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MAPS:
Multilateral Academic Projects

Research in the spotlight

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Research in the spotlight

Project title: Shedding Light on LOwer DanubE Black Sea region paleoCLImate since the Mid-Brunhes Event (MBE) by novel loess-paleosol records

Aim: assessing past Quaternary climate change across a transect of terrestrial loess paleosol sequences (LPS) records spanning several glacial-interglacial cycles.

The study area borders the Lower Danube Black Sea region and has been subject to several modes of atmospheric circulation patterns that affect the eastern Mediterranean, central Europe, and western Eurasia.

This location thus provides the unique opportunity to investigate the interplay of these atmospheric circulation and moisture-delivering patterns through time and assess different environmental conditions and soil response to past environmental change.

Consortium partners:

Universität Zürich
Guido Wiesenberg

Romanian Academy Cluj-Napoca Branch
Daniel Vereș

Bulgarian Academy of Sciences
Diana Jordanova

Project budget: 1.049.982 CHF

Research field: Mathematics, natural sciences

Main discipline: Earth Sciences

Keywords: paleoenvironment; paleoclimate; paleovegetation

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Research in the spotlight

Project title: Combinatorial synthesis of cyclic peptide libraries and their application against emerging therapeutic targets

Aim: addressing the challenge of druggability of important protein-protein interaction (PPI) targets needed for the development of drugs for unmet medical needs.

A large number of protein-protein interactions have been identified as attractive drug targets, but many of them are difficult to target with classical small molecule drugs due to the lack of deep clefts or pockets required for binding. Small cyclic peptides can bind to flat, featureless surfaces often found at the interface of protein-protein interactions and can cross membranes if they are small and non-polar enough, but their development for new targets is not trivial due to the lack of large and diverse macrocyclic peptide libraries or assays suitable for high-throughput functional screening.

Consortium partners:

École Polytechnique Fédérale de Lausanne
Christian Heinis

Babeș-Bolyai University
Laszlo-Csaba Bencze

Hungarian Academy of Sciences
György M. Keserű

Project budget: 1.039.932 CHF

Research field:
Medicine

Main discipline: Organic Chemistry

Keywords: drug development; protein-protein interaction; cyclic peptide

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Research in the spotlight

Project title: Change generation by soft materials and devices

Aim: developing soft stimuli-responsive materials and devices that convert different forms of energy, including mechanical, thermal and magnetic energy, into electricity.

A soft charge generator consist a stimuli-responsive soft material placed on interdigitated electrodes of be-tween two compliant electrodes whose function is to collect the generated charge.

Different kinds of soft materials, including different type of elastomers will be developed, to make these generators more efficient and adaptable.

Consortium partners:

Swiss Federal Laboratories for Materials Science and Technology
Dorina Maria Opris

National Institute for Research and Development of Isotopic and Molecular Technologies Cluj Napoca
Alexandrina Nan

Sofia University
Elena Vassileva

Project budget: 1.048.191 CHF

Research field:
Engineering sciences

Main discipline: Material Sciences

Keywords: magnetic elastomers; electromagnetic effect; charge generation

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Research in the spotlight

Project title: Avalanche mitigation and forest dynamics under climate change in the mountains of southeastern Europe and the Alps

Aim: in a synergistic collaboration between Switzerland (where data foundations for risk mitigation are already strong) and research teams from Bulgaria and Romania (where improvements in such foundations are urgently needed), significant research gaps will be overcome regarding the long-term avalanche regime and avalanche-forest interactions under changing climatic conditions.

By combining historical records, tree-ring data, computer simulations, and new sensor technology, they aim to improve avalanche risk mapping and protection in all three countries

The project will provide the opportunity to improve large-scale hazard mapping and risk mitigation activities and thus reduce the risk for human life, infrastructure, and activities such as tourism.

