MAIL - Identifying Marginal Lands in Europe and strengthening their contribution potentialities in a CO2 sequestration strategy

MAIL project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 823805; [H2020 MSCA RISE 2018]

December 2021

MAIL Newsletter 6

Editorial

Dear friends and colleagues,

Welcome to the final issue of the MAIL (Identifying Marginal Lands in Europe and strengthening their contribution in a CO2 sequestration strategy, GA No. 823805, H202-MSCA-RISE-2018) project newsletter. MAIL is a cooperation European project funded by the Research Executive Agency (REA). This is the sixth of a total of six newsletters over the course of the MAIL project. The 6th issue presents a brief outline of the progress and the results that have been achieved during the implementation of the project.

Since the official start of the MAIL project almost three years ago, there have been significant advances in realizing MAIL's objectives. During this last period MAIL implemented an European wide workshop titled "The potential of Marginal Lands as carbon sink in Europe" on November 25th, 2021 by teleconference, the MAIL MOOC workshop on November 26th, 2021 by teleconference and its final conference titled "Carbon sequestration potential of Marginal Lands in Europe" on December 13th, 2021 by teleconference.

I believe that this brief review of technical progress included in our 6th newsletter, is a good opportunity for us to present our activities and results, exchange information with you and create awareness in management and usage of marginal land as potential carbon stocks.

Please do not hesitate to send your suggestions on this publication as well as on project activities.

Petros PATIAS
MAIL Coordinator
Director of AUTH's Laboratory of Photogrammetry and Remote Sensing

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Editorial Board

The MAIL project

The global climate change is a worldwide problem where its mitigation is one of the 17th Sustainable Development Goals of the UN. An effective mitigation strategy should assess all the possible sustainable actions that can contribute to this direction. A challenging and very prominent contribution to raise CO2 sequestration could come from the Land Use Land Use Change and Forestry sector (LULUCF sector) and the utilization of Marginal Lands (MLs) that today are widely available in the EU. MLs can play significant role as potential Carbon Sinks. Especially those on mountainous and semi-mountainous areas (m/sm MLs) are of great capacity and can contribute actively to that goal having no effect in the agri-food production sector. Even though MLs' contribution is acknowledged the influence of their active inclusion in the climate change mitigation strategies has not yet been estimated in depth.

MAIL focuses on m/sm MLs in order to classify them into Carbon sequestration capacity categories based on innovative approaches fully consistent with the IPCC methods and the UNFCCC requirements. The final goal is to deliver a methodology and application set in a web-based platform format, which will be valuable for policy makers, stakeholders or researchers. Free open access data of other EU initiatives will be combined, (land cover, soil, topography, climate, etc.) in order to detect the potential existence of m/sm MLs. These, will be further examined, validated and classified in Carbon sequestration capacity groups through stratified field sampling. State of the art remote sensing (RS) techniques and free open access satellite images with improved spatial and radiometric resolution will be used in order to augment the accuracy of the produced pilot thematic maps. In addition, actions that have to be taken in order to increase the Carbon sequestration capacity will be proposed, while their feasibility will be assessed. A final methodology will be delivered for on-demand production of thematic maps within Europe.

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Outcomes of the project

MAIL achieved all its of objectives during its implementation. A total of 37 secondees implemented 47 secondments adding up to approximately 174 person months of secondments. Fourteen of the secondees were female achieving a 38% of female participation on the project while 23 of them (62%) were male. Six of them (16%) were experienced researchers, while 31 of them (84%) were early-stage researchers. The secondments were implemented between academic and non-academic partners in different countries.

