

DATA SCIENCE FOR CLIMATE AND AGRICULTURE

Studying the relationship between land use and climate change

Call deadline

October 26th, 2023

CALLS 2023

Fondazione
CARIPLO

TUTE SERVARE MUNIFICE DONARE • 1816



In collaboration with

Fondazione
Patrimonio
Ca' Granda



Abbate cura di ciò che vi è stato donato · 1456



FONDAZIONE
Osservatorio Meteorologico
Milano Duomo *ETS*

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1. INTRODUCTION

“Data Science for Climate and Agriculture - Studying the relationship between land use and climate change” is a call promoted by the Scientific Research and the Environment Areas falling in Fondazione Cariplo strategic goal “Scientific research: supporting multidisciplinary research for the well-being of people and the socio-economic development of communities”.

The call is in collaboration with Fondazione Patrimonio Ca’ Granda and Fondazione Osservatorio Meteorologico Milano Duomo ETS, which provide the datasets detailed in Appendix for public interest and research purposes.

2. BACKGROUND

In 2018, the European Council adopted the LULUCF Regulation (Land Use, Land Use Change and Forestry) on the inclusion in the 2030 climate and energy framework of greenhouse gas emissions and removals resulting from land use, land use change and forestry. In its approach, the Regulation aims to set targets for Member States for the period 2021-2030 and to harmonize these targets through other European directives (notably, Farm to Fork and Biodiversity 2030).

In this context, the new regulation provides a framework for encouraging a more respectful land use, which will also help farmers to develop more sustainable farming practices. In the long run, it will therefore be increasingly necessary to develop methodologies for monitoring the emissions from agricultural and livestock activities, create geo-referenced datasets, in addition to the use of inventories of climate-changing gas emissions (CO₂ and non-CO₂) and adopt new indicators comprehensive of various types of parameters (related to soil quality, climate, land use and the adopted agricultural practices).

3. AIMS

In light of the scenario outlined above, the call intends to support research projects in the field of Data Science that analyze the relationship between land use and climate change at the finest possible spatial scale. Projects should pay particular attention to the main agricultural practices in the geographical area of intervention of Fondazione Cariplo, with the final goal of enhancing the role of agricultural activities in soil carbon storage capacity and providing an useful knowledge base to foster new development opportunities for carbon farming.

Starting from the datasets provided by Fondazione Patrimonio Ca’ Granda and Fondazione Osservatorio Meteorologico Milano Duomo ETS, detailed in Appendix, applicants are required to formulate original working hypotheses, accurately describe the techniques and methods of Data Science that they intend to apply and develop new interventions and policies to support carbon sequestration through agricultural activities and decrease emissions. Should additional datasets be used for comparative analysis, applicants will take care to describe them in detail, specifying their added value for the achievement of the project objectives.

Where proposals are submitted in partnership, it will be essential to clarify the expertise contributed by each project partner and how this complements that of the leading organization in a unified design.

In order to stimulate the public debate and promote the adoption of models and guidelines developed, applicants should identify specific ways of sharing the evidence obtained as a result of the research, produce position papers and policy briefs and engage the relevant stakeholders in line with

the principles of Responsible Research and Innovation (RRI)¹.

Finally, given the labour market needs for professional profiles and skills in the field of Data Science, proposals shall offer training opportunities and professional growth to the researchers involved.

4. GUIDELINES

4.1 Eligible subjects

Public or private non-profit organizations conducting scientific research. Third sector organizations (e.g.: private non-profit organizations active in the environmental and/or agricultural field) can participate as partners only. It is mandatory for the operational headquarter of the leading organization to be located within the geographical area of intervention of Fondazione Cariplo (Lombardy and provinces of Novara and Verbano-Cusio-Ossola). This requirement does not apply to potential partners.

By participating to the call, organizations allow the portability of the grant. The transfer of research and funds to another organization will be evaluated by Fondazione Cariplo taking into account the provisions of the present call, the guidelines for submission of proposals (“Guida alla presentazione dei progetti su bandi”) and the general criteria for granting awards (“Criteri generali per la concessione dei contributi”), available on Fondazione Cariplo website.

4.2 Eligible projects

To be eligible, projects must meet the following requirements:

- develop independent research for public utility purposes;

¹ The European movement on the theme of RRI is constantly evolving, as emerges from the debate which has recently led to the so called “Rome declaration on RRI” (https://ec.europa.eu/research/swafs/pdf/rome_declaration_RRI_final_21_November.pdf). Considering the available literature, it is possible to describe RRI as a dynamic and iterative process which intends to match research and innovation to values, needs and expectations of the society. Moreover, RRI aims at actively involving all the stakeholders taking part to activities of research and innovation, making them mutually responsible with respect to both the research process and its results.

