



**MINISTERIO DE CIENCIA E INNOVACIÓN**  
**Secretaría de Estado de Universidades**  
**Dirección General de Programas y Transferencia del Conocimiento**

## **CONSOLIDER-INGENIO 2010 PROGRAMME ANNUAL REPORT**

### **Follow-up report**

*(This activity report refers to the period January 2010 - December 2010)*

<b>PROGRAMME REFERENCE: CSD2006 - 00041</b>
<b>Coordinating Researcher: Josep Gallart Muset</b>
<b>Programme Title: Geosciences in Iberia: Integrated studies of topography and 4-D evolution. 'Topo-Iberia'</b>
<b>Managing Institution<sup>1</sup>: Institute of Earth Sciences 'J. Almera' - CSIC Barcelona</b>
<b>Programme Initiation Date: October 16<sup>th</sup>, 2006</b>
<b>Programme Completion Date: September 15<sup>th</sup> 2012</b>

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<sup>1</sup> Entidad Gestora

## **I. Summary of key activities initiated by the Programme since the start of the funding period [one page or less]**

During the 2010 period (fourth year of the project), main activities afforded within the eight Subprogrammes or Workpackages (WP) defined in 'Topo-Iberia' have been reviewed by the Scientific Committee in two meetings, held respectively, in July 2010 in Granada and January 2011 in Barcelona. The working groups of each WP interacted regularly and met whenever necessary to accomplish the specific objectives.

The website summarizing project information, <http://www.igme.es/internet/Topolberia/> is being maintained at IGME, within WP1. The WP1 also manages an Oracle 10 G database 'Topolberia' compiling existing and newly acquired geological and geophysical data sets. A specific high performance server ('SITOPPO') is implemented at IGME for this purpose.

The instrumental platform IberArray (Seismic, GPS and MT), created within this project, has kept running continuously during this period, acquiring high-quality geophysical data.

In the last months of 2010 the seismic portable array has started their third and last shift scheduled in the project, from the central sector towards North Iberia. The 19 stations deployed in Morocco were also partly shifted towards southwest, to monitor a wider area of the Gibraltar Arc system in an international collaborative effort with US and German scientists that deploy also portable seismic networks in Morocco within the Picasso initiative. The Topolberia seismic data center running at ICTJA (<http://xeon.ija.csic.es/IberArray/>) incorporates also the continuous recordings from all permanent stations in Iberia. Current results show important lateral variations in crustal structure in the Gibraltar Arc System, and marked variations on mantle anisotropy features in relation with major tectonic events on the different domains of the study area.

The WP3 has supervised during 2010 the maintenance of the GPS IberArray, the compilation of data from sites of the global reference system, the data transfer, storage and analysis within the 3 expert groups, ROA, UB and Jaen. A new version of the Gipsy software package is implemented, and comparative analyses of temporal series have been performed using Gipsy and Gamit codes. Preliminary results of displacement vectors have been presented and discussed in different international meetings.

In 2010 a N-S structural transect of about 1300 km length, across the whole Iberian Peninsula and the Rif-Atlas systems, from the Cantabrian Coast down to the Algerian-Sahara border, has been completed from several Magnetotelluric profiles (broad-band and long-period data sets). The last two segments have been acquired, one in a N-S profile across the Cantabrian range and Duero Basin and the other across the Central System. Results of MT profiles in Spanish Meseta and Betics-Rif system have been published this year.

Analyses of recent tectonic activity, relief formation, uplift and erosion rates or landscape evolution are being performed within WP5 in different sites of main ranges and foreland basins of Spain and North Morocco. In 2010, field experiments involving geomorphological indexes, thermo-chronology (fission tracks and cosmogenic isotopes), paleoseismology, paleogeography, active tectonics or structural geology provided new data sets, and results from on-going analyses are presented in several papers published in 2010.

Numerical and analogue modelling of deep and surface processes are investigated in WPs VI and VII. Developments in 2010 are particularly focussed in providing appropriate materials to integrative WP VIII, hence increasing interactions between the three WPs. The WP VIII is designed to compile all geophysical and geological observables and evolutionary models. Structural transects covering major Iberian domains have been defined to synthesize the achievements. Compilation tasks in 2010 have been developed mainly along the major N-S transect.