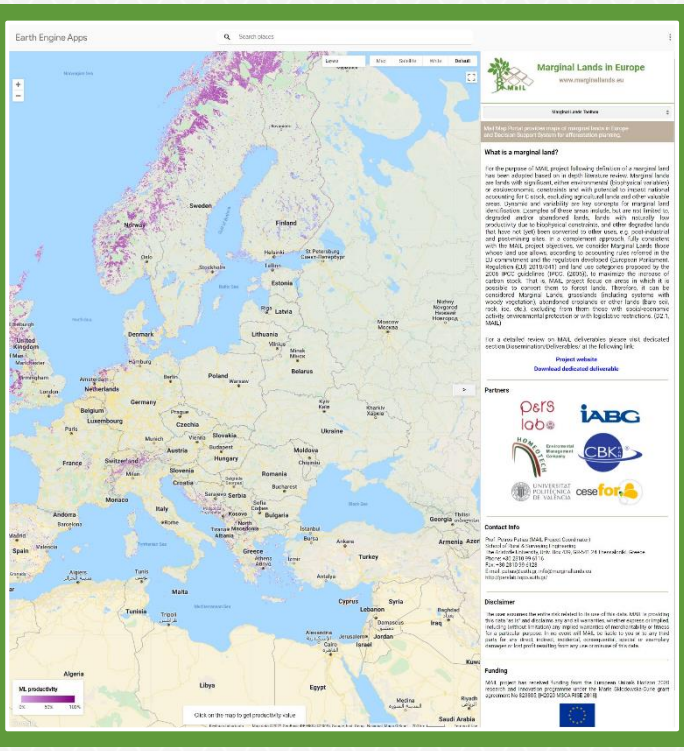
The work performed during the lifetime of MAIL resulted in the definition of marginal land for the scope of MAIL, in the collection and evaluation of the available European/Global datasets, in the development of a methodology for the detection of marginal lands, its accuracy assessment and its precision enhancement. The definition of a methodology for the estimation of biomass volume at low productivity marginal lands was also developed. Furthermore, existing models for the carbon sequestration were evaluated and customized considering local aspects, and marginal lands were classified in carbon sequestration capacity groups. The achieved results were validated through the implementation of four pilot case studies focused on the use of open-source platforms and free satellite data to map and monitor marginal lands, on the quantification of carbon sequestration capacity in marginal lands, on the estimation of carbon stock in forest products, and change detection and mapping ion forest marginal lands. In addition, best practices for marginal land monitoring using remote sensing techniques were identified, while the financial social and technical aspects of the sustainable development of marginal lands were defines. The potentialities of emerging stock exchange markets for carbon transactions and proposed policies were defined and a success stories portfolio regarding marginal land management, guidelines, and decision support system was assembled.

Finally, all the knowledge acquired and research performed during the MAIL project was used for the development of a series of applications leading the development of a Google Earth Engine web application for marginal lands management incorporating the results of the project. In addition, a Massive Online Open Course was created that will be used to provide training, knowledge and information about the tools methodologies and techniques that were developed during the implementation of the MAIL project to foresters, surveyors, remote sensing, and GIS specialists and students.

MAIL Map Portal

MAIL Map Portal is an online tool developed within MAIL project to present dynamic maps and provide interactive tool – Decision Support System which facilitates the end-users and stakeholders utilization of project outcomes in the processes like: marginal land identification (based on databases or on satellite imagery), classification in 3 classes (from the most suitable to unsuitable areas for afforestation) management, afforestation planning (identify the most suitable tree species) and analysing carbon sequestration potential.

The tool is open and free – try it.



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Workshop and Final Conference

In December 2021 two big events summarizing the results obtained in the MAIL project took place online.

The first was a two-day workshop "*The potential of Marginal Lands as carbon sink in Europe*" on 25-26 November 2021 which organisation was led by UPV. The first day consisted of ten presentations and a round table discussion between MaiL representatives and invited speakers from other European projects dealing with marginal lands. The main objective was to provide the opportunity for discussion about what is the current situation in marginal lands in the European Union, current policies, regulations, potentials and applications. The second day was focused on the demonstration of the Massive Open Online Course and the MAiL Map Portal, both developed by consortium partners. The workshop was attended by 108 participants in total.

