

**4-D TOPOGRAPHY EVOLUTION IN EUROPE:
UPLIFT, SUBSIDENCE AND SEA LEVEL CHANGE
(TOPO-EUROPE)**

Call for Outline Proposals

Funding initiative in the field of 4-D Topography Evolution in Europe: Uplift, Subsidence and Sea Level Change (TOPO-EUROPE)

What is EUROCORES?

The ESF European Collaborative Research (EUROCORES) Programmes offer a flexible framework for researchers from Europe to work on questions which are best addressed in larger scale collaborative research programmes. The EUROCORES

Programmes allow excellent researchers from different participating countries to collaborate in research projects 'at the bench'. They also allow, when appropriate, colleagues from non-European countries, for example the US, to participate. The Programmes encourage and foresee networking and collaboration of researchers to achieve synthesis of scientific results across the programme, to link to related programmes, and to disseminate results.

EUROCORES Programmes allow national research funding organisations in Europe and beyond to support top class research in and across all scientific areas, by matching the needs articulated by the scientific community with their strategic priorities.

Funding decisions on the projects and the research funding remain with the national research funding organisations, based on international peer review operated by ESF. ESF also provides support for networking of researchers and for the scientific synthesis of research results and their dissemination⁽¹⁾. This way, the EUROCORES Scheme complements the EC Framework Programme and other collaborative funding schemes at European level.

For further information see:
<http://www.esf.org/eurocores>

⁽¹⁾ Currently supported through a contract with the European Commission under the Sixth Framework Programme (EC Contract no. ERAS-CT-2003-980409).

Following an agreement with funding organisations in 19 countries, the European Science Foundation is launching a Call for Outline Proposals for Collaborative Research Projects (CRPs) to be undertaken within the EUROCORES Programme "4-D Topography Evolution in Europe: Uplift, Subsidence and Sea Level Change" (TOPO-EUROPE). The Programme will run for 3-4 years depending on national funding regulations and will include national research funding, as well as support for networking and dissemination activities provided by the ESF¹. The Programme aims to support high-quality multidisciplinary research.

Outline Proposals are to be submitted by 9 May 2007. Full Proposals are expected to be invited by 15 June 2007, with 11 September 2007 as deadline for submission.

Information on the process of the implementation of the TOPO-EUROPE Programme is also available on the ESF website <http://www.esf.org/topoeurope>.

Rationale

The topography of the continents and their margins is at the interface of deep Earth, surface and atmospheric processes. Topography influences society, not only as a result of slow landscape changes but also in terms of how it impacts on geohazards and the environment. When sea-, lake- or ground-water levels rise or land subsides, the risk of flooding increases, directly affecting the sustainability of local ecosystems and human habitats. On the other hand, declining water levels and uplifting land may lead to higher risks of erosion and desertification. In the recent past, extreme events (e.g. earthquakes, catastrophic landslides, rockfalls, explosive volcanism and abrupt climate changes) have caused heavy damage and numerous fatalities in Europe. Rapid population growth within river valleys, coastal lowlands and mountainous regions and global warming associated with increasingly frequent exceptional weather events are likely to exacerbate the risk of flooding and devastating rock failures. Along active deformation zones, earthquakes and volcanic eruptions cause short-term and localized topography changes. These changes generate additional hazards, but at the same time they provide us with a means to quantify stress and strain accumulations, key parameters for seismic and volcanic risk assessment. Although natural processes and human activities create geohazards and environmental changes, the relative contribution of the respective components remains poorly understood. That topography influences climate has been known since the beginning of civilization, but only recently have we been able to model its effects in regions where good (paleo-)

topographic and climatologic data are available. The present state and behaviour of the shallow Earth System is a consequence of processes operating over a wide range of temporal and spatial scales. These include the long-term effects of tectonic uplift, subsidence, climate variations and the development of river systems, the residual effects of the ice ages on crustal movement, natural climate and environmental changes over the past millennia up to the present, and the powerful anthropogenic impacts of the last century. If we are to understand the present state of the Earth System, to predict its future and to engineer our use of it, this spectrum of processes, operating concurrently but on different scales, needs to be better understood. The challenge to the Geosciences is to describe the state of the system, to monitor its changes, to forecast its evolution and, in collaboration with others, to evaluate modes of its sustainable use by human society.