**II. Degree to which Programme objectives have been achieved, as measured by the indicators listed in Section 8 of the Implementation Agreement [four pages or less]**

The Table hereafter summarizes the objective achievements for the 2010 period, according to the ones declared in the Indicators specified in the Implementation Agreement.

<b>Indicators (Section 8 of Implementation Agreement)</b>	<b>Declared</b> (on average)	<b>Achieved</b> (2009)
<b>1. Scientific Production</b>		
1.1. Papers in indexed, peer reviewed journals	50	122
1.2. Other publications and technical docs.	100	126
1.3. Presentations to Congresses (International and Nat.)	200 (70%Int.) (140 Int + 60 N.)	228 (92% Int.) (209 Int+19 N)
<b>2. Formation</b>		
2.1. On-going PhDs	30	57
2.2. PhD defenced in the whole period of the project	30	7
2.3. PostDoctoral contracts	12	15
<b>3. Scientific Infrastructure (equipment)</b>		
3.1. IberArray platform: Seismic, GPS and MT arrays	3 Arrays	3 Arrays
3.2. Technicians devoted to the project	6	12
<b>4. Research Projects</b>	15	80
<b>5. Connection with Companies, Agreements, Contracts</b>	30	33
<b>6. Dissemination</b>		
6.1. Organization of Congresses, Symposia, Lectures,..		11
6.2. Conferences, Seminars, Media Interviews,...		67

The Table documents that all indicators, and specially the most relevant ones clearly fulfil and exceed the objective achievements, as reviewed hereafter.

The first block of parameters concerns the Scientific Production. The activities of the researchers included in the project resulted in up to 122 first-order publications in the 2010 period, which more than doubles the declared compromise of 50 papers per year on average. This productivity has increased in about 20% with respect to that one reported in each of the previous 2 years. Moreover, the number of reported non-SCI publications and technical reports reaches 126, exceeding the 100 declared. They have significantly increased this year, much ahead of the 75

reported in 2009. As mentioned in previous reports, this parameter seems to have significant fluctuations every year, probably related to the difficulty of compiling this particular information.

Up to 228 contributions to Congresses, 92% of them in International events are compiled (i.e. 209 Int. + 19 Nat.), also improving the total expected ones (200) and the international percentage (70%).

The indicators concerning the second block, Formation, are also positive and in agreement with the expected ones. Up to 57 PhD Thesis were on-going in 2010, and 7 were successfully accomplished in this period. This indicates also that the compromise of 30 PhD Thesis for the whole period of the project has been achieved (35 PhD already presented within the period 2007-2010). Up to 15 PostDoctoral contracts within the groups have been reported for 2010, exceeding also the 12 ones declared in the Agreement, despite the general decrease observed in recruitments of the type Ramon y Cajal or Juan de la Cierva.

Next topic in the Indicators concerns the scientific Infrastructure. A major aim of this integrative project has been the implementation of an observational platform, IberArray, composed by three instrumental pools, Seismic, GPS and Magnetotelluric. New geophysical data with unprecedented density and resolution to constrain key geodynamic problems on the Iberian plate can be collected through the coordinated use of these pools during the project and in future developments. All equipment is fully operational since beginning of 2008, the arrays deployed in the field and acquiring data continuously. The current achievements will be summarized hereafter, and are considered quite satisfactory. During this year, up to 12 technicians have been engaged to take care specifically of these arrays, as well as of the geochronological measurements and analyses, and of the high-performance server system acquired to manage the geological and geophysical databases.