On 13 December 2021, the final conference "Carbon sequestration potential of Marginal Lands in Europe" took place, jointly organised by the consortium coordinated by AUTH. This one-day meeting included 17 presentations on the results of individual tasks carried out within the project,

starting from establishing the definition of ML, collecting databases, development of methodology, through many different processing workflows and verification of results, building a web portal and MOOC, to more theoretical considerations and feasibility studies. The achievements were presented by 15 secondees involved in the various parts of project implementation. The conference was attended by 51 participants, including the Project Officer from the European Research Executive Agency who supervised MaiL.

The recordings of speeches from both events are available on our website: www.marginallands.eu/dissemination/media.

Secondments

1. Mr Nikolaos Gounaris (HOMEOTECH) has successfully finished his secondment to UPV working on T3.1 and 3.2
2. Ms Ino Vasileia Korompoki (HOMEOTECH) has successfully finished her secondment to UPV working on T3.1
3. Mr Lampros Papalampros (HOMEOTECH) has successfully finished his secondment to UPV working on T5.1
4. Mr Jesús Torralba Pérez (UPV) successfully finished his secondment to HOMEOTECH working on T2.9, 3.2 and 5.4
5. Ms Laura Martin Collado (CESEFOR) successfully finished his secondment to HOMEOTECH working on T4.1
6. Ms Marta Milczarek (CBK PAN) has successfully finished her secondment to IABG working on T3.2
7. Mr Juan Pedro Carbonell Rivera (UPV) successfully finished his secondment to HOMEOTECH working on T2.9, 3.2 and 5.4
8. Mr Eleftherios Mystakidis (HOMEOTECH) successfully finished his secondment to CBK PAN working on T2.7
9. Ms Ewa Gromny (CBK PAN) successfully finished her secondment to HOMEOTECH working on T5.4
10. Mr Michał Krupiński (CBK PAN) successfully finished his secondment to HOMEOTECH working on T3.2 and 5.4
11. Ms Ashwini Trivedi (IABG) has successfully finished her secondment to CBK PAN working on T5.1
12. Ms Zoi Touludi (AUTH) has successfully finished her secondment to IABG working on T4.2
13. Mr Georgios Spanos (AUTH) has successfully finished his secondment to IABG working on T2.9

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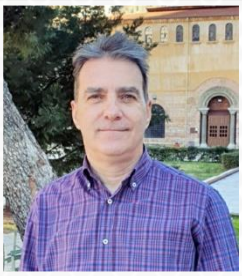

My name is Nikolaos Gounaris, I am Forest Engineer and CEO of HOMEOTECH Co. HOMEOTECH Co. is a company that provides environmental consultancy services and one of the 6 partners of the MAIL consortium. We provide services in several environmental sectors from which most significant are those related to biodiversity monitoring and protection, invasive species monitoring and control and forest and urban green management under the scope of climate change mitigation and adaptation. HOMEOTECH was established in 2001 in Thessaloniki Greece and since then shows vigorous development fulfilling ambitious and challenging goals in the preparation, supporting and implementation of environmental projects.

I was seconded to the Geo-Environmental Cartography and Remote Sensing Group (CGAT) of the Polytechnic University of Valencia (UPV) from 13th of September to 8th of November 2021. There I worked on the tasks 3.1 & 3.2 of MAIL project, where I collaborated with professor Luis Angel Ruiz Fernandez. During my secondment I assisted in definition of MAIL MOOC sections and in the organisation of the final Workshop that took place between 25th and 26th of November.

Watch video

My name is Ino Vasileia Korompoki and I´m a Forester - Environentalist. I have graduated from the Aristotle University of Thessaloniki and I hold the intergraded master diploma of Forestry and Environmental Sciences and a master of Sustainable Management of Forest and Natural Ecosystems. Over the last year I´ve been working in HOMEOTECH where I participate in projects that deal with the management of protected areas under the Natura 2000 network, Management of Ecosystems under Climate Change but also EU funded programs especially in the field of forestry and management of invasive alien species.