Consortium partners:

Swiss Federal Institute for Forest, Snow and Landscape Research
Peter Bebi

West University of Timișoara
Mircea Voiculescu

University of Forestry
Momchil Panayotov

Project budget: 856.068 CHF

Research field:
Natural sciences

Main discipline: Ecology

Keywords: climate change impacts; snow avalanches; dendroclimatology

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Research in the spotlight

Project title: Becoming Axolotl: Empathy, Simulation, and Embodiment in Medieval Narratives

Aim: create a new methodological framework at the underexplored intersection of cognitive literary studies, sensory studies, narratology, and critical theory (especially environmental humanities, object-oriented ontology, and critical race theory).

The project will result in a ground-breaking account of the cognitive-cultural frameworks that medieval people used to engage with and imaginatively simulate the thoughts, feelings, and sensations of a variety of others including swords, trees, bears, spirits, Mongolian khans, and European 'crusaders'.

Consortium partners:

University of Berne
Annette Kern-Stähler

New Europe College
Cătălin Țăranu

Croatian Academy of Science and Arts
Mirko Sardelic

Project budget: 832.144 CHF

Research field:
Humanities

Main discipline: German and English languages and literature

Keywords: medieval narratives; empathy; sensory experiences

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Research in the spotlight

Project title: Adapted forest management for biodiversity conservation in mountain Norway spruce forests under climate change

Aim: to evaluate the consequences of different forest management scenarios in the context of climate change for biodiversity and ecosystem functions of spruce-dominated mountain forests and to provide recommendations to stakeholders for adaptive management options in these sensitive forest ecosystems.

The results of this project will inform stakeholders and practice on how to adapt future management of Mountain Norway spruce-dominated forests across the alpine biogeographic region of Europe, taking into account potential trade-offs between wood production and diversity.

Consortium partners:

Swiss Federal Institute for Forest, Snow and Landscape Research
Martin Gossner

National Institute for Research and Development in Forestry "Marin Dracea"
Any Mary Petritan

Bulgarian Academy of Sciences
Tzvetan Zlatanov

University of Zagreb
Stjepan Mikac

Project budget: 1.363.505 CHF

Research field:
Life sciences

Main discipline: Environmental Sciences

Keywords: mountain forest; forest health; climate change

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Research in the spotlight

Project title: Implications of Nano/Microplastic Pollution on AquatiC Environment HealTh

Aim: enhance the ability to track and quantify the fragmentary and fibrous nano-microplastic (N/MPls) in aquatic environments and biota via development of novel Raman spectroscopy approaches based on the enhanced signature of both plastic's polymers and pigments.

Fill the gap of the knowledge on the possible interactions and effects of naturally aged N/MPls by phyto/ zooplankton species and deepen the understanding of the potential interactions and impacts of N/MPls on aquaculture shellfish production focusing on key-stone species and natural food webs interactions with an implication on human nutrition.

Consortium partners:

University of Geneva
Vera Slaveykova-Startcheva

Babes-Bolyai University Cluj-Napoca
Simona Pînzaru

University of Dubrovnik
Glamuzina Branko

Project budget: 1.040.601 CHF

Research field:
Natural sciences

Main discipline: Environmental Sciences

Keywords: microplastics; naturally aged; environmental impact

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Research in the spotlight

Project title: Enlightenment and Publicity: The problem of deception in late 18th-century political and religious thought

Aim: examine the central aspects of the problem of deception that the 1780 prize competition brought to central-stage, shedding light on the nature and limits of enlightenment and the ways in which deception can be used for enlightenment as well as for political and religious purposes.

By focusing on the difficult and ambivalent entanglement of political and religious goals, it will contribute to the critical reappraisal of the late Enlightenment.

Consortium partners:

University of Fribourg
Ralf Bader

Institute of Philosophy and Psychology, Romanian Academy
Tinca Prunea-Bretonnet

Jagiellonian University in Kraków
Anna Tomaszewska

Project budget: 898.049 CHF

Research field:
Humanities

Main discipline: Philosophy

Keywords: deception; rational religion; superstition; prejudices

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Research in the spotlight

Project title: EXperiMental: Wearable Technology and EXplainable AI for Mental Health and Inclusivity in Schools

Aim: to generate long lasting Mental Health (MH) inclusivity in schools by identifying and encouraging characteristics of mentally healthy and resilient adolescents.