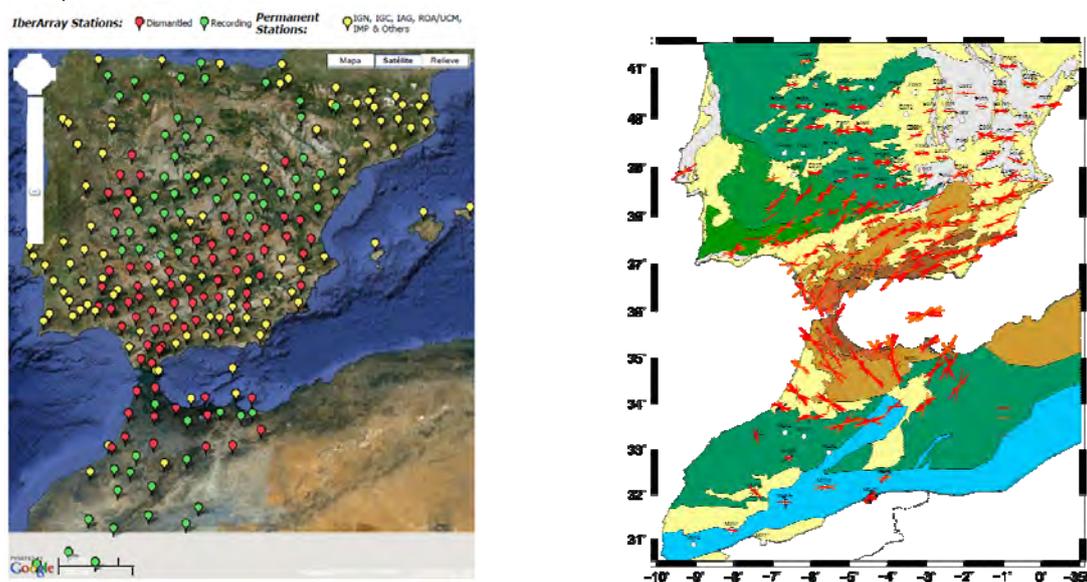
Fourth Indicators item is the number of research projects that the participant groups develop in parallel with Topo-Iberia. The capacity of its members to obtain competitive funding (via European, national or autonomous calls) is again well illustrated by the 80 projects reported to be active in 2010, much ahead of the 15 projects declared on average in the Implementation Agreement. The Indicator of external connections with companies, public institutions, etc., by means of agreements, contracts or advising tasks, shows up to 33 actions of this type in 2010, also exceeding the 30 expected ones. Comparison between the two latter indicators in the period 2007-2010 reveals the tendency of the groups in this Topo-Iberia programme to achieve support through academic agencies, although the amount of funding from external resources is also remarkable.

Another aspect to be remarked is the relationship and synergies of Topo-Iberia with other international projects, such as Topo-Europe (some Topo-Iberia groups are also involved in several of these projects) or Picasso (several projects from USA, Ireland or Germany launched in the 'southern Topo-Iberia domain' of Betics-Rif-Atlas), as well as the perspectives that it has opened in neighbouring countries. Besides our continued cooperation with Morocco, in France and Portugal two projects have been launched in this period, assuming the same objectives as our seismic component, i.e. to implement a BB network to achieve an even coverage of Portugal and of the northern Pyrenean domains coinciding with our array deployments. Moreover, the EPOS project of the ESFRI road map started its way end of 2009, with a relevant Spanish participation based on the Topo-Iberia coordination structure.

The dissemination indicator, concerning the social diffusion of scientific knowledge, shows a significant amount of organization tasks in symposia, congresses, lectures, etc. Members of the project have convened different symposia of the 2010 Annual Meeting of the European Union of Geosciences (EGU), delivered invited talks in the American Geophysical Union (AGU) and have acted as associate editors in a special issue of *Tectonophysics*. On the other hand, different members of Topo-Iberia groups have been required to deliver about 67 Conferences, Seminars or Interviews in audio-visual media, more than doubling the contributions in previous years.

Apart from the strategic objectives, the indicators of which have been reported above, during 2010 significant improvements have been made on the scientific objectives pursued.