To realize its objectives, the ESF EUROCORES TOPO-EUROPE programme will involve fundamental new research initiatives, the integration of process-oriented scientific endeavours, the establishment of a common European platform and the coordination of scientific activities by TOPO-EUROPE participants. To implement its scientific objectives, TOPO-EUROPE will pursue an integrated and interdisciplinary approach that combines hitherto distributed know-how and facilities. It will provide a platform for sharing research on process monitoring, reconstruction and process-oriented modelling. This ESF EUROCORES initiative is a unique opportunity to establish a world-class program based on Europe's strengths in integrated Solid-Earth sciences. A core concept of TOPO-EUROPE, adapted from the U.S. EARTHSCOPE programme, is that data will be made available on the web in near real-time. This pertains particularly to the seismic, electromagnetic and GPS data to be recorded by the EUROARRAY component of TOPO-EUROPE.

An important feature of TOPO-EUROPE is the integration of existing research capacities to reach the ambitious goal of establishing a pan-European programme that addresses key issues of scientific innovation and societal need. TOPO-EUROPE offers the first European platform for the effective integration and sharing of a new generation of research facilities in Solid-Earth sciences, including multi-sensor observation systems, satellites, airborne systems, surface and subsurface observatories, advanced analytical and analogue modelling facilities and high-speed computing. Information management systems will be brought together to facilitate the development of dynamic models. The availability of these facilities to participating scientists and their intention to share them in integrated research programs will set the stage for a very competitive European position in the domain of dynamic topography research.

In Europe there is significant scientific expertise that can be mobilised for the TOPO-EUROPE programme. Moreover, there are numerous local and regional projects that are addressing issues relevant to this programme. Connecting and integrating these teams into a European wide platform and coordinating their research efforts is a primary goal of TOPO-EUROPE. This will permit the TOPO-EUROPE programme to achieve its ambitious objectives and should lead to a modernisation of the Solid-Earth geosciences. This is only now feasible on a European scale, owing to recent improvements in techniques and technology, such as satellite monitoring of the potential field and topography changes, high-resolution geochronology and isotope geochemistry, high-pressure laboratory experiments, tomographic techniques, computing capacities and the handling of large, (near)-real-time datasets.

Scientific goals

TOPO-EUROPE is concerned with the geoscience of coupled deep Earth and surface processes and their effects on the evolution of the topography of continents and their margins. In addition to addressing world-class issues of Earth-System sciences, TOPO-EUROPE has considerable societal relevance, since topography directly affects humanity as a result of secular landscape changes that have a direct bearing on environmental change and geohazards. TOPO-EUROPE intends to investigate the 4-D topography evolution of the European continent, its margins, and adjacent parts of North Africa, Asia and the Middle East. This requires an interdisciplinary approach that integrates research in the subdisciplines of geomorphology, geochronology, geology, tectonics, geochemistry, petrology, geophysics, hydrology, geodesy, remote sensing and various branches of geotechnology. One principal objective is to assess processes that control continental topography development, related geohazards and the vulnerability of the environment to intensified land use. Europe hosts excellent natural laboratories for studying and resolving first-order problems in continental topography. Several areas with specific characteristics and problems offer exciting opportunities for investigation. Combined studies of processes operating in these areas and other regions of the world will address the general issue of topography evolution. The important role that lithosphere-scale processes play in controlling topography development has only recently been recognised. Consequently, major scientific breakthroughs in this important field of research can be expected in the coming years.