At the outset, engage young adolescents in a participatory co-design process to learn about their attitudes towards MH,digital behavioral interventions, AI, data sharing, ethical issues, and physical activity (PA).

The research team will investigate how PA can enhance MH by exploring types of PA work for specific individuals and considering factors like timing, duration, and context.

The insights gained will allow researchers to create personalized nudges to encourage beneficial personalized PA behaviors.

Consortium partners:

Università della Svizzera Italiana
Marc Langheinrich

Alexandru Ioan Cuza University of Iasi
Georgiana Juravle

University of Zagreb
Maroje Soric

Project budget: 1.043.586 CHF

Research field:
Engineering sciences

Main discipline: Information Technology

Keywords: mental health; wearable sensing; machine learning

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Research in the spotlight

Project title: AI-based Brain Metastases Tracking and Segmentation - A-BEACON

Aim: development of A-BEACON, an AI-based system designed to provide zero-miss detection and efficient tracking of brain metastases.

The approach proposes innovative AI methodologies and strategies for Active Test-Time Augmentation (ACTTA) and interpretability-based inductive biases to enhance model performance and reliability.

Utilizing a multicenter dataset of 914 re-annotated cases, the research team will train and validate the models. This dataset, curated for diversity in imaging characteristics and lesion profiles, will form the backbone of this research.

Consortium partners:

University of Berne
Mauricio Reyes

Lucian Blaga University of Sibiu
Claudiu Matei

Medical University Varna
Elitsa Encheva-Mitsova

National Research Institute of Oncology
Jacek Kunicki

Project budget: 1.146.247 CHF

Research field:
Engineering sciences

Main discipline: Biomedical Engineering

Keywords: brain cancer; glioma; medical image analysis

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Research in the spotlight

Project title: AquaChain - Connecting the trophic levels of a freshwater aquaculture food chain

Aim: follow the fate of essential fatty acids from the primary producer through three trophic levels of a model freshwater food chain.

It is proposed an experimental approach that uses a tri-trophic model food chain consisting of primary producers (freshwater microalgae), first consumers (zooplankton), and second consumers (fish larvae) to manipulate and monitor the flux of long-chain polyunsaturated fatty acids (LC-PUFA).

The results of the project have implications beyond ecology and touch on several applied issues.

Consortium partners:

Zurich University of Applied Sciences
Dominik Refardt

Alexandru Ioan Cuza University of Iasi
Marian Burducea

AgrobioInstitute, Sofia
Ivayla Dincheva

Project budget: 982.516 CHF

Research field:
Life sciences

Main discipline: Ecology

Keywords: food chain; essential biomolecules; fatty acids; gene expression

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Research in the spotlight

Project title: IMAGO: How do images speak? The dynamics of figures, metaphors and symbols in Christian discourse and beyond

Aim: explore different contexts in which "images speak" about the relationship with the divinity and about inter-human relationships. It will inquire the circulation of images under the form of metaphors and symbols and the presuppositions they carry with them inside and across religious, cultural, ritual, linguistic and conceptual boundaries.

The research involves an interdisciplinary approach: areas of investigation include, but are not restricted to, biblical and patristic literature, history of Christianity and church doctrines, iconography and art, ritual and liturgical celebration, philosophical influence and reception, relevance in modern society.

Consortium partners:

University of Berne
Georgiana Huian

Lucian Blaga University of Sibiu
Constantin Horia Oancea

Sofia University
Ivaylo Naydenov

Project budget: 1.047.448 CHF

Research field:
Humanities

Main discipline: Religious studies, Theology

Keywords: Christianity; Church History; iconography; family resemblance

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Research in the spotlight

Project title: Magic Bullet Gels: Unleashing Antimicrobial Peptide Metal Complexes

Aim: obtaining novel, potent, metabolically stable antimicrobial therapeutics for topical use, based on antimicrobial peptides with a bound rhenium complex, locked inside an antibacterial microcarrier.

Antimicrobial resistance is one of the largest threats for nowadays society and the urge to discover novel, effective classes of antibiotics that can act synergistically is crucial to overcome the soon-to-be major cause of deaths worlwide.