During my second secondment here at UPV in Valencia of Spain, I was given the opportunity to be a part of Task 2.10 and Task 3.1 working team. In the Task 2.10 I will work on the deliverable that has to do with the development of MAIL website and the platform selection for the virtual classroom of Work Package 3. In the Task 3.1 I worked for Massive Online Open Course that the project provides in the field of marginal lands to reaching out to students and researchers. In particular, I did the editing and the uploading of the videos in the platform of MOOC under the guidance of the researchers from UPV.

Watch video

My name is Lampros Papalampros. I am from Thessaloniki (Greece) and I work in HOMEOTECH since 2007. I am a graduate of the Department of Forestry and Natural Environment of the Aristotle University of Thessaloniki (AUTH) (2006). I have substantial experience in scientific areas such as forest management, cadastre, research programs, LIFE programs, environmental subjects, etc., as I am professionally active since 2004. I have acquired an M.Sc. degree in "photogrammetric production and remote sensing management in GIS environment" (2013) from the School of Rural and Surveying Engineering (School R&SE/AUTH). Since 2013, I am studying towards a Ph.D. in the area of Geodesy and Surveying (School R&SE/AUTH), in the field of 3D capturing and monitoring of natural environments through novel technologies.

I seconded to the Geo-Environmental Cartography and Remote Sensing Group (CGAT) of the Polytechnic University of Valencia (UPV) from 13th of September to 8th of November 2021. There I work on the tasks 2.10, 3.1 & 3.2 of MAIL project, where I collaborate with professor Luis Angel Ruiz Fernandez. During my secondment I collaborate with Ms Ino Korompoki regarding the document D2.9; Report on Webpage and Virtual Classroom. Also, I collaborated with Mr Samuel Nyarko (IABG) towards the D3.1, where I prepared and edited videos for the Massive Open Online Course (MOOC) of MAIL. Finally, I assisted prof. Ruiz in the organisation of the final Workshop that took place between 25th & 26th of November.

Watch video

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My name is Jesús Torralba Pérez. I am a Forestry and Natural Environmental Engineer from the University of Castilla-La Mancha (Spain) and I studied a master's degree in Remote Sensing at the Universidad Mayor (Chile). Since the end of 2017, I am a Ph.D. student in Geomatics Engineering at the Geo-Environmental Cartography and Remote Sensing Group (CGAT) at the Polytechnic University of Valencia. My Ph.D. is focused on the characterization of forest structure and forest fuel by integrating analysis of methods based on Terrestrial Laser Scanning (TLS), airborne LiDAR and imaging. My interests and experiences are focused on the analysis and management the forest resources and natural environments with remote sensing and GIS in the framework of climate change.

During my stay at the HOMEOTECH in Thessaloniki/Greece from June 2021 to November 2021 I was working on task 2.9 "Web application for MLs' management", 3.1 "Preparation of a Massive Online Open Course (MOOC)", 3.2 "Seminar-workshop organization through MOOC" and 5.4 "Success stories". During this period, we finalized the GEE application for the detection and management of MLs that will be freely available to anyone interested. In Task 3.1 I worked together with Carbonell in the edition of the videos and the preparation of the MOOC. Together with Lampros, Carbonell and Krupiński, we prepared the workshop "The potential of Marginal Lands as a carbon sink in Europe" celebrated online in November 2021. And finally, in task 5.4 I prepared the general guidelines for the management of MLs at the European level, based on existing regulations and policies, as well as on the requirements of current and future forests to be resilient to climate change.

Watch video

My name is Laura Martín and I am ICT technical of the Cesefor Foundation. I am Forest Engineer with a Master degree in Geographic Information Systems, Remote Sensing and GPS applied to Territory Planning (University of Valladolid). Recently I obtained the Master in Protected Areas Governance and Management at the University of Madrid and I am currently studying a Master degree in Environmental Management based on Data Science at the University of Valladolid. I have a strong background in forest inventories, field data collection, GIS analysis and mapping development as tools for natural resource management.

My secondment for the MAIL project, at HOMEOTECH in Thessaloniki, took place from July to November 2021. I worked on task 4.1 "Using an open source platform and free satellite data to map and monitor MLs". More specifically, I developed and implemented a national/local marginal land detection system for selected test areas in Spain and compared the results at European, national and local scale. The main objective of the task was to provide important information to include local aspects in the ML algorithm and to improve the classification of marginal land in terms of suitability.

