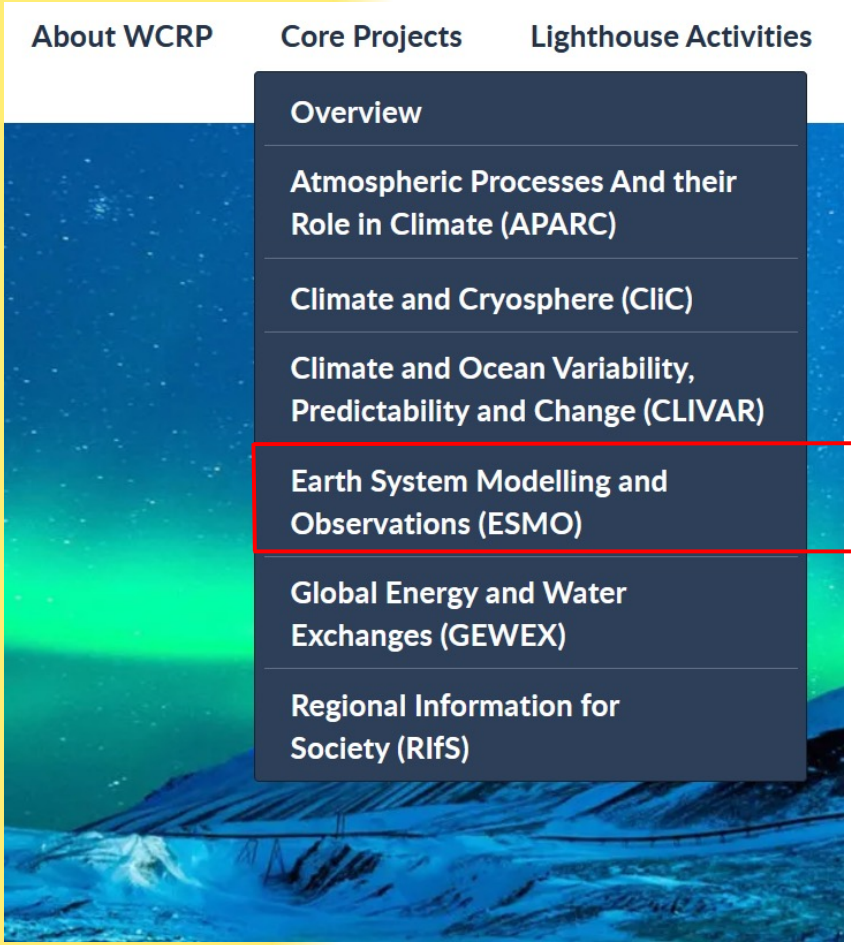
CNRS-INSU Ocean & Atmosphere scientific challenges and their relevance for to WCRP Core Projects : a « perfect » match?



- Climate system variability, trends and tipping points
- Extreme events
- Atmospheric convection
- Living diversity & biogeochemistry
- Anthropization of environments and pollution

- Extreme events
- Atmospheric convection

CNRS-INSU Ocean & Atmosphere RIs and their relevance for to WCRP Core Projects : a « perfect » match (again) ?



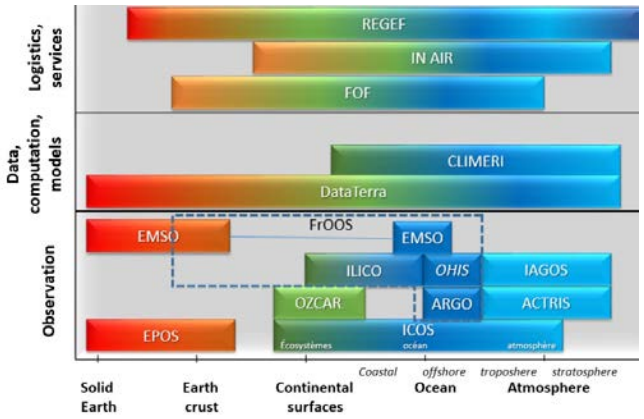
CLIMERI: **modeling the Earth's climate system**
Data Terra: **E-infrastructure integrated observation system**

ACTRIS: **Aerosol, Clouds and Trace Gases**
IAGOS: **In-service Aircraft for a Global Observing System**
ICOS-Atmosphere: **Integrated Carbon Observing System**

IR IN-AIR Airborne Fleet

ARGO: **floats-based observing system**
ILICO : **Coastal observing system**
ICOS-Ocean: **Integrated Carbon Observing System**
OHIS: **Ocean offshore in situ observing system**
EMSO: **EU Multidisciplinary Seafloor and water column Observatory**

IR* FOF French Oceano. Fleet



France's Research Infrastructures Landscape

A variety of research topics relevant to WCRP Core Projects

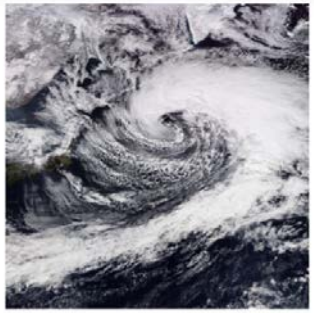
MENU cnrs TERRE & UNIVERS Actualités Actualités

ven. 11.04.2025

RÉSULTAT SCIENTIFIQUE OCÉAN ATMOSPHÈRE

Les algues glaciaires : un rôle crucial dans l'absorption des nutriments et l'accélération de la fonte des glaces