According to the proposal planning, in November-December 2010 the seismic network has started shifting from the central sector towards North Iberia. Up to 20 new sites are operational there by end of 2010. The 19 stations deployed in Morocco where also partly shifted towards southwest, to monitor a wider area of the Gibraltar Arc system in an international collaborative effort with US and German scientists that deploy also portable seismic networks in Morocco within the Picasso initiative. Continuous recordings from all permanent stations in Iberia have also been included at the ICTJA seismic data center (<http://xeon.ija.csic.es/IberArray/>). Figure 1a shows the present configuration of the seismic array. Structural features are being inferred from the data sets through analysis from seismic methodologies ranging from different tomographic inversions, receiver functions or SKS splittings. Mantle anisotropy results in the Gibraltar Arc System and its geodynamic implications have been published in 2010 (Diaz et al., GRL). A compilation of SKS measurements for the first and second deployments is shown in Fig. 1b (Diaz et al., in prep.). Crustal features inferred from receiver functions show crustal thickening in the Betics-Rif axis and marked thinning eastwards (Mancilla et al., submitted).



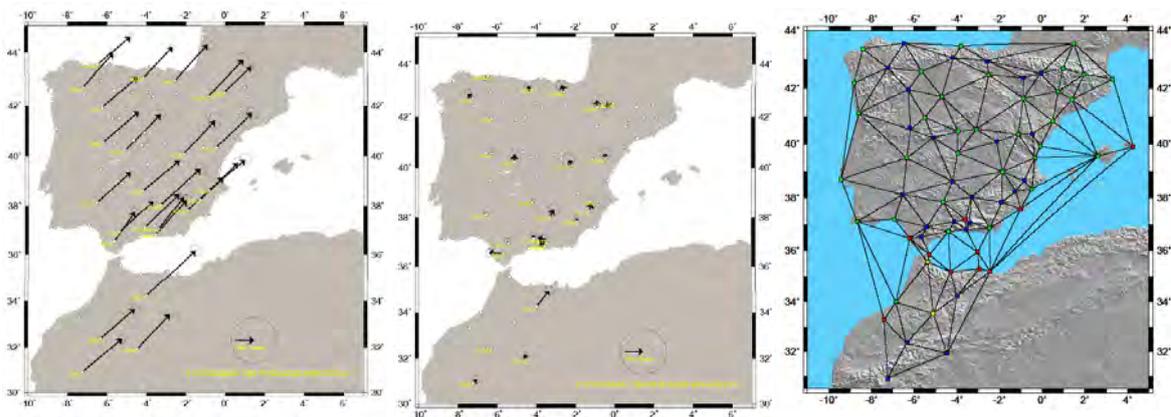
*Figure 1a* (left panel). BB seismic array covering the Topo-Iberia study area. Yellow: permanent sites; Green: IberArray instruments operating end 2010; Red: dismantled sites (first and second deployments).

*Fig. 1b*. Right panel: Mantle anisotropy from SKS splitting; fast velocity directions show clear variations in relation with different tectonic domains.

The GPS group has ensured during 2010 maintenance of the GPS IberArray, the compilation of data from sites of the global reference system, the data transfer, storage and analysis within the 3 expert groups, ROA, UB and Jaen. A comparative analysis of results obtained by using different software packages (Gipsy-Oasis II, Gamit-Globk and Bernesse) is undertaken within the 3 expert teams, ROA, UB and Jaén. A new version of the Gipsy software package is implemented, and comparative analyses of temporal series have been performed using Gipsy and Gamit codes. The pattern of GPS measurements documents the need of collecting continuous time series during a few years, to overcome fluctuations. Preliminary displacement vectors calculated confirm the general NE direction in absolute movements, and a more dispersed pattern in relative movements, lesser than 1 cm/year in most cases. Figure 2 shows examples of the stress analysis pattern and preliminary absolute and relative velocities obtained.

The MT WG acquired in 2010 two N-S profiles, both in BB and LP modes; one profile across the Cantabrian range and Duero Basin and the other across the Central System. These profiles allowed to complete a N-S structural transect of about 1300 km length, across the whole Iberian Peninsula and the Rif-Atlas systems, from the Cantabrian Coast down to the Algerian-Sahara border. Analysis and

interpretation of previous profiles has been continued, and results of MT profiles in Spanish Meseta and Betics-Rif system have been published this year.



