

Radon monitoring and seismic activity.

Il monitoraggio del radon e l'attività sismica.



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SUPSI



Earthquake prediction

- It is like a weather! Easy!
 - time
 - location
 - magnitude



- Distinguished from *earthquake forecasting*.
- Major earthquakes are often followed by reports that they were predicted, or at least anticipated, but no claim of a successful prediction of a major earthquake has survived.

Precursors

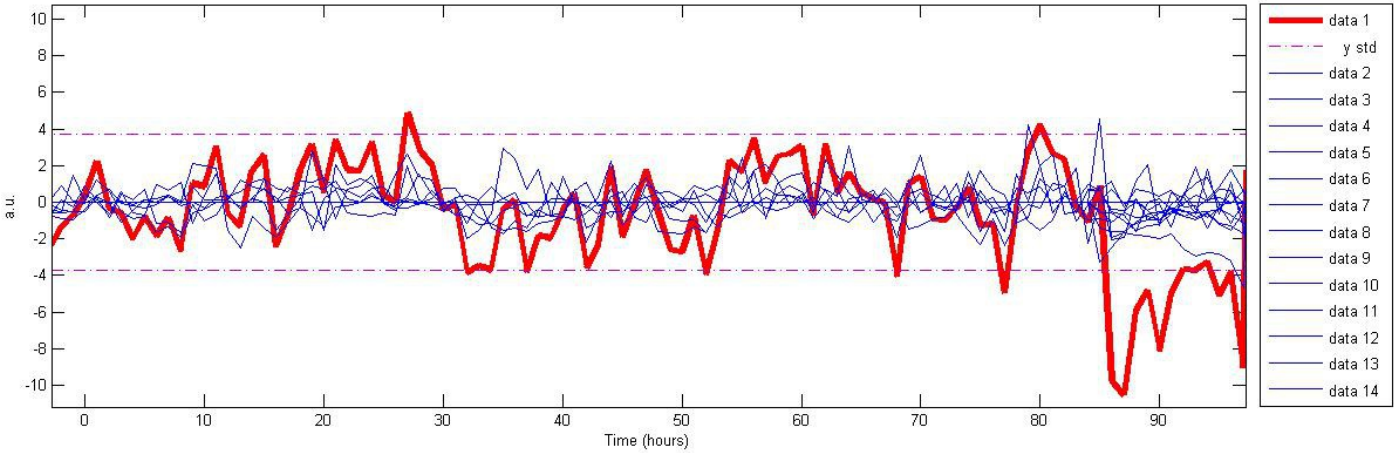
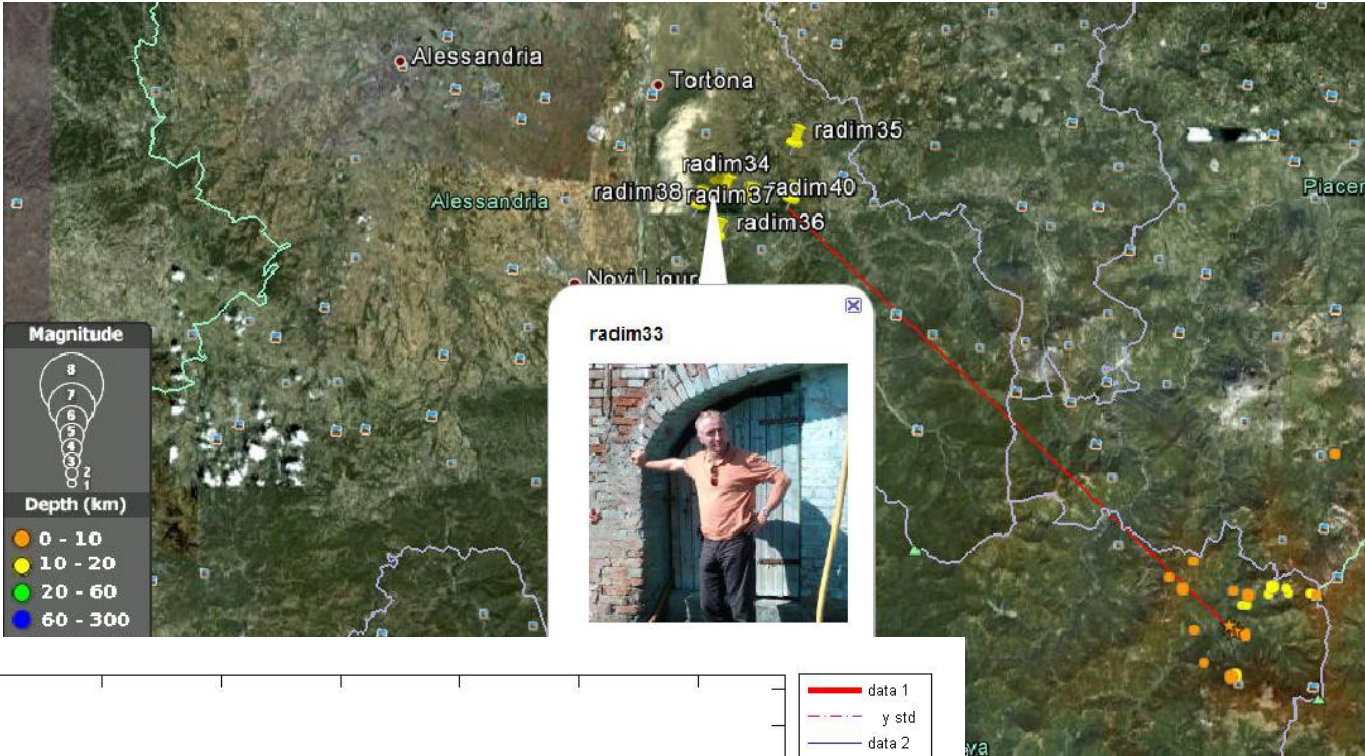
- **Animal behaviour**
- **Changes in V_p/V_s**
- **Radon emissions**
- **Geoelectric**

