Programme opérationnel Interreg IVA
France-Espagne-Andorre 2007 – 2013

SISPYR

Système d'Information Sismique des Pyrénées

Sistema de Información Sísmica del Pirineo

Technical progress report – 2009, October

5 octobre 2009

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Administrative review

The FEDER convention n°EFA73/08 for the SISPYR Project (System of Seismic Information for Pyrenees) has been approved on June the 22th by CTP. Technical works are in progress for all the partners since this date. To be able to start as efficiently as possible the project and plan works for 2009, a kick-off meeting took place in Barcelona the 23-24th of February 2009.

During this meeting were organized and presented:

- detail of actions (M0 to M6);
- designation of coordinators & responsible for each partner & each action;
- 1st schedule of plenary meetings ;
- Creation of the SISPYR ftp.

The financial progress report is presented in a separate document introduced in the SIGEFA application.

Technical review

Action 0
General organization of project

Designation of coordinators and responsible for each partner and for each action is done. At the end of November there will be held in Barcelona the first coordination meeting to engaged technical-administrative components, basically *following project indicators* and *detailed activities planning* for each single partner, keeping in mind global Sispyr objectives and project budget. The first plenary meeting is fixed at the beginning of 2010.

Action 1
Pyrenees real time seismic network

1.1 BB new stations

The planning of deployment is calibrated:

- IGN stations (2 stations, prelim loc maybe a third one, 2009 and 2010)
- OMP 5 stations (last in early 2011)

- Bid for hardware done on July, delivery expected on the beginning of 2010:
  - Sensors : Nanometrics (5 BB)
  - Digitizers : Agecodagis (5)
- Sites choice
  - “Lourdes castle”: RAP site, electric work are going on
  - “Moulis cave” is tested but the site seems to be good.
  - “Nébias ISARD site: some test are planned for November 2009

1.2 Accelerometric RT stations

The planning of deployment is calibrated:

- IGN: 6 stations
- OMP : locations defined, 2 per year
- IGC : 3 already installed, 3 more before 2010
- BRGM (location to be discussed) 2 per year

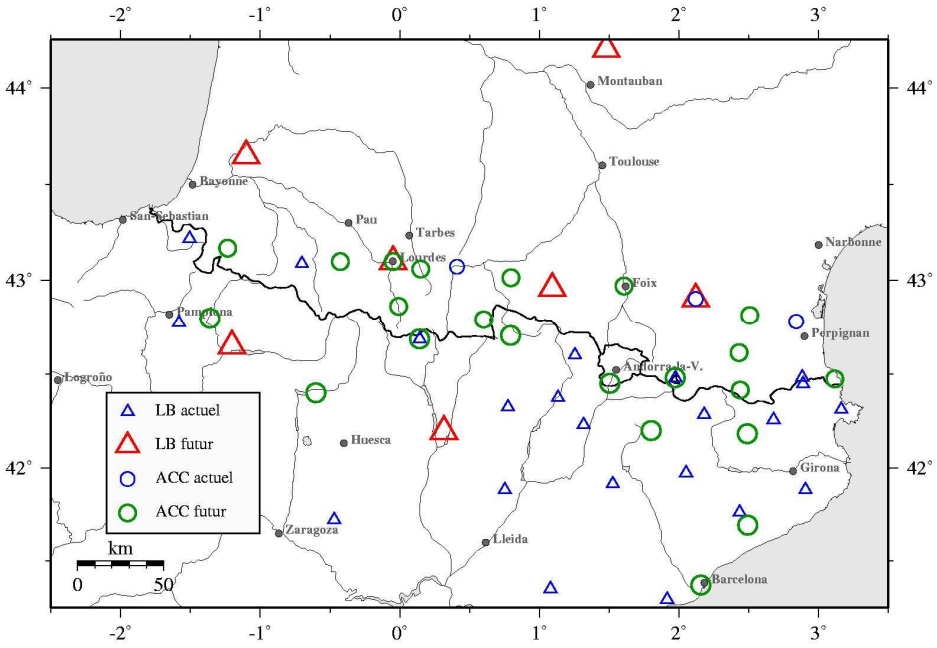

Figure 1 : SISPYR seismic network

Hardware is in test in BRGM for ADSL implementation for sensors which will be installed in France.

Hardware for 4 OMP’s stations are already tested and software for specific communication adapted. 2 sites will be first equiped :

- Bagnères-de-Bigorre (PYBB) during november
- Arudy (PYAD) planned on december 2009 or January 2010 electrical works are going on).

1.3 Experts group for post-seismic intervention

A 1st meeting will be planned for the beginning of 2010. Work is not engaged although will be planned on the coordination meeting of November 2009.

Action 2
Data exchange

It is decided to establish a convention between the Interreg partners which will determine the terms of the data share / exchange in real-time / near real-time / archive server and condition of access / property / diffusion of these common data. As possible sharing & interoperability data will be provided for each partner through the EU INSPIRE recommendations.

2.1 Real time data exchange

The real time data exchange (action 2.1.) is now engaged between partners:

Rx \ Tx	IGN	BRGM	OMP	IGC
IGN		3 acc done	2 BB in progress	3BB done
BRGM	5 BB done		6 BB to be done	13 BB done
OMP	2-3 BB in progress	1 Acc to be done		3-4 BB in progress
IGC	5BB done	3 Acc done	2 BB in progress	

figure 2 : Real time data exchange planning

« seiscomp » software is already installed on the dedicated server in OMP. Real time access to records from ATE and SJAF stations is possible by seedlink. This way of work should be developed for all OMP stations. By this way, data exchange is in progress with IGN and IGC.