Glacial algae: a crucial role in nutrient uptake and accelerating ice melt



mar. 08.04.2025

RÉSULTAT SCIENTIFIQUE OCÉAN ATMOSPHÈRE

Couplage ocean-atmosphère à fines-échelles : influence sur les tempêtes

Fine-scale ocean-atmosphere coupling: influence on storms

mar. 15.04.2025

RÉSULTAT SCIENTIFIQUE OCÉAN ATMOSPHÈRE

Retrait précoce de la glace et puits de CO2 anormal dans l'Atlantique sud en été austral 2022

Early ice retreat and anomalous CO_2 sink in the South Atlantic in austral summer 2022

jeu. 23.01.2025

RÉSULTAT SCIENTIFIQUE OCÉAN ATMOSPHÈRE

Climat : la variabilité interne décide du niveau de réchauffement et d'humidification de l'Europe du Nord à court-terme

Climate: internal variability determines short-term warming and humidification in Northern Europe

mer. 27.11.2024

DÉMARCHE SCIENTIFIQUE OCÉAN ATMOSPHÈRE

ICOS-France-Atmosphère : les gaz à effet de serre battent des records en 2024

ICOS-France-Atmosphere: greenhouse gases break records in 2024

ven. 22.11.2024

RÉSULTAT SCIENTIFIQUE OCÉAN ATMOSPHÈRE

Le changement climatique : une menace avérée pour le plancton calcifiant

Climate change: a proven threat to calcifying plankton

Cookies & Services

The TRACCS research program (2023-2030)

A 51 M€ PEPR program connected to the CLIMERI-France, Data Terra Research Infrastructures

Led by

Funded by

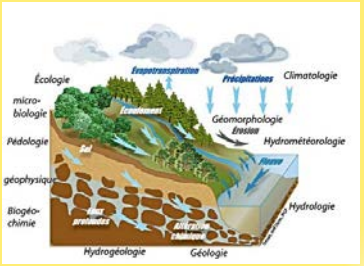
Operated by

The TRACCS research program - TRAnsformer la modélisation du Climat pour les services ClimatiqueS - aims to **accelerate the development of climate models to meet societal expectations in terms of mitigation and adaptation to climate impacts and risks.**

Main activities:

- improving the reliability of climate models and developing downscaling and bias correction methods,
- developing prototype climate services co-constructed with the stakeholders concerned,
- exploring technological and scientific advances (notably new computing architectures and artificial intelligence techniques) that open up new perspectives for climate science,
- training the next generation of climate experts in all areas of modeling and the development, provision and use of climate services.

CNRS-INSU Continental Land & Ecosystems (Critical Zone) forsight exercice (2024-2028)



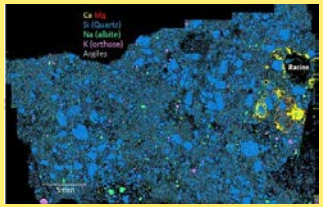
Understanding and predicting the impacts of global changes on the Critical Zone. Adaptin and mitigating the impacts, with and for society, at the territorial scale.

FIVE THEMATIC CHALLENGES:

- Interfaces and Continuums in CZ
- Integration of Different scales of Space and Time in the Study of CZ stocks & Natural Resources (Water, Carbon, and Critical Metals)
- Sustainability in a Context of Global Change and Planetary Boundaries
- Contaminants & Pollution: Fate, Impacts, and Solutions
- Urban and Peri-Urban Critical Zones

FOUR METHODOLOGICAL CHALLENGES:

- Let's observe the observatories
- CZ Data: Measurements and instrumentation, services and repositories, tools and models
- Science-Society Continuum and Transdisciplinarity: co-construction of action research to support the transition of territories
- Environmental responsibility of SIC research



Some recommendations:

Given the rapid pace of change in critical environments, it is essential to continue

- **the acquisition of continuous, long-term measurements through a co-located approach integrating in situ and remote sensing observation, experimentation, modeling (eLTER Ris)**
- and the harmonization of analytical protocols at the national level.

The analysis of increasingly numerous and complex data and its interpretation

- will require new approaches, relying on the use of machine learning (AI) methods (e.g., AI-assisted automation, database creation, etc.),
- while retaining and modernizing analysis techniques that are experiencing declining skill levels (e.g., palynology, pedology, organic petrography, etc.).

To improve our understanding of these processes, it will be necessary

- **to strengthen the linkage of models of climate, erosion, transport, deposition, biogeochemical, diagenetic, hydrological, and ecological nature,**
- as well as those specific to land-sea interfaces, such as hydrodynamic models (marine submersion),
- those specific to solid earth/surface, surface/atmosphere, and climate, as well as social sciences

The output data from global/national models (climat
including extreme events, socio-economic trajectories) will serve as input data for territorializec models co-constructed with decision-makers in order…

…to establish scenarios for the impact of human societies (and their trajectory) on the exchange of materials and assess the vulnerability and resilience of (coastal, urban, agricultural) socio-ecosystems.