Instead of watching for anomalous phenomena that might be precursory signs of an impending earthquake, other approaches to predicting earthquakes look for trends or patterns that lead to an earthquake. As these trends may be complex and involve many variables, advanced statistical techniques are often needed to understand them, wherefore these are sometimes called statistical methods. These approaches also tend to be more probabilistic, and to have larger time periods, and so verge into earthquake forecasting.

http://en.wikipedia.org/wiki/Earthquake_prediction

Geo measurement campaign 2011

RADIMs located 70km away from seismic activities



Very optimistic expectation, but correlation with rainfalls only observed

Geo measurement campaign 2011

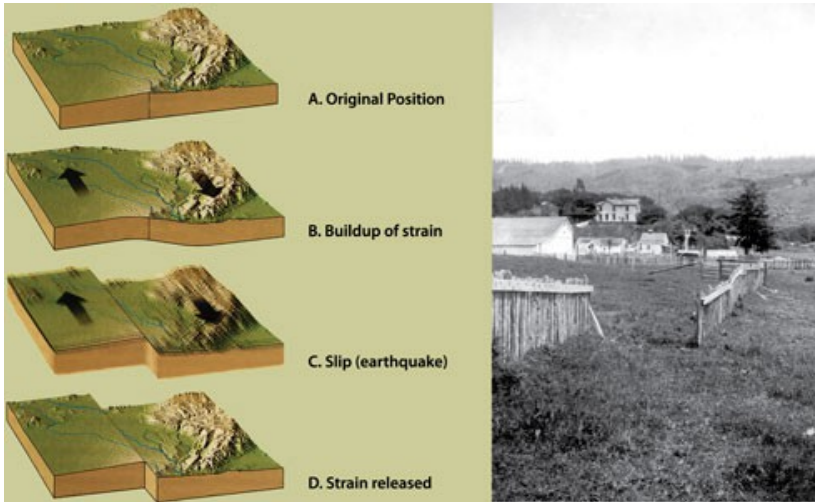
The image displays a MATLAB workspace with the following components:

- Command Window:** Shows MATLAB code and output. The code includes:

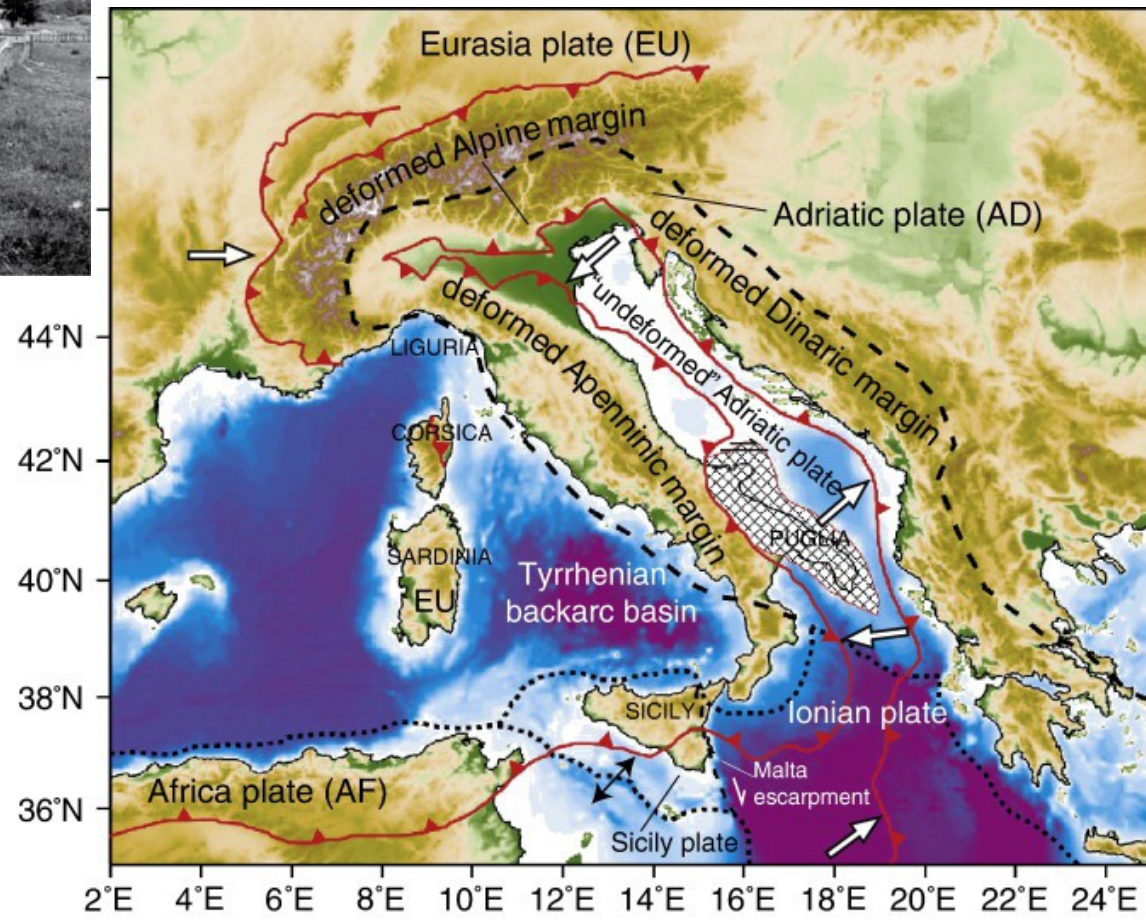
```
harmonics =  
    38  
Warning: Imaginary of complex X and/or arguments ignored  
> In DATA_24_FFT_INDEX  
harmonics =  
    94  
Warning: Imaginary of complex X and/or arguments ignored  
> In DATA_24_FFT_INDEX  
??? Operation terminated by user during ==> DATA_24_FFT_INDEX
```
- Figure 3 (Top Left):** Titled "Compressed signal", showing a time series plot of "data" (solid blue line) and "y std" (dashed magenta line) over 14 days. The y-axis is labeled "a.u." and ranges from 100 to 200.
- Figure 3 (Bottom Left):** Titled "RAW data", showing a time series plot of "E dose" over 14 days. The y-