Because of the general lack of resistance towards antimicrobial peptides, they are being relied on as potential "treasure tovers" of starting points for rational, focused antimicrobial drug design.

tresu

University of Fribourg
Fabio Zobi

"Petru Poni" Institute of Macromolecular Chemistry Iasi
Loredana Elena Nita

University of Wroclaw
Magdalena Rowinska-Zyrek

Project budget: 775.124 CHF

Research field: Mathematics

Main discipline: Inorganic Chemistry

Keywords: antifungal treatments; antimicrobial peptides; microcarries

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Research in the spotlight

Project title: Exploring the Triad of Academic Writing, Critical Thinking and AI Literacy: Interdisciplinary Perspectives on Undergraduate Thesis Writing (TRAI)

Aim: to understand, analyse, describe, and extract relevant education-related information regarding the relationships within the triad of academic writing, critical thinking, and AI literacy.

The project addresses this topic in the context of undergraduate thesis writing, a crucial academic practice in most national higher educational systems. Thesis writing is a critical event in the 3-4 year Bachelor's degree programmes, forcing students, many of them for the first time, to undertake independent, research-based work.

The project's ultimate goal is to conceptualise how digital scholarship evolves under growing AI influence, thus providing insights into new forms of intellectual inquiry and institutional responses in higher education.

tresu

Zurich University of Applied Sciences
Christian Rapp

West University of Timisoara
Madalina Chitez

Bulgarian Academy of Sciences
Petya Osenova

Project budget: 1.048.013 CHF

Research field: Humanities

Main discipline: Applied linguistics

Keywords: academic writing; critical thinking; artificial intelligence

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Research in the spotlight

Project title: Children's Honest and Deceptive Behavior during School Transitions: Developmental insights from three European educational systems (CHOICES)

Aim: to capture the variability in the life of children and how this variability contributes to the development of sincere and deceptive behavior in their interpersonal or academic interactions.

The project will provide insight into the impact of individual and environmental variability on children's socio-cognitive development. The anticipated data will provide insights into the developmental pathways of honesty and deceit.

Understanding these dynamics is essential for developing targeted interventions to promote ethical behaviour in children, two of which are explicitly tested: enhancing socio-cognitive skills and mobilising them towards supporting dialogical thinking about interpersonal honesty and academic integrity.

Consortium partners:

Universität Zürich
Daum Moritz Matthäus

Babeș -Bolyai University
Laura Visu-Petra

Nicolaus Copernicus University
Marta Białecka

Project budget: 1.027.488 CHF

Research field:
Social sciences

Main discipline: Psychology

Keywords: deceptive behaviour; theory of mind; socio-cognitive.

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Research in the spotlight

Project title: Seconds Matter: Cutting-edge Earthquake Early Warning Systems

Aim: to establish and operate end-to-end semi-public Earthquake Early Warning (EEW) in Romania, Croatia and Switzerland using existing algorithms.

The consortium intend to continually improve the existing EEW approaches, including scientific tasks such as adaptation for complex regional seismicity such as deep Vrancea events or shallow crustal earthquakes in the Dinarides; improvement in ground motion estimation using synthetic waveforms; integration of machine learning algorithms for picking and shaking prediction and integration of distributed acoustic sensing data alongside seismic stations.

Additionaly, the research team will focus on social science studies that engage user communities to understand how to best communicate and deliver EEW in the different countries.

Consortium partners:

ETH Zurich
John Clinton

National Institute for Research and Development for Earth Physics
Elena Florinela Manea

University of Zagreb
Iva Dasovic

Project budget: 1.049.171 CHF

Research field: Mathematics, natural sciences

Main discipline: Geophysics

Keywords: earthquake early warning; machine learning

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Research in the spotlight

Project title: Proton-driven molecular machines: Turning tautomeric molecular switches into nanoscale molecular motors

Aim: development of a novel molecular motor type. The consortium will pursue a proton-driven switching mechanism, called tautomerism, which can be triggered by light irradiation and has thus far remained underexplored for motor designs, despite its favorable switching dynamics.