Research topics

Proposals

Proposals for Collaborative Research Projects (CRPs) that address the topics and themes described below should focus on exploring and understanding the coupling between deep Earth and surface processes, addressing topography (de)formation and active source to sink relationships in space and time. They should be submitted by international interdisciplinary groups of scientists from at least three participating countries who have proven expertise in this field and who have access to appropriate facilities. We encourage participation of groups that have no access to advanced Earth-monitoring, high-performance computing or analytical facilities of their own. Scientific excellence and relevance to the TOPO-EUROPE goals will be the criteria for selection of projects.

Topics and Sub-themes

1. Monitoring the Earth System operating on a wide range of spatial and temporal scales by:

- Acquisition, processing and interpretation of satellite gravity and geodetic data;
- Multisensor studies;
- Scientific drilling of strategic targets;
- Quantifying plate-boundary and intra-plate uplift and subsidence rates (e.g. continental margins, basins, deltas, mountain ranges, volcanic areas), lateral displacement rates and identifying the respective controlling mechanisms with emphasis on resolving the contribution of lithospheric and mantle processes;
- Investigating landscape evolution on a human time scale;
- Studying shallow and deep characteristics of active fault systems;
- Investigating natural hazards in the natural laboratories;
- Compiling data and securing long term accessibility to the resultant integrated databases;
- Assessing the long-term impact of human activities (e.g. water pumping, oil and gas exploitation) on land subsidence;
- Quantification of erosion rates integrated over short to long timescales using novel techniques;
- Quantification of ground uplift/subsidence in active areas.

2. Imaging and characterising the deep Earth by:

- Studying crustal and lithospheric structure, thickness, strength and strain-rate distribution throughout Europe;
- Developing new mantle models based on seismic tomography data;
- Investigating 3-D high-resolution density, electrical and seismic structural information;
- Employing high-resolution information on the structure of the mantle and crust as a means to quantify stress, strain and temperature distributions

3. Dynamic topography reconstruction by:

- Integrating source-to-sink studies (sediment balance and redistribution from active uplifting regions to subsiding sedimentary basins);
- Quantifying the evolution of the European drainage system, sedimentary basins and topography with a focus on the past 20 Myr via palaeogeographic, palaeoclimatic and palaeotectonic studies;
- High-resolution dating;
- Developing new dating technologies;
- Studying the interplay of tectonic and climatic controls on recent denudation, glaciation and river systems and the resultant erosion and sediment transport.

4. Process modelling and validation by:

- Analysis of common processes operating in studies of the natural laboratories;
- Developing a new generation of high-performance computer methods required to advance: (i) tectonic and lithospheric studies; (ii) modelling of seismic wave propagation; (iii) mass-redistribution in the Solid-Earth system; (iv) global circulation models of the Earth's mantle; (v) glacial rebound models;
- Innovative analogue and numerical modelling of mantle-to-lithosphere-to-surface processes;
- Integrating 4-D data sets originating from different geoscientific fields, including space geodesy.

Guidelines for applications

(Outline and Full Proposals)

Collaborative Research Project (CRP) proposals from individual scientists or research groups eligible for funding by the agencies participating in the Programme will be accepted for consideration in the EUROCORES Programme TOPO-EUROPE.

Proposals must, as a minimum, involve three eligible Principle Investigators (PIs) from **three different countries**. At the same time, a maximum of 50 % of Individual Projects (IPs) in a Collaborative Research Project (CRP) from one country is accepted.

Scientists or groups not applying for or not eligible to apply for funding from these agencies (including applicants from industry), can be associated with a proposal where their added scientific value can be demonstrated. Their participation as Associate Partners in a project must be fully self-supporting and will not be financially supported by the participating funding agencies.

Applications should normally be for three years although applications for shorter or longer time periods may be considered depending on the rules of the participating funding agencies. Taking into account the selection and approval processes, the successful projects are expected to begin their activities in **March 2008**.

Online submission of applications

Outline and Full Proposals will be submitted online. Applicants should follow the proposal structure as indicated in the Application Template for Outline Proposals available on the Programme website at:

<http://www.esf.org/topoeurope>.