*Figure 2. a (left panel): GPS absolute velocities (mm/year, see ref. on bottom right inset). 2b (middle panel): relative velocities. 2c: (right panel): GPS stress pattern analysis with Delaunay triangulations.*

The aim of the geological WP-5 is to constrain, in the main ranges and foreland basins of Spain and North Morocco, recent tectonic activity, relief formation, uplift and erosion rates or landscape evolution. In 2010 some field measurements completed extensive datasets acquired in previous years and the analysis of all these informations has resulted in about 25 papers published or submitted this year, which involved results on either low-T thermochronology (dating apatite cooling ages in U-Th/He, fission tracks, cosmogenic isotopes  $^{21}\text{Ne}$ ,  $^{10}\text{Be}$ ), geomorphological indexes (including new developments of automatic calculations using ArcGIS), paleoseismology in fault trenches, paleogeographic reconstructions and paleontological dating, active tectonics (geophysical and surface geology data) or structural geology (orogens and basins). Members of this group have organized specific symposia, on a national scale and in collaboration with French colleagues.

Features constraining deep and surface processes are also investigated by means of numerical and analogue modelling techniques. Numerical developments in 2010 (WP6) concern 2D modelling of subduction processes including slab break-off and mantle recycling applied to Indian-Eurasia collision (dynamic numerical models based on finite differences), application of 3D codes (LitMod 3D) to the Gibraltar Arc and Atlas region, calculation of Vp/Vs-Mg# correlation to identify thermal and compositional anomalies in the upper mantle, analysis of vertical movements produced by loading/unloading and tectonic evolution, global analysis of the radiogenic heat production variability and its significance to lithospheric thermal modeling, and 2D lithospheric structure across to the Gorringe Bank region and other continental margins.

Members of the WG7, in cooperation with the Amsterdam University, have performed a series of analogue models based on geophysical and geological data available in Iberia. The models focus particularly on the presence of lateral lithosphere strength changes from west to east that may have influenced the mode of deformation during the Alpine Orogeny. The experimental results were analyzed with respect to the Bouguer gravity anomalies and the Moho depth maps. In addition, spectral analysis of topography and gravity was carried out to identify the presence of periodic patterns that may have influenced the present-day topographic trend. The results were compared with previous studies carried out in Iberia.

WP8 has continued working to establish the infrastructure allowing the integration of all geophysical and geological observables that should characterize the 4D evolution of Iberia. The structure of the geo-refered database has been defined, built up as an ArcGIS geodatabase that is going to integrate all relevant informations.

### **III. Description of the Programme's scientific and administrative management [one page or less]**

The Scientific Committee of the project (SC), formed by the PIs of the 10 participant groups/institutions meet three times in this reporting period. A two days meeting was held in January 2010 at ROA, San Fernando, Cádiz together with the responsables of the eight working groups (4 of them are already members of the SC). End of July 2010, another meeting of the SC was held in Granada, during a two-days workshop organized there to favour interactions within all project participants. Finally, in January 2011, a third meeting took place at the managing institution (ICTJA-CSIC, Barcelone). In these meetings the scientific and administrative status of the project was reviewed. After having examined summary reports provided by each of the 8 Workpackages defined in the project, the Committee discuss and agreed on the activities and strategies to be undertaken within the different WPs for the next period, on the relationships with external projects/groups, dissemination actions, preparation of annual report, etc.

During the year, practically all WPs have had at least one group meeting, besides continued e-mailing contacts, providing in each case a specific report to the project Coordinator. Some WPs, such as seismics and GPS had additional workshops several days long, discussing technical aspects on data storage, processing and interpretation procedures.

The managing institution (ICTJA-CSIC) has taken care of the budget distribution among the participant groups. Fourth annuity was distributed in early 2010, and the fifth and last one is on the way beginning of 2011, always according to the specific Agreement signed between CSIC and the 10 groups.

In this period, contacts have pursued between the administrative services of each Institution and the CSIC managing group, linked in cases by the Project Coordinator, especially in the preparation of the annual economic report, to clarify items and achieve homogeneous expenses reports.

