CLIMAT AmSud

2023 call for proposal approved projects

CELESTE

Impact of climate and land use change on soil and water resources

EMSH2FS

Energy management system for hydrogen-based flexibility services

GHG for MACC

Identifying enteric methane emission factors from pasture-based ruminant livestock in contrasting agro-climatic regions for mitigation of climate change.

TROPIPOLAR-GLASCLIM

Tropical to polar glacier mass balance reconstructions and their relationship with climate variability

CELESTE

impaCt of climatE and Land usE change on Soil and waTer rEsources

Climate change is expected to lead to increased soil erosion in many locations worldwide,affecting ecosystem services and human well-being. Accelerated soil erosion will threaten agricultural production's sustainability and lead to enhanced sediment and contaminant transfer to river systems and dam reservoir siltation, limiting the life expectancy of hydroelectric power production resources. To disentangle the respective roles played by climate and land use change on soil degradation and that of water resources, the current project proposes to gather experts from different Earth Science disciplines (climatology, sedimentology, soil science, agronomy, geology), from different countries eligible to this call (France, Brazil, Uruguay, Argentina, Colombia) and rely on a set of complementary methods (field monitoring, sediment multi-proxy dating, and tracing, computer modelling)
to propose an original scientific approach to investigate this timely research question. This will create an international and interdisciplinary network of complementary teams, which will train the next-generation of scientists on these urgent and timely issues. Erosion and sediment transfer models at the landscape/catchment scale will be calibrated and validated for a wide range of environmental conditions observed in France and South America. Furthermore, this approach will be complemented by the design and application of novel sediment fingerprinting approaches (a method of measuring a panel of biophysico-chemical properties in both potential sources and target sediment to quantify sediment source contributions). Finally, the validated models will be able to simulate scenarios of further land use and climate change to predict their impact on the quality of water and soil resources. The results will be disseminated to the scientific community and local/national stakeholders to guide the implementation of effective management measures to protect soil and water resources.

Project coordinators

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EMSH2FS

Energy management system for hydrogen-based flexibility services

This research proposal entitled “Energy Management System for Hydrogen-based Flexibility Services” will analyze the requirements for the successful integration of hydrogen-powered services used by Latin American power grids when flexibility-related actions are required to preserve the system’s reliability. This proposal is focused on the interactions among the ISOs and DSOs, assuming that the latter is able to cluster prosumers, loads, and energy storage systems in microgrids. In this sense, additional requirements for energy management systems will be considered to include the diversity of hydrogen provenances and flexibility services.

This proposal is relevant in the Latin-American context since it is aligned with the decarbonization and energy transition policies, stated in the climate change mitigation strategy. In this regard, this proposal will contribute to highlighting the most relevant issues in the planning and execution of energy transition roadmaps inside the region. However, as mentioned, exploiting the opportunities related to the integration of hydrogen-powered services, in addition to the distributed generation, and the microgrids implementation, imply integrating adjacent technologies for control and telecommunications. In this sense, this project will also contribute by proposing a novel transactive scheme for distributed power grids where flexibility services are required. This scheme will be validated through simulations and submitted to peer review Q1 journals. To overcome the proposed goals, a methodology composed of four (4) stages is proposed as follows:

Stage I: State-of-The-Art and Latin-American Energy transition roadmaps comparison.

Stage II: Characterization of requirements for hydrogen-powered technologies integration to the Latin-American context.

Stage III: Transactive scheme for hydrogen-powered services.

Stage IV: Energy management for hydrogen-based flexibility services in power grids

Project coordinators

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GHG for MACC

Identifying enteric methane emission factors from pasture-based ruminant livestock in contrasting agro-climatic regions for mitigation of climate change.

Agricultural emissions represent about 25% of total anthropogenic greenhouse gas (GHG) emissions, and livestock production contributes about half of these, through emissions of methane (CH4) from their enteric fermentation of feeds.

Thus, a transition of current livestock systems towards lower carbon livestock systems is unavoidable, if we want to combat climate change. Nearly 70% of the world's agricultural land area is pastoral land and used for livestock production. In France and in South America, pasturelands are the main feed for ruminant production systems. Thus, we propose to establish a collaboration between France and 3 South American countries (Argentina, Chile and Uruguay) with the goal to estimate enteric CH4 emission factors of pastoral livestock production and evaluate mitigation options in those 4 agro-climatic zones. This collaboration will consist of an interdisciplinary team of experts in GHG emission measurements, GHG emission modelling, and animal production and mitigation strategies that reduce animal methane emissions. The team of experts will train at least 3 future PhD students and 1 postdoc engaged in joint ongoing research projects (Eranet Integrity; Fontagro). The team of experts will transfer competency and technology in measurement, modelling, and mitigation of GHG, between members through group and individual research stays, as well as to the public through webinars. Scientific publications and technical notes will also be disseminated to increase the visibility of our work for farmers, researchers and policy makers.

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TROPIPOLAR-GLASCLIM

Tropical to polar glacier mass balance reconstructions and their relationship with climate variability

Worldwide glacier retreat is causing important environmental changes from local (e.g., water availability) to global (e.g., sea level rise) scales. Understanding the impacts of climate change and its variability on glacier mass balance (MB) requires considering the influence of climate forcing at various scales. Recent studies reported that both glacial and local climate changes are influenced by various climatic forcings, ranging from large-scale factors such as El Niño-Southern Oscillation (ENSO) or the Southern Annular Mode (SAM), to regional-scale factors such as atmospheric and oceanic circulation patterns, sea ice, and sea surface temperature. The extent of these influences depends on the geographical location of each glacial region. Given the environmental and socio-economic significance of glaciers and their local climate, long-term glacier-climate studies are of paramount importance to improve our understanding of their past, present, and future changes. In this project, we first aim at reconstructing glacier MB time series from tropical to polar latitudes using a combination of machine learning (ML) techniques and regional climate model (RCM) outputs. Then, we aim to investigate the interannual and seasonal variability of glacier mass balance from tropical to polar latitude regions (i.e. Andes, Patagonia and Antarctic Peninsula regions), and their relationship with climate forcing factors at seasonal and inter-annual time scales. Building upon existing literature, we will use state-of-the-art ML algorithms to develop robust models able to capture the complex nonlinear interactions between different climate and topographical variables and glacier MB. These models will be trained using historical glacier MB data and RCM outputs, and validated using independent datasets. The outcomes of this project will provide valuable insights on the impacts of climate change on tropical to polar glaciers, considering the influences of specific large to regional scale climate forcings. These new insights are extremely relevant for climate change adaptation decisions. Finally, this proposal will contribute to the capacity building of young scientists for climate and glaciological research through exchanges of PhD students and postgraduates between the institutions involved and through the organisation of workshops.

Project coordinators

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