2.2 Near real time data exchange

The future “near real time data exchange” is planned but not yet engaged.

	IGN	BRGM	OMP	IGC
Seismic	7 BB	-	7 BB	9 BB

Accelerometric	6 ACC	9 ACC	6 ACC	6 ACC

figure 3 : « Near real time » data exchange planning

2.3 Unique data storage system

The unique data storage system (action 2.3) is not engaged at present time.

Action 3
Seismology

3.1 Seismic sources – moment tensors

The main objective of this action is to be able to perform automatic moment tensor in the Pyrenees region. Results of this action should be integrated for Action 4.1 (real-time shake-map). First step is to be achieved: earthquake database for Pyrenees since 2001.

Some methodological work is already engaged for the moment tension inversion method (OMP). First results, based on the B. Delouis works, are very promising.

3.2 3D crustal model of Pyrenees

The work is based on the collect of data and the tomography building. Work is on the very beginning. A feasibility study is on the way for the determination of the thickness of the crust on each seismic station (OMP).

3.3 Attenuation models

On the same data set to be defined for 3.1, proposals of attenuation laws-models for Pyrenees region will be performed by each partners involved in this action by different ways. A future comparison of results may permit to validate the attenuation model to be used for M4.1. Work is still not engaged.

Action 4
Seismic risk

4.1 Real time shake-map

The work plan is defined on session of February:

- 2009 : State of art / Soft conception (& development until 2011) / Attenuation law definition
- 2010 : Site effects taking account / PGA/PGV calculation / Macrosismic information

State of art is now engaged by IGC. Here above main implementation of shake-map in Europe.

Region	Year	Agency	GM attenuation	Site effects	Instrumental I	Grid	Reference & Comments
Italy	2008	INGV	M>5.5 Ambraseys et.al., 1996 and Boomer et al (2000).	Geology simplification based on EC8. The amplification factor adopt the Borcherdt relation.	Wald, 1999	-	· Michelini, 2008 ·http://earthquake.rm.ingv.it/shakemap/shake/archive/ · It has lots of shake maps on the web. The structure of the web is the USGS structure
South-eastern Alps	2009		3.5< M <5.5 Massa et al (2008) M>5.5. Sabetta and Pugliese (1996)	Geology simplification. Basic resolution. amplification factors estimated by Borcherdt (1994).	Faccioli and Cauzzi, 2006.	5'	· Moratto, 2009
Iceland		IMO	-	-	Wald, 1999	-	·http://hraun.vedur.is/ja/safer/shake/index.html
Turkey		KOERI	-	-	-	-	· Oye, 2008 · Calculate the shake maps in his early warning system until unless 2008. On the web they have only a shake map for a 2008 earthquake
Norway		NORSAR	-	-	-	-	· Oye, 2008 · They develop a lot of interesting documents for the JRA3.
Switzer-land	2007	ETHZ	-	-	-	-	· Wiemmer, 2007 · I have no acces to the paper.
IGN	2009 ?	Granada	-	-	-	-	· SISPYR communications · They have installed recently for the Granada region..
Rumania	2007	RO-NDC	Default ShakeMap installation.	Wald and Allen, 2007	-	-	· Ionescu, 2007 · They use Broad Band and accelerometer stations

figure 4 : European shake-map main implementations

4.2 Seismic risk scenarios

1st step of working is the definition of GIS files / tools that can be valorised in the frame of the project (cf. action 6 on the way). Pilot zones, kind of scenarios & methods for site effect evaluation are defined:

- probabilistic based on the INTERREG IIIA ISARD results for all Pyrenees
- deterministic:
    - Vall d'Aran Earthquake (1923)
    - Lourdes Earthquake (2006)
    - Saint-Paul de Fenouillet (1996)

Significant work has been realized in order to adapt and/or to develop methods, techniques and computer programs for assessing the vulnerability and fragility of the buildings. In particular for unreinforced masonry and reinforced concrete typical buildings. Specific applications to current buildings have been also performed. A GIS platform has also been designed at the UPC platform and it is being adapted for developing automatic risk scenarios for essential and/or special buildings as well as for current buildings, at regional and urban scale.

The vulnerability assessment and Retrospective analysis of past earthquakes (action 4.3) is not engaged at present time.

Action 5
Feasibility of an Early Warning System in Pyrenees

The feasibility of a Pyrenean EWS is attached to several tasks. First work to be plan is the definition of the architecture of the possible system. State of art is engaged in 2009 (bibliography).

Action 6
Communication

This action is only engaged for the presentation of the SISPYR project (no results today). Information to public was done by OMP about Pyrenees seismicity (posters) and SISPyr project presentation:

- november 2008 : « Science en Fête » in Toulouse
- mai 2008 : « Sismotour » in Lourdes

Before end of 2009, the web site development is planned. A preliminary web plan is proposed. Regarding the difficulties to translate all articles, the site will be a 3 languages site but all documents attached should be in English if possible (CTP).

One more sub-action is included in the action 6: 6.4. Data management (GIS essentially). The GIS cross-border database under ArcGis platform is on building. This GIS will include geology, seismic network, DEM and administrative limits before end of 2009.