On this Programme website, links to information on national funding eligibility and requirements as well as to a EUROCORES Glossary and Frequently Asked Questions (FAQs) are available.

Prior to submitting Outline Proposals, all applicants have to contact their national funding agencies in order to verify eligibility and to ensure compliance with their relevant agency's granting rules and regulations.

At the time of online submission of the Outline Proposals, the Project Leader is asked to confirm this on behalf of all the participants in the CRP.

Outline Proposals

Outline Proposals are invited by 9 May 2007.

Outline Proposals will be examined by the participating funding agencies for formal eligibility. Therefore, it is crucial that all applicants contact their national funding agency prior to submitting their proposals.

In compliance with the rules and regulations of the participating national funding agencies, the requested funds under the EUROCORES Programme TOPO-EUROPE can include salaries for scientific and technical staff, equipment as well as travel costs and consumables within the project, specifying the amount requested from each Funding Agency. National policies may also require the proposal to contain additional specific information. Applicants should be aware that the participating funding agencies can make significant adjustments to the requested funds in order to bring these in line with their rules and regulations.

Applications will be assessed according to a set of criteria in a two-stage procedure so as to ensure a thorough selection of scientifically excellent proposals. At the outline stage, the Review Panel will select proposals with potential for scientific excellence, by applying the following criteria:

- Relevance to the Call for Proposals
- Novelty and originality
- European added value (scientific)
- Qualification of the applicants

An Outline Proposal submitted must comprise:

- A short description of the CRP (max. 1200 words, including objectives, milestones, methodologies (for example experiments and fieldwork);
 - o Short description of how (and why) the partners contributing to the CRP will work together;
- Short CVs of Project Leader (PL), all PIs and Associate Partners (max. one page each, including five most relevant publications);
- Estimated budget (consistent with the rules of relevant national funding agency) tabulated according to a provided template.

Associated Partners (APs) are also considered part of a CRP and will be assessed as such at both the Outline and Full Proposal stage.

It will be assumed that arrangements for the handling of IPR (Intellectual Property Rights) will be in place within projects, following the applicable national legislation and national funding agency rules. Applicants are strongly urged to have such arrangements in place, covering all research groups (including any associated groups) before the start of the projects. It is expected that the results obtained by the projects supported under this EUROCORES Programme will be placed in the public domain.

It is also expected that all relevant clearance of other national or international committees (for example ethics) has been obtained before funding is granted. It is the responsibility of applicants to clarify any such matters (if applicable) with their national contact points.

Full Proposals

Full Proposals will be invited following the recommendations of the Review Panel. The deadline for full proposals will be 11 September 2007.

Please note that only applicants who submitted an Outline Proposal can submit a Full Proposal.

For the Full Collaborative Research Project (CRP) proposals, the most important selection criterion is "Scientific quality". Other criteria include interdisciplinarity (according to the scope of the call), qualification of applicants, level of integration and collaboration, feasibility, European added value and relation to other projects (risk of double-funding and track record for collaboration).

The Full Proposals will be assessed by at least three independent external expert referees who are selected by the ESF from a pool of scientists suggested by the participating funding agencies and the Review Panel. A list of all referee names used for the international peer review will be published once the selection process is complete.

After receiving all referee reports, they will be made available (anonymous) to the applicants for their information and for commenting (optional). The Review Panel will rank all Full Proposals based on the assessment of the Full Proposal, the anonymous referee reports and the applicants' responses to these.

The Review Panel will create a ranked list consisting of the best Full Proposals and will subsequently make recommendations to the Management Committee for the funding of these proposals. The actual granting of the funds to the Individual projects on the ranked list will depend on the total amount of funds available in each country by the participating Funding Agencies. The use of funds in a project will be subject to the rules and regulations of each participating Funding Agency as well as to the national laws of those countries.