Watch video

My name is Marta Milczarek. I am geographer and work as a GIS and remote sensing specialist at the Space Research Centre of the Polish Academy of Sciences in Warsaw, Poland, since 2014. I graduated from the University of Warsaw, Faculty of Geography and Regional Studies, specialising in two fields: Geoinformatics & Remote Sensing and Geomorphology. I have worked in several projects dealing with satellite imagery processing and geospatial analysis for crisis management, public security units and development assistance.

During my stay in IABG Dresden Geodata Factory in December 2021 I worked in task 3.2 "Seminar-workshop organisation through MOOC" led by UPV. I prepared a deliverable D3.2 which contains the description of events and proceedings regarding seminar/workshop organisation and implementation as well as summary of scientific publications and participations that happened during the project. I also presented the outcomes of T4.4 at the final MaiL conference.

Watch video

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My name is Juan Pedro Carbonell Rivera and I am an engineer in Geomatics and Topography by the Universitat Politècnica de València (UPV) with a M.Sc. in Geomatic Engineering and Geoinformation by the UPV and a M.Sc. of the International Master in Geomatics of the Hochschule Karlsruhe – Technik und Wirtschaft (HsKA). Since September 2018 I am PhD student in Geomatics Engineering UPV. My research is focused on characterisation of forest structure by integrated analysis of methods based on Unmanned Aerial Vehicle (UAV) derived imagery.

During this period, I have accomplished two secondments at HOMEOTECH (Thessaloniki, Greece). The first secondment was involved with the task 5.4: "Guide on success stories for remote sensing techniques and open source data / applications". This task continued with the review of literature focusing on three different aspects: «Forests, carbon sequestration and remote sensing", "Satellite monitoring of marginal lands" and "Carbon-based management on marginal lands". The second secondment was dedicated to task 2.9 "Web application for MLs' management", where I documented the work developing the web-GIS portal of the MAIL project. This portal allows end-users to determine the best possible way to visualize, monitor and sustainably utilize MLs, and to draw conclusions and decision-making, in field of forest management, planting etc.

Watch video

My name is Eleftherios Mystakidis, I am from Thessaloniki/Greece and I am a 2013 graduate of the Department of Forestry and Natural Environment of the Aristotle University of Thessaloniki (AUTH). I have been working at HOMEOTECH since 2013, providing technical support on projects involving GIS applications, databases and field surveying, participating in redaction of forest and environmental studies (management, fire protection, road construction and maintenance, technical works, management of protected areas, etc.) and field works for surveying and data collection.

During my secondment in CBK PAN, at Warsaw/Poland, for the MAIL project, from August until December of 2021, I was working on task 2.7 which is about Marginal Lands classification in Carbon Sequestration Capacity Groups. For the implementation of the task, due to the extent, size, and resolution of the data, as well as for compatibility with the MAIL geoportal, I worked on Google Earth Engine, where I developed a tool that will be accommodated to the platform into the Decision Support System, providing to users a general overview regarding Carbon Sequestration Capacity Groups and suggest potential suitable species for afforestation.

Watch video

My name is Ewa Gromny. I am a graduate of Military Univerity of Tehnology and currently I work for Space Research Centre of the Polish Academy of Science in Warsaw as a geospatial analyst in the Earth Observation Department. My area of interest covers among others the classification of satellite images. So far I have been mostly focused on optical imagery from Sentinel-2 satellites and lately I took part in the project S2GLC which outcome is the Land Cover map of Europe for 2017. Recently I took part in Sat4Envi project which aim was to create an operating system for flood detection in Poland using Sentinel-1 data.