#### **IV. Description of budget expenditures, in relation to the Programme objectives and activities and including the budget distribution among the partners [one page or less]**

The funds obtained from the MEC-Consolider Programme, 4.5M€ and the additional 20% (0.9 M€) provided by the Managing Institution (CSIC) were first distributed according to the activities planned in the proposal. Then, they were distributed among the 10 groups according to their degree of involvement in each activity, and finally, distributed per annuities per groups according to the MEC deliver sequence. Economic Tables reflecting each scenario were prepared and distributed among the groups.

A specific Agreement has been established and signed between CSIC and the 10 participant groups concerning the budget distribution between the managing institution (ICTJA-CSIC) and the groups. After reception of funds from the MEC, first, second, third and fourth annuities have been distributed during 2007, 2008, 2009 and 2010, respectively. Fifth and last one is on the way, early 2011.

Basic items considered in the budget are the Personnel Costs, that include contracts for technical support in the activities involving new data acquisition, for a total amount (whole project duration) of 930K€, and the Execution Costs. Main items of the latter (overheads included) are: Infrastructure costs: 2075K€, Consumables: 375K€, Travel and per-diem: 1.625K€, and Other Divers expenses: 395 K€

Major expenditures concerning the infrastructure acquisition have already been performed in 2007 and 2008. In the present annuity (2010) an amount of only ~15K€ are reported on this topic. A number of contracts of personal continued to be established in 2010 for technical support in the 3 networks of the IberArray platform, in the geochronological analyses and in the database server management, with a total amount of ~313K€. The rest of Direct Costs expenses reported in 2010, amounting ~270K€, are mostly devoted to the field operations related to the instrumental arrays of seismics and GPS (site reconnaissance, deployment and maintenance tasks), recording of magnetotelluric profiles and acquisition of new datasets for geochronology, structural geology, geomorphology or paleoseismology analyses. Most of the 10 participant groups are involved in these tasks at different degrees. Also included are Consumable expenses corresponding basically to the items related and needed to the field deployment of equipments, as well as Travel and per-diem expenses related to assistance of internal meetings, participation to external workshops, congresses, etc. Total amount of Direct Costs reported in 2010: ~583K€

## **V. Brief description of the Research Activity Plan to be carried out between January 1, 2010 and December 31, 2010, as stated in the Implementation Agreement [two pages or less].**

The Research Activities of Topo-Iberia are structured into 8 Subprogrammes or WorkPackages (WP1-8). Their activities foreseen for 2011 are briefly summarized in the following:

The WP1 (Databases) will continue the data storage within the SITOPPO server system implemented at IGME. The leading group will also take care of maintenance and updating of the project Web site.

At the end of 2010, the portable seismic network (WP2), has started its last scheduled movement, dismantling stations from central Iberia and re-deploying them at the northern sector of the Peninsula. This operation should be pursued and completed during January-March 2011. In order to collect an appropriate amount of relevant seismic data, we expect to keep the array in place till summer 2012, once the prolongation of the project for an extra year has been agreed. The deployment will be completed by using some 15 BB stations of high quality borrowed to German and Dutch institutions. In this way, we can keep our sub-array of 19 stations monitoring the Rif and Atlas domains of Morocco, hence participating in a remarkable international effort in that area together with American and German colleagues. Data analysis concerning the southern and central sectors will be pursued, and corresponding results after studies of noise level, receiver functions and anisotropy will be presented at international venues like EGU and AGU and published accordingly.

Accurate maintenance of the GPS network (WP3), taking advantage of quick checking from the GPRS data transmission, will continue to be a major task of WP3 during this period, to minimize eventual anomalies, either in antennas or in signal transmission. The different strategies and software considered for data processing within the expert groups will be reviewed and compared in this period. Analyses of the time series available from the IberArray pool and from the retained permanent sites will be pursued, and improvements in absolute and relative displacement vectors will be evaluated and presented at international ventures.

