



## **Anthropogenic versus natural processes and pollution in Padana Valley in last years involving new communication/policy strategies and ethical issues in research evaluation**

Fedora Quattrocchi (1), Carmela Vaccaro (2), and Enzo Boschi (3)

(1) Istituto Nazionale di Geofisica e Vulcanologia, Rome, Italy (fedora.quattrocchi@ingv.it), (2) Department of Physics and Earth Sciences - University of Ferrara, Ferrara, Italy (vcr@unife.it), (3) University of Bologna, Bologna, Italy (enzo.boschi@unibo.it)

Smart grids-Smat cities “fashion” requires management plans of highly urbanized areas located over the Padanian floodplain, which are prone to diffuse pollution of both lands and urban sectors, mostly after the disasters caused by tremendous alluvial rains in January 2014, when shallow aquifers and agricultural matters could have increase pollution over wide territory. Moreover the urban expansion has affected areas previously used for industrial activity and in some cases such for landfills. When the loss of memory of previous activity prevails after urbanization, with health issues, ethical questions are inevitable, accompanied by social conflicts and economic impacts. The alluvial plains of active tectonic areas - as the Padania Valley - in additions to widespread “anthropogenic pollution” is suffering from widespread “natural pollution” of deep fluid sources – mainly methane - corresponding to areas prone to uprising gaseous brines, along faults. Some of them were partially activated during the 2012 Emilia seismic sequence. This noteworthy seismic sequence engaged discussion about the possible role of gas storages and hydrocarbons production or the simple/exploring drilling activity to trigger typical tectonic seismicity. The paper deepen this troubled communication strategy, their gaps and peculiar geopolity case histories, to avoid the same strategy, in the future. On the other hand, gas burst or brine-gas-contamination in shallow aquifers, soils and indoor, should be studied by simple and cheap methods, by deepening stratigraphic gaps for the tectonics effects on sedimentation: natural processes should be recalled prior to recall anthropogenic causes, if any. Policy should be more responsible in state clearly the role of research in study infrastructures/processes, also when engaged by private companies, for sites selected by ministries mostly to star research: relevant gaps involves serious confusion in the public as regards responsibility and an exact reconstruction of the true facts.

Moreover these areas are affected by natural enrichment in heavy metals and toxic elements harmful to the health: geochemical surveying may allow both to recognize issues of diffuse “natural pollution” and to identify markers and tracers able to discriminate among anthropogenic and natural anomalies by geochemical methods mostly. The discovery of pollution emergency poses the problem of how to share to the public scientific data, avoiding that communication produces alarmism or persecution for the involved researchers, as occurred in the past. When diffuse pollution is linked to natural causes which can be defined as transient that precede potential gas-burst disasters, the risk communication by researchers not always meets sufficient support from those who are responsible for the administration of the territory, being afraid to lose the political consensus. Conflicts of interest in promoting certain non urgent research should be highlighted readily and clearly. This is one of the main cause of low resources devoted to the study of transient geochemical contamination in shallow aquifers, which could be useful for seismotectonic research too.

A discussion about: i) intellectual property & equal opportunity for all Earth Science researchers to have access to the public research calls (MIUR, MATT MSE Ministries); ii) about the critical research on some short-term hazards, which penalized the researchers in terms of scientific productivity and career was opened by the paper, suggesting new research evaluation indicators –ethical ones– than Impact Factor only.