Full proposals must include a well-argued scientific case (both for the collaboration envisaged and for the individual contributions), a list of participants, a detailed tabulated budget and other supporting information. A single, common scientific case must be made throughout the proposal to demonstrate an aim for scientific synergy and integration of multinational expertise. In addition, the amount requested from each national funding agency has to be clearly and separately specified. Detailed instructions on requirements and how to complete the application forms will be made available once Full Proposals are invited.

The Project Leader will be the main CRP proposal contact point for ESF for the duration of the project. He/she will be responsible for representing the Collaborative Research Project, for its participation in programme activities, and for any reporting requirements placed on the project as a whole.

All Principal Investigators will be responsible for dealing with the requirements attached to the contributions of their own funding organisation.

Programme Structure and Management

Programme Structure

The overall responsibility for the governance of the programme lies with a Management Committee, whose membership is formed by one representative from each participating funding agency (usually a senior science manager) together with an ESF representative.

Proposal assessment and selection are the responsibility of an international, independent Review Panel. The members of this panel are leading scientists, appointed by ESF following suggestions from participating Funding Agencies. The membership of the Review Panel will be available on the Programme website for information. The Review Panel is also expected to monitor the overall scientific progress of the programme.

The Scientific Committee which is formed by the Project Leaders of all funded CRPs will be responsible for proposing networking activities for scientific synergy in the EUROCORES Programme. They will also advise and support the EUROCORES Programme Coordinator in the coordination of networking activities.

Programme Networking

Networking activities are designed to strengthen the science objectives of this EUROCORES Programme by promoting coherence in the activities of the science community involved. This will provide the European added-value which is the central objective of any EUROCORES Programme.

Networking and collaboration within EUROCORES Programmes takes place at two levels:

1. between the various Individual Projects within each Collaborative Research Project (CRP) and
2. between the funded CRPs within the programme as a whole.

The intra-CRP activities are supported through the research grants each participant receives from the participating funding agencies in the given CRP. The cross-CRP activities are funded

through contributions to the EUROCORES Programme.

The intra-CRP collaboration is motivated by the nature of the CRP's research objectives, i.e., by the scope and the complexity of the questions it deals with. In a CRP, the participating groups have the opportunity to gather the required critical mass to successfully address the objectives and challenges of their project.

The cross-CRP networking and collaboration is stirred by the aims and the nature of the particular EUROCORES Programme. The theme which was the basis of this EUROCORES Programme has been selected for its clear need of collaboration in the proposed field. The funded CRPs will collectively set up and further streamline this new collaboration. To this end, the CRPs will engage the programme participants and, when of clear benefit, colleagues from outside the programme in joint activities such as:

- Working Group meetings for the exchange of information and results across the CRPs;
- Joint scientific meetings or summer schools;
- Short term visits;
- Development and delivery of joint training schemes;
- Seminars, Workshops, symposia, invited sessions either stand-alone or as part of other larger events;
- Common web-facilities and publications.

Through active participation of scientists in the above mentioned activities, not only existing collaborations are enhanced but new and strategic partnership opportunities are also identified.

Furthermore, these activities may provide opportunities to explore aspects of the programme which are not covered by the funded research projects.

The integrative activities between the CRPs will help to strengthen the field by building coherence within this emerging research community and will serve as a platform for the research work which is done in the programme.

Project members are expected to participate annually in at least one cross-CRP activity. When submitting your proposal, please note that the costs for networking within your CRP should be budgeted for in your proposal. Funds for networking between the CRPs will be centrally

managed by the ESF through contributions from the participating member organisations.

Programme evaluation

A Mid-Term evaluation, conducted by the Review Panel, will evaluate the overall progress of the Programme, based on the progress of the funded CRPs. Here, the Review Panel has a steering function and can comment on the CRPs' work plan in relation to the objectives of the overall Programme. A final evaluation will assess the achievements of the whole EUROCORES Programme.

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**CNR's final decision for participation is expected by the end of March 2007. For further details and latest information please contact Dr. Anna D'Amato at CNR*

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