ESC2016-427, 2016
35th General Assembly of the European Seismological Commission


35th General Assembly of the European Seismological Commission
4–10 September 2016 Trieste

# Tidal evidences of strain sensitivity in mud volcanic fluids

Giovanni Martinelli (1), Andrea Dadomo (2), and Dario Albarello (3)

(1) ARPAE Environmental Protection Agency of Emilia Romagna, Reggio Emilia, Reggio Emilia, Italy (giovanni.martinelli15@gmail.com), (2) GEOINVEST, Via della Conciliazione 45, 29122 Piacenza, Italy, (3) University of Siena, Dept. of Physical Sciences, Earth and Environment, Via Laterina 8, 53100 Siena, Italy

Tidal evidences of strain sensitivity in mud volcanic fluids

Martinelli G.,* Dadomo A.,° Albarello D.^

ARPAE Environmental Protection Agency of Emilia Romagna Region, Dept.Reggio Emilia, Via Amendola 2, 42100 Reggio Emilia, Italy
°GEOINVEST , Via della Conciliazione 45, 29122 Piacenza, Italy
^University of Siena, Dept. of Physical Sciences, Earth and Environment, Via Laterina 8, 53100 Siena, Italy

Mud volcanoes are peculiar geological structures characterized by the squeezing of cold multiphase fluids. They often occur both offshore and onshore in compressional tectonic environments. Fluids are constituted by a mix of fine grained sediments with brackish waters and with gaseous hydrocarbons. Mud volcanoes are generated by rapidly deposited undewatered sediments hosted by a reservoir which is subjected to a continuous size reshaping due to tectonic strain. Flow rate activity of mud volcanoes is relatively low and characterized by variable eruptive paroxistic periods. Eruptive periods have been linked by various authors to tectonic activity and to climate fluctuations. Monitoring activity of mud volcanoes revealed a poor link of the gaseous phase flow rate with tectonic activity while a total fluid flow rate increase has been sometimes observed after the occurrence of local seismic events. Eyewitnesses also reported that total fluid flow rate changes induced by the lunar cicles were observed in particular conditions. A one year monitoring of the liquid phase has been recently carried out on a mud volcanic emission in northern Apennines. A pressure sensor usually utilized in groundwater monitoring allowed to detect possible water level changes in a clayey water pool. Recorded data were processed and the diurnal and semidiurnal tidal components were revealed. Strain values due to tidal effects on the earth's crust are comparable to those induced by earthquake occurrence, thus these monitoring experiences could better constrain similar data recorded by GPS devices in seismically active areas.