The Magnetotelluric IberArray (WP4) of Broad Band and Long Period instruments will be used to acquire a number of MT profiles that will complement the ones performed in previous years, according to the schedule agreed in the WG. In northern Spain, a E-W crustal profile in Galicia-Asturias will be extended in this period, and a NE-SW transect, 300 km-long, across the Iberian Chain will be undertaken, both in BB (one site every 5 km) and in LP modes (one site per 15-20 km). 2D and 3D modelling interpretations of completed profiles will also be pursued.

The teams integrated in WP5 (geologists from practically all the participant institutions) will keep developing main targets in the 3 regional domains defined in the project (South, Central and North): to provide new constraints to quantify geological processes such as relief formation, uplift and erosion rates, landscape evolution or recent tectonic activity. For this purpose, some field campaigns are again foreseen in this period to acquire new data sets in selected geological aims of the Cantabrian Mountains and Galician Margin, Pyrenees, Central and Iberian Systems, Betics, Rif and

Atlas domains. Activities will focus also on analyses and interpretation of existing datasets, and publication and dissemination of results. A wide range of methodologies will be considered, from low-T thermochronology (U-Th/He, fission tracks and cosmogenic isotopes, using Lab. facilities in Cádiz, Granada and Barcelona Universities), geomorphological indexes (to evaluate instabilities, avalanches or land slide hazards), paleoseismology, paleogeographic reconstructions, paleontological dating, active tectonics (geophysical and surface geology data) or structural geology (in orogens and basins).

Integrated modeling of deep processes combining relevant results obtained in previous WPs is the basic aim of WP6. The main activities for 2011 will focus on: a) improvement of numerical models of mantle delamination and subduction processes by incorporating brittle failure and faulting and radiogenic heat production effects; b) integrated 2D lithospheric structure along selected transects crossing the NE-Iberian Peninsula (this will be done in interaction with WP8 and will integrate results of previous WPs); c) modeling the crust-mantle accommodation of the Africa-Eurasia convergence in the Gibraltar Arc region and resulting landscape evolution. These activities imply a close collaboration with other active international projects as TopoMed and PyrTec, both integrated in the TOPOEUROPE Eurocores.

Tectonosedimentary and relief evolution processes are afforded within WP7, particularly the interaction between tectonics, erosion-sedimentation and environmental impact, and the influence of relief variation on the surface tectonic deformation. In 2011 field-work is going to be carried out at the boundary between the Spanish Central System (SCS) and the Iberian Range to fully understand the role of inherited rift-related structures and their evolution during subsequent N-S Alpine compression. Moreover, field data will bring new insights into the structural patterns and effects of lateral thermo-mechanical lithosphere variations on surface topography. The field results will be compared with the evolution of surface topography from the analogue models. The proposed comparison will be established by studying the velocity vector field of the models surface. This methodology (also known as Particle Image Velocimetry, PIV) will aim on the interpretation of pre-existent tectonic structures and their probable reactivation. In addition, PIV technique will provide valuable information on the identification of possible mechanisms of strain partitioning that may have been played an important role on the present-day configuration of topography in the Iberian Range.

WP8 approaches the interrelation between surface and deep processes, i.e. the structure and 4D evolution of Iberia. It focuses on the integration of all geophysical and geological observables and evolutionary models, a final aim of the project. In the coming period, the ArcGIS database should be enlarged with new, relevant information through painstaking processing and standardisation efforts, considering the very diverse, heterogeneous sources and formats of the elements to be incorporated to the database. Moreover, the 3D modelling of the datasets already incorporated will be pursued, using the powerful tool of the GoCAD modelling software.

## **VI. National and international actions carried out in order to increase the visibility of the Programme [one page or less].**

Topo-Iberia has established close relationships and positive synergies with other international ventures, such as Topo-Europe or Picasso programmes, and it has triggered new perspectives in neighbouring countries.

Topo-Europe is an ESF-Eurocore, approved one year later than Topo-Iberia, with whom it shares main objectives at a European scale. One of its projects is Topo-Med, an integrated research in Western Mediterranean margins which holds a strong team of Spanish researchers, many of them involved also in Topo-Iberia. Another one is PyrTec, focused in modelling processes on the Pyrenean-Cantabrian domain, which includes also Topo-Iberia researchers.