- propose a research design using methods and techniques of Data Science;
- use the datasets provided by Fondazione Patrimonio Ca’ Granda and Fondazione Osservatorio Meteorologico Milano Duomo ETS;
- comply with the scientific priorities detailed in section 3 “Aims”;
- identify a researcher with a maximum age of 45 years, reached by the deadline of the call, as the principal investigator of the leading organization².

Principal investigators (PIs) of all the involved organizations (leading and partner) are allowed to:

- submit one proposal only to the call;
- not be the PI of any other ongoing proposal previously funded by the Scientific Research Area (except for calls in partnership with other granting bodies)³.

The total cost of the project should include additional costs⁴ and overhead only, according to the eligibility criteria and the thresholds listed below:

- A03 - “Equipment and software”
This entry shall not exceed 30% of the additional costs. It fully covers the costs for newly acquired equipment and software of multi-year use acquired *ex novo*. It is mandatory to clearly motivate these costs according to the specificity of the project.
- A04 - “Others amortizable costs”
This entry can include patent costs, as well as costs related to equipment rental.

² Extension of eligibility:

- maternity leave: 18 months for each child;
- paternity leave: effective period of paternity leave for each child;
- serious illness leave (over 90 days): actual period taken for each illness.

³ A proposal is considered ongoing unless the final grant reports - both the scientific and the financial one - have been uploaded on our website before the deadline of this call.

⁴ Sum of: A03, A04, A06, A07, A08, A10.

- A06 - “Temporary staff”
This entry shall include research personnel costs. The cost for administrative staff is not allowed.
- A07 - “Sub-contractors and consultants”⁵
This entry can include costs of accessing databases and utilities for the project such as, for example, computing power or virtual machines, both in cloud and remote.
- A08 - “Materials and supplies”
This entry cannot include costs related to office supplies and photocopies.
- A09 - “Overheads”
This entry cannot exceed 5% of the additional costs.
- A10 - “Travel, publication and dissemination costs”
This entry can include travel expenses and conference participation fees for the research personnel involved in the project, costs for meetings between partners, publications costs, training and dissemination activities costs.

The grant will cover 100% of project costs; therefore, the total cost of the project should correspond to the requested amount.

Requested funding must not exceed 200.000 Euros.

Projects must have a maximum duration of 24 months.

Proposals should provide the following mandatory documents:

- Host Institution agreement⁶;
- Partnership agreement⁷;

⁵ Given the amount of the maximum funding that can be requested, the obligation to acquire the Financial Audit from a certified auditor cannot be prefigured for this Call. However, in case an organization wishes to acquire - on a voluntary basis and in accordance with its internal procedures - the financial audit, the related cost can be charged in the expenditure item A07. In any case, the prerogatives already recognized to the Foundation regarding the verification of the financed projects remain unaffected, which therefore may order the carrying out of sample accounting-administrative checks as part of its annual planning of audit activities.

⁶ Host Institution agreement should be filled in according to the available online format.

- Project form as PDF file⁸;
- Detailed budget as EXCEL file⁹.

By participating in the call, organizations accept and undertake to respect the indications contained in the following documents, available online for the download: “Policy della Fondazione Cariplo in tema di tutela della proprietà intellettuale”, “Policy di open access” e “Linee guida per la citazione del contributo nelle comunicazioni scientifiche”. It should be noted that all publications that will derive from the project results will have to report the affiliation of the organization with which the proposal was submitted. In addition, for the purposes of preparing the proposal, it is recommended to carefully read the FAQs specifically prepared for this call.

4.3 Criteria

The evaluation of the received proposals will be carried out according to the methods outlined in the document “Guida alla presentazione dei progetti su bandi”¹⁰ and the criteria represented below:

1. SCIENTIFIC QUALITY (weight 30%)

- clarity in the formulation of objectives and proposed strategies;
- relevance of the project with respect to the state of the art;
- presence of a logical and well-structured research design;
- suitability of the proposed methods and techniques with respect to the research objectives;

⁷ Partnership agreement should be provided exclusively in case the project involves partner and should be filled in according to the available online format.

⁸ Project form should be drawn up on the basis of the form made available for the call.

⁹ The detailed budget Excel file will be automatically generated in the “Economic plan” section of the platform.

¹⁰ Since 2020, the Foundation intends to gradually increase its focus on the environmental and climate impacts of funded projects. For more details, see section 10 of the guide.