The aim is to deliver the first proton-driven molecular motor, whose switching mechanism promises fast rotation speeds, exceptional fatigue resistance and reliable remote switching control via light irradiation. These results promise to have a profound impact on fields developing (responsive) nanomaterials, molecular switches and machinery, and photochemical systems.

Consortium partners:

University of Basel
Malte Oppermann

University of Bucharest
Mihaela Matache

Bulgarian Academy of Sciences
Liudmil Antonov

Project budget: 988.378 CHF

Research field:
Mathematics, natural sciences

Main discipline: Physical Chemistry

Keywords: molecular motors; tautomerism; proton transfer

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Research in the spotlight

Project title: Promoting Effective Transport through Healthy Bus Drivers (PROMETHEUS)

Aim: to improve the preventive value of the statutory occupational health (OH) surveillance (OHS) by integrating biomonitoring coupled with health education of bus drivers.

The scope is to investigate its feasibility and effect on bus drivers health and wellbeing in a 2-year follow-up.

The innovative approach is the combination of the strong epidemiological, biological, and medical expertise with the occupational health promotion frameworks as the Total Worker Health, Stay-at-Work, Salutogenesis and the Patient and Public Involvement in Research.

This integrates work-related safety and health hazards prevention with health promotion and disease prevention for the advancement of bus drivers wellbeing.

Consortium partners:

University of Lausanne
Irina Guseva-Canu

"Carol Davila" University of Medicine and Pharmacy
Ruxandra Marina Oțelea

Institute for Medical Research and Occupational Health Zagreb
Goran Gajski

Project budget: 1.049.147 CHF

Research field:
Medicine

Main discipline: Occupational Medicine, Ergonomy

Keywords: public transport; bus driver; acute cardiovascular disease

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Research in the spotlight

Project title: Wellbeing of School Principals: A Longitudinal Perspective (WESPA)

Aim: to understand how school principals can maintain high levels of well-being and how they can successfully activate their resources and handle the demands of their jobs. In exploring a multifaceted concept of school principal well-being, the research team use the well-established Job Demands-Resources Theory and the Conservation of Resources Theory and collect data from both school principals and teachers to gain insight into perspectives of different responsible actors with the schools.

The data will be used to create practical guidelines for improving school principals' (and teachers') well-being that will inform schools, teacher education, and national policies. Our longitudinal and comparative perspective can also serve as a role model for future research on well-being in education.

Consortium partners:

University of Berne
Tina Hascher

West University of Timișoara
Laurențiu-Paul Maricuțoiu

University of Zagreb
Irena Buric

Project budget: 990.573 CHF

Research field:
Social sciences

Main discipline: Psychology

Keywords: school principal; job demands; job resources; well-being

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Research in the spotlight

Project title: Study of impact on central respiratory engagement in epilepsy

Aim: to investigate potential pathways involved in patients with epilepsy at high risk of sudden unexpected death in epilepsy (SUDEP).

The focus is on the ability of brainstem and forebrain respiratory centres to restore effective breathing after seizure-induced apnea, hypoxia and hypercapnia.

The objective is to identify differences between groups of patients at high and low risk of developing SUDEP according to well-described criteria, prone positioning in bed during the night, presence of focal to bilateral tonic-clonic seizures or more generalized tonic-clonic seizures (GTCS), such as the presence of nocturnal GTCS, with the potential to uncover similarities in functional magnetic resonance imaging responses between the low-risk group and healthy controls.

Consortium partners:

Lausanne University
Carolina Ciumas

University of Medicine and Pharmacy "Carol Davila"
Ioana Mindruță

University Hospital "St. Ivan Rilski"
Krasimir Minkin

Project budget: 989.279 CHF

Research field:
Medicine

Main discipline: Neurology

Keywords: central control of breathing; brainstem; apnea

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The MAPS competition was organized by the Swiss National Science Foundation (SNSF), as Program Component Operator, together with UEFISCDI as Measure Support Partner and other funding agencies from beneficiary states.

This initiative reflects the significance of the Second Swiss Contribution, through which researchers from Switzerland and their colleagues from Bulgaria, Croatia, Poland, Romania, and Hungary are implementing Multilateral Academic Projects (MAPS).

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