



TRAINING EXPERTS FOR MACROSEISMIC FIELD SURVEYS

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After earthquakes of magnitude greater than 5, the impacted zones cover frequently a large area. The collection of macroseismic observations in the field requires then the commitment of numerous people to estimate intensities quickly after the mainshock, before the effects are modified by human interventions or aftershocks. It is not possible to constitute at the last minute an inexperienced team for a field survey without threatening the safety of the members, the reputation of the institutes involved or compromising the quality of the work performed. Training experts before the events is thus an essential stage to realize field surveys.

The French central seismological office (BCSF) is in charge of the macroseismic surveys since 1921 in France. As of numerous institutes in the world, its staff has too few employees to achieve its mission on its own in case of large event. We created in 2007 a macroseismic intervention group (G.I.M). So far, 80 voluntary members from several institutes of seismology, from France and neighbouring countries, make up the GIM. After following the various training courses, 54 experts of this group are now operational and ready to evaluate, quickly after an earthquake, the effects to estimate the macroseismic intensities.

TWO LEVELS OF TRAINING

The GIM's training set up by the BCSF, with the support of the training service of the University of Strasbourg, allows the experts to reach the necessary skill level.

The educational objectives of these trainings were numerous: training the usage and the application of the EMS-98 macroseismic scale, training the usage of a survey method, efficient and common to all experts, teaching the members the safety behaviour during the field survey and allowing evolutions of the analysis methods to improve the quality of the intensity estimations.

Beyond the knowledge of the concept of the macroseismic intensity itself and the usage of the EMS-98 scale, what educational tools can we use to prepare the trainees to conditions as close as possible to the field conditions?

The GIM is based on two levels of trainings. The first level, during 3 days, uses mainly lectures, while the second level (during 24 hours), with night and day in field conditions, is based on a case-study with a simulation of a field intervention.

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Having approached the fundamentals of the EMS-98 scale, the dynamics of structures, the seismic vulnerability estimation, the group organization, the data collection and analysis, the estimation of the intensity and the safety procedures, the first level of the GIM's training ends by an exercise of interview in pairs. One member plays the role of a responsible local officer and the other the expert of the GIM. Through this final exercise, level 1 allows the experts to concretely practice the data collection and analysis. We also project a movie of the fire brigades of Guadeloupe (West Indies) showing the difficult conditions of their intervention after the earthquake of Haiti in 2010.

Following the movie, a psychologist of the emergency unit dedicated to catastrophic situations explains how to recognize signs of post-traumatic depression. International emergency fire-fighters (PUI, a non-profit organization) train the experts to basic first-aid knowledge and present their field experiences to adopt a safe behaviour in the field.

During the second level of training, the experts are really developing practical experiences with the fieldwork difficulties. This training is based on a real-size simulation in an existing municipality. The different stages of the organization are also tested. Everything is simulated; such as transportation, accommodation, and logistics including the field survey by pairs in the municipality. The building damages are represented by barricade tape with codified colours (fig.1) or by photomontages (fig.2).



Figure 1. Simulation of damage in Wickerschwihr (Alsace-France) for training purposes

They give an idea of the effects in the municipality analysed by the expert, who has to estimate the vulnerability and the level of damage (EMS-98 scale). This field exercise helps us to optimise the GIM organisation and training despite it cannot perfectly reflect the reality. However, the preparation of such exercise remains long and difficult.



Figure 2. Example of photomontage in Wickerschwihr (France) for the training purposes

ASSESSMENT OF THE TRAININGS AND OUTLOOK

These trainings have got an excellent feedback from the trainees and they have evolved after each session in their synopsis thanks to the exchanges between all GIM members and their individual experiences.

Moreover, the field simulation has obviously limits, such as the number of equipped buildings, the reality of photomontages, the field atmosphere (low stress) and the absence of real dangers. Also, its implementation needs a large amount of time. Therefore, the BCSF now develops, for the second level training, a field simulation coupled with virtual exercises on computer by using photos of real damages with a 360° view.

Nothing will replace the field experience, but these two levels of training allow deploying, after an earthquake with damages, experts (GIM) trained and prepared.

SECONDARY BENEFITS OF THE TRAININGS

These trainings also offered other less expected benefits. Indeed, the concepts of macroseismic intensity, nevertheless historically used by the seismologists, are still too often source of confusion and misunderstanding. These trainings are the opportunity for the members to approach more concretely the nature of the intensity, to understand its construction and limits of usage.

They are also source of meetings and of sharing of experiences, which strengthen the group but also the collaborations between the institutes. Getting to know each other better and working together better are other important outcomes. The interest of our foreign counterparts registered in the GIM during these trainings (from Belgium, Spain, Switzerland, Germany) breaks down the barriers of nationality, just like macroseismic maps. We benefit from their field experience and, at their request, we could help them if an event affects their territory.

CREATION OF THE GIM AND FUTURE

The creation of intervention group would not have been possible with a simple announcement to the community; the implementation of the macroseismic trainings allowed interested seismologists who volunteered for macroseismic surveys to meet. This is how the G.I.M. was born. It started with 10 people in 2007, and counts 80 members today, what is sufficient at the moment to perform a macroseismic field survey in good conditions.

The experience of the GIM starts to raise the interest of other intervention groups such as rescue teams that requested the BCSF to give them a seismological approach and the basic knowledge of seismic risk.

The training of experts to estimate the post-earthquake habitability of buildings is also currently discussed in several European countries. The experience of GIM trainings procedures and methods can also help the people in charge of these training for their implementation.

Last but not least, the young generation of seismologists actively participated to these trainings and is motivated to take part in macroseismic field surveys and eventually to take over the macroseismic data collection, still irreplaceable.

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