- originality of the project in terms of the proposed methods and techniques.
2. OUTCOMES (weight 25%)
- expected impact in terms of developing new knowledge;
 - expected impact in terms of benefits to citizens and community;
 - identification of adequate modalities for sharing project's results and project's ability to foster the public debate on the topic by involving the relevant stakeholders;
 - expected impact in terms of project's contribution in the development of new interventions and policies.
3. PRINCIPAL INVESTIGATOR, TEAM AND ORGANIZATIONS (weight 10%)
- PI's scientific and managerial leadership;
 - expertise of the research team members;
 - project's contribution in terms of scientific and professional growth;
 - suitability of infrastructure and tools to the size and type of the project.
4. RELEVANCE FOR THE FOUNDATION (weight 15%)
- expected impact in terms of value creation for the local community.
5. CONSISTENCY WITH THE DATASET (weight 10%)
- compatibility of the research hypothesis and objectives with the features of the datasets provided.
6. BUDGET AND PROJECT DURATION (weight 10%)
- budget suitability, coherence and duration of the project.

Please note that proposals' evaluation is carried out through peer review, meaning a scientific merit assessment entrusted by qualified experts who are requested to follow specific rules and procedures aimed at excluding conflicts of interest, ideological prejudices, personal pressures and self-referentiality. Fondazione Cariplo will express

opinions limited to the relevance for the Foundation and the coherence of the budget. Fondazione Patrimonio Ca' Granda and Fondazione Osservatorio Meteorologico Milano Duomo ETS will assess the consistency with the dataset.

4.4 Non-eligible projects

Proposals will be considered non-eligible in case they are not in line with the requirements detailed in section 4.2 "Eligible projects" and/or fall in any of the following categories:

- proposals not considering the generation of new knowledge for the common good;
- research projects solely aimed at the development of datasets, software, new mathematical models and predictive analysis tools without appropriate consideration of the call's scientific priorities detailed in section 3 "Aims";
- proposals aimed to set up new research centres.

4.5 Submission process

Proposals must be submitted by 5:00 p.m. on **October 26th, 2023**.

5. AVAILABLE BUDGET, ELIGIBLE/NON-ELIGIBLE COSTS

The budget available for this call is 800.000 Euros.

Eligible and non-eligible costs are detailed in the previous section 4.2 "Eligible projects".

6. COMMUNICATION AND INFORMATION

Fondazione Cariplo, as a private body, is not required to comply with public procedures and has full power to decide on the allocation of the budget. The text of the call and all the mentioned documents are available at Fondazione Cariplo website (www.fondazionecariplo.it).

For the purposes of peer review process, any personal data reported in the Project form may be transferred to non-EU Countries or organizations, in compliance with EU Regulation 2016/679. For more information, before submitting the application, please read the privacy policy on the processing of personal data and transfer of

personal data to Countries or organizations outside the European Union.

7. SUMMARY*

Call	Data Science for Climate and Agriculture
Type	Deadline call
Deadline	October 26 th , 2023
Available budget	€ 800.000
Aim	The call aims to support research projects in the field of Data Science that analyze the relationship between land use and climate change and develop useful knowledge base to foster new development opportunities for carbon farming
Eligible subjects	Public or private non-profit organizations conducting scientific research
Funding constraint	Maximum funding € 200.000
Contacts	Environment Area Scientific Research Area Staff contacts at: www.fondazionecripio.it

** I dati riportati al paragrafo "Sintesi" hanno mera valenza riassuntiva delle condizioni e clausole riportate nel testo del bando, alle quali si rinvia per una descrizione integrale.*

8. APPENDIX: STRUCTURE AND INFORMATION ABOUT THE DATASETS PROVIDED BY FONDAZIONE PATRIMONIO CA' GRANDA AND FONDAZIONE OSSERVATORIO METEOROLOGICO MILANO DUOMO ETS

1. *Fondazione Patrimonio Ca' Granda*

Fondazione Patrimonio Ca' Granda manages the rural heritage of the Ospedale Maggiore in Milan, spread over 96 municipalities mainly located in Lombardy. In 2020, the Foundation launched a soil protection and enhancement programme based on the scientific knowledge of soils by means of chemical-physical analysis and, in 293 cases, also biological; to date, 1.498 soil samples have been collected and analyzed, for a total of about 5.012 hectares of land. The programme will continue in 2023 to further increase the hectares analyzed. The samples were all collected and analysed by the same technical methods and represent a significant picture of soil quality in Lombardy, with particular reference to the provinces of Milan and Lodi. Sampling was carried out according to the methodologies reported in DM 13/09/1999 n. 185. The test reports include the parameters analysed, numerical values, measurement units, reference values and date of measurement. As an example, the test reports cover the following chemical-physical properties: fraction, pH, total limestone, organic matter, organic carbon, total nitrogen, carbon/nitrogen ratio, exchange capacity, exchange calcium, exchange magnesium, exchange potassium, exchange sodium, degree of base saturation, calcium/magnesium ratio, magnesium/potassium ratio, exchangeable sodium percentage and assimilable phosphorus.

