



## **Statistical surveillance of Earthquakes based on volunteer sensor networks**

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A smartphone-based volunteer sensor network (VSN) is a wireless sensor network based on an easy-to-use software (app) developed by Earthquake Network. (<http://earthquakenetwork.it>) that users install on their personal smartphone and exploiting sensors on-board smartphone and communication with a host application. This paper considers some statistical modelling issues of VSN behaviour and data coming from smartphones on earthquake.

Unlike statistical health surveillance in epidemiology and statistical quality control in industry, here, alarms are issued according to the network behaviour, rather than single sensor intensity. Similarly, false alarm rate is assessed considering the epidemic behaviour of VSN. In particular the volunteer nature of the network implies that network is dynamical as the number of sensors active in each moment in each place is unknown and modelled as a latent random variable.

Both heuristic detectors and likelihood based detectors will be considered and compared. Some case studies from South America and Europe will be presented showing the ability to handle the heterogeneity of the network, and the ability to control false alarms and detection delays.

**Keywords:** on-line change detection, dynamic networks, false alarms, detection delay.