In October 2021 I have been seconded to HOMEOTECH In Thessaloniki /Greece. Within this time I have been working on the tasks 5.4 Success stories and 4.1 Planning: Pilot case study, use of open source platform and free satellite data to map and monitor marginal lands. My main task was to develop a workflow for creation a map of potential marginal lands for Poland. Unlike to the map created in task 2.3, this approach was focused on regional adaptation to conditions in Poland and the particular emphasis was placed on using regional databases. In this case it was mainly the Database of Topographic Objects especially its division into land cover categories and delineation of protected areas.

Watch video

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My name is Michał Krupiński and work as geospatial analyst in Space Research Centre of the Polish Academy of Sciences in Warsaw (Poland). I received B.S. (2010) and M.S. (2012) degree in geodesy and cartography from Military University of Technology in Warsaw. I was involved in number of R&D projects focused on geospatial data analysis. My research interests include novel methods for satellite imagery classification and imaging spectroscopy. I'm also strongly involved in the Copernicus User Uptake in Poland.

My secondment took place in HOMEOTECH (Greece) from September to December 2021. Within this time, I worked with Ashwini Trivedi on the task 5.4 to prepare the guide on success stories for remote sensing techniques and open source data and applications. Moreover I was have given three presentations during international events organized within MaiL project (workshop and final conference) and prepared video materials explaining the MaiL Map Portal for the MOOC which was developed within the project. During this time I was also supervising the tasks 2.9 and 4.4, implemented by Secondees who were in IABG (Germany) that time.

Watch video

My name is Ashwini Trivedi. I am an Environmental Engineer from Gujarat University of Technology, India (2018). I am pursuing MSc. Environmental Science with specialization in Remote Sensing and Modelling from University of Trier, Germany. I am employed as a master thesis student by IABG Geodatan Factory, Dresden. My area of interest includes satellite image classification, object based analysis and change detection.

I was seconded at The Space Research Centre of the Polish Academy of Sciences (CBK PAN), Poland. My secondment period lasted from 15 September to 15 December. I was responsible for task 5.1 which is entitled as "Guide on success stories for RS techniques and open source data / applications" in MaiL project. I have been working under supervision of Michał Krupiński. At CBK PAN, I listed down information about available free and paid satellite data along with its platform. I supported on editing and formatting the final Report.

Watch video

My name is Zoi Touloudi, I have studied Agricultural Economics at the Aristotle University of Thessaloniki, in Greece, as a Bachelor student and later on, I studied at the Mediterranean Agronomic Institute of Chania (MAICh) for my Master of Science in the department of Geoinformation in Environmental Management. My Master program was focused on Geographical Information Systems and on Mediterranean Forest Management. Through my master's thesis, I got involved with image processing, classifications, and spatial statistics in order to model the distribution of an agricultural disease in Europe. I'm very passionate about the environmental protection and the tackle of climate change.

Since middle of March of 2021 till the end of this year I am seconded in IABG Geodata Factory in Dresden working in four tasks, 2.4, 4.4, 5.2 and 5.3. More specifically I have worked on the "Accuracy assessment of mountainous/semi- mountainous MLs detection", the "Financial aspects of the sustainable development of MLs", focusing on the feasibility analysis by creating an "Afforestation cost model" and finding strategies for improving CO2 sequestration. Moreover, I have worked on the "Potentialities of emerging stock exchange markets for carbon transaction and proposed policies" proposing ways for sustainable management for the implementation of MLs, and on "Change detection and mapping in forest MLs".

