9th Alexander von Humboldt International Conference
Istanbul | Turkey | 24 – 28 March 2014
AvH9-11

Risk assessment and mitigation: the link between science and decision making

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A sound an effective risk reduction planning requires a careful evaluation of separate components. First, an accurate scientific assessment of the different hazards and risks. Second, a transparent and rationale decision making protocol that translates the uncertain scientific information into mitigation actions. Third, an effective risk-communication to the people under threat. The development of these components requires a wide range of expertise, and an effectual connection between them. These connections are of fundamental importance because, implicitly, they define roles and responsibilities of each partner involved in the decision making process. We live in a world where natural risks are ever increasing, and it is easy to foresee that regular audits will become very common after events that cause significant damages. This already happened in Italy with the infamous L'Aquila earthquake trial, but since then other similar accusations to scientists and decision makers have been raised in other fields.

In this talk, I discuss some of the basic aspects of the whole decision making process. The focus is on the risk posed by earthquakes and volcanic eruptions. I describe some of the most recent advancement in quantifying the hazard and risk both on the long- (land use planning) and in the short-term (emergency management). In particular, I show some of the most recent models developed at this purpose in Italy and elsewhere, and I introduce some of the basic concepts that stand behind the definition of operational earthquake and eruption forecasting, and the hazard/risk assessment at different time scales.

Finally, I discuss the link between scientists and decision makers. They have to have different expertise, roles and responsibilities, but they have also to work together to shape a common language and a decision making protocol that can be profitably used to mitigate the risks. I also show that the link between scientists and decision makers may be quite controversial; the most striking example of this controversy is related to the usefulness of the concept of maximum credible event, largely used by seismologists and volcanologists.