2. *Fondazione Osservatorio Meteorologico Milano Duomo ETS*

Fondazione Osservatorio Meteorologico Milano Duomo ETS provides weather data monitored indicatively from 01/01/2013 to 31/12/2022 at 5 among the urban stations of its network of urban stations (please see urban stations interactive map at the link <https://www.fondazioneomd.it/rete-meteo>).

At the link <https://www.fondazioneomd.it/caratteristiche-rete> it is possible to download a document describing the technical features of the network.

The following weather variables are detected at a temporal resolution of 10 minutes:

- air temperature;
- relative humidity;
- atmospheric pressure;
- precipitation (amount, intensity, duration), with distinction between rain and hail;
- wind speed and direction, including gusts;
- global radiation (not available at all stations and for the entire period).

In particular, the following parameters pertaining to the above 6 physical variables will be available:

ABBREVIATION	PARAMETER	MEASUREMENT UNIT
1_G_d	Overall hail duration	Seconds
1_G_imed	Mean hail intensity	hits/(cm2*h)
1_G_imax	Maximum hail intensity	hits/(cm2*h)
1_H_G_imax	Date and time at maximum hail intensity	dd/mm/yyyy hh:mm
1_G	Hail	hits/cm2
1_URmed	Mean relative humidity	%
1_sigmaUR	Relative humidity standard deviation	%
1_URmax	Maximum relative humidity	%
1_URmin	Minimum relative humidity	%
1_Pmed_V	Mean pressure	hPa
1_deltaP_V	Maximum pressure gradient over 1 minute	hPa
1_HdeltaP_V	Date and time at maximum pressure gradient over 1 minute	dd/mm/yyyy hh:mm

1_deltaP_V_min	Minimum pressure gradient over 1 minute	hPa
1_HdeltaP_V_min	Date and time at minimum pressure gradient over 1 minute	gg/mm/aaaa hh:mm
1_Pmax_V	Maximum pressure	hPa
1_Pmin_V	Minimum pressure	hPa
1_RHmed	Mean global radiation	W/m2
1_RHmax	Maximum global radiation	W/m2
1_RHmin	Minimum global radiation	W/m2
1_PP_d	Overall rain duration	Seconds
1_PP_imed	Mean precipitation intensity (rain)	mm/h
1_PP_imax	Maximum precipitation intensity (rain)	mm/h
1_H_PP_imax	Date and time at maximum precipitation intensity	gg/mm/aaaa hh:mm
1_PP	Rain	mm
1_Tmed_V	Mean temperature	°C
1_sigmaT_V	Temperature standard deviation	°C
1_Tmax_V	Maximum temperature	°C
1_Tmin_V	Minimum temperature	°C
1_VR	Gust	m/s
1_H_VR	Date and time corresponding to the gust	gg/mm/aaaa hh:mm
1_DV	Mean horizontal wind direction	°
1_sigmaDV	Wind direction standard deviation (Yamartino)	°
1_VVmed	Mean wind speed	m/s
1_DV_p	Prevailing wind direction over 16 sectors	°
1_FDV_p	Frequency of the prevailing wind direction over 16 sectors	
1_sigmaVV	Wind speed standard deviation	m/s
1_VVmax	Maximum wind speed	m/s
1_H_VVmax	Date and time at maximum wind speed	gg/mm/aaaa hh:mm
1_DV_Vmax	Direction corresponding to the maximum wind speed	°
1_VVmin	Minimum wind speed	m/s
1_DV_r	Resulting wind direction	°

* the number before the abbreviation corresponds to the station code

Data will be provided in CSV format.

From the climatic point of view, it is also possible to exploit the data collected in the ClimaMi project, co-funded by Fondazione Cariplo, which are related to the last decade and to an area corresponding to the metropolitan city of Milan and part of the provinces of Varese, Monza and Brianza, Lodi and Pavia. Database, temperature atlas and related documentation can be downloaded and used in open source at the link <https://www.progettoclimami.it/si-cu>). The following database are available:

- Climatological Database (92 indicators of Fondazione Osservatorio Meteorologico Milano Duomo ETS network stations collected between 2012 and 2020; climatological normals 1961-1990 and 1991-2020 are also available for the center of Milan);
- Climatic Atlas of Air Temperatures, available for the winter and summer seasons in the conditions of “heat island” and “heat wave” (100mx100m resolution);
- Precipitation Catalogue, describing precipitation regime and extreme events from 46 stations of Fondazione Osservatorio Meteorologico Milano Duomo ETS, ARPA Lombardia e MM SpA network.