The Picasso initiative, launched also by the Topo-Iberia core group, has resulted in a number of projects supported by USA, Irish and German agencies to carried out seismological and magnetotelluric research in the 'southern Topo-Iberia domain' of Betics-Rif-Atlas. All of them are organized in a coordinated way with our groups and the corresponding field experiments have been designed to complement Topo-Iberia surveys.

Besides our continued cooperation with Morocco, in France and Portugal two projects have been launched in this period, assuming the same objectives as our seismic component, i.e. to implement a BB network to achieve an even coverage of Portugal and of the northern Pyrenean domains coinciding with our array deployments. We established also coordinated actions with the leaders of each project.

Moreover, the updated ESFRI road map included in its environmental section the EPOS (European Plate Observing System) project, which started its preliminary phase in November 2010. It holds a relevant Spanish participation based on the Topo-Iberia structure. Coordinated by ICTJA-CSIC, it includes the 10 groups involved in Topo-Iberia, the IGN (National Geographic Institute) and the IGC (Geological Institute of Catalonia).

A presentation of the Topo-Iberia programme has been requested to the Coordinator at two relevant international forums held in 2010:

- 32th European Seismological Commission, Montpellier, France.
- American Geophysical Union Fall Meeting, San Francisco, USA

Different members of the Topo-Iberia Groups have attended and presented several contributions in other relevant venues directly related to the project:

- European Geosciences Union 7<sup>th</sup> General Assembly, Wien, Austria,
- 32th European Seismological Commission, Montpellier, France.
- American Geophysical Union Spring Meeting, Foz do Iguazú, Brasil
- American Geophysical Union Fall Meeting, San Francisco, USA
- 2nd Central & North Atlantic Conjugate Margins Conference. Lisbon
- 72nd EAGE (European Association of Geoscientists & Engineers) Conference, Barcelona.
- 6th TOPO-EUROPE Workshop, Hønefoss (Noruega)
- 14th Deep Seismic Reflection Profiling of the Continents and their Margins. Cairns, Australia.

On the other hand, members of Topo-Iberia groups have been required to provide about 70 Conferences, Seminars or Interviews in audio-visual media.

## **VII. Detected problems and suggestions.**

No relevant problems in the project are to be highlighted in this period.

A limited number of failures in the functioning of a few field equipments (GPS antennas, seismometers or dataloggers) have been detected. In all cases, the failures could be solved in reasonable time delays, either by direct actuations or by sending these instruments back to the manufacturers for repairing and reinstalled as soon as possible. In the meantime, spare equipment could be used in some cases, so the data loss does not seem much significant.

As mentioned in the research activity plan for 2010, an extension of the project for one additional year, without any extra costs involved, has been solicited to the Consolider Commission. Main reason identified for such an extension is to achieve the best possible data bases to constrain key geodynamic problems, from the new data sets being acquired by seismic and GPS networks. In the proposal, three successive deployments of the seismic array were envisaged to cover the whole study area, each one standing for about 18 months to gather an appropriate number of seismic events. In practice, first annuity has been spent basically in the equipment acquisition procedure, delivery, permitting and testing of stations. To complete the shifting from southern to central sector has also involved some delay, due to bad weather conditions. Hence, to fulfil the 18 months monitoring period, at the central sector at present and at the northern one afterwards, the project should be active until Fall 2012. Moreover, the GPS array also needs to keep monitoring the study area continuously for several years, in order to collect time series long enough to decipher the small-scale deformation values within the sites in the Iberian Peninsula. Hence, an extra year of field operations would also benefit significantly the GPS results. Finally, the integrated interpretations foreseen in the corresponding WPs are much based on the new geophysical data sets, which need also some time for processing and analysis, so they would also clearly benefit from the project extension.

Finally, in October 2010 the approval for such extension has been notified to us by the Coordinator of the Consolider-Ingenio programme. Hence, now the project will end on September 15<sup>th</sup>, 2012.