Watch video

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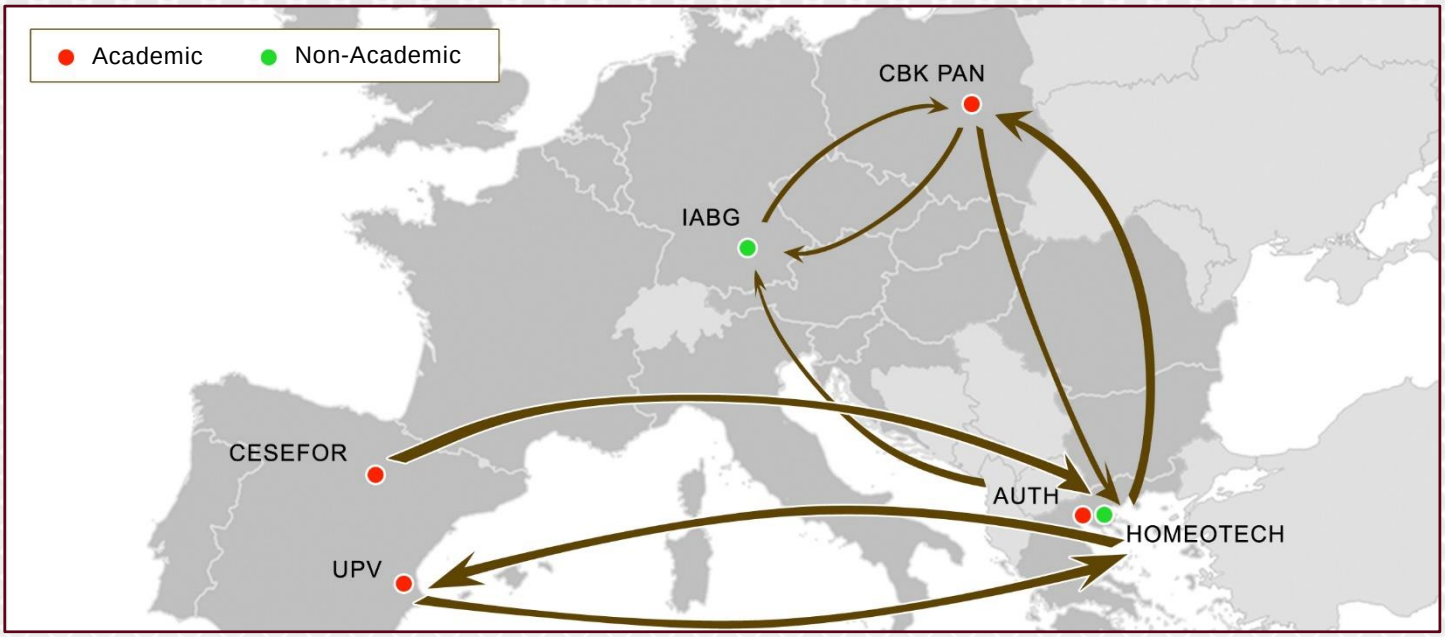
My name is Yorgos Spanos, and I have a bachelor's degree in Geology from the Aristotle University of Thessaloniki (Greece). After my degree in Geology, I got very fond of the Remote Sensing and GIS fields of research. Therefore, I enrolled in the master's program of the Mediterranean Agronomic Institute of Chania "Geoinformation in Environmental Management", during which I was equipped with advanced skills concerning the use of Geographic Information Systems and decision support systems on environmental management as well as the analysis of remotely sensed data for a variety of applications. Currently, I am working on my thesis on the "Application of geospatial technologies for effective multitemporal monitoring of coastal erosion phenomena in Chania (Crete, Greece) North coast region". Hence, I am very motivated in the environmental fields of research that make use of the state-of-art technological advances.

My secondment in IABG Geodata Factory lasted in total from March of 2021 until December of 2021. During this time, I supported the completion of the task 2.4, which was an Accuracy Assessment of the detection methodology developed in task 2.3. Then I was mainly involved with the development of the "Enhanced Classification" tool for the task 2.8, which aimed at augmenting the precision in the MLs detection. Finally, I got also involved with the completion of the task 4.4, which was a Pilot case study for change detection in forest MLs, for the needs of which a vegetation change detection algorithm was implemented in the MAIL web application.

Watch video



The directions of secondments described above

About the Project

- Topic: MSCA-RISE-2018 Marie Skłodowska – Curie Research and Innovation Staff Exchange
- Title: Identifying Marginal Lands in Europe and strengthening their contribution potentialities in a CO2 sequestration strategy
- Project Duration: 36 months
- Official start of the project: 01/01/2019
- Total budget: 800,400.00 €
- EU funding: 800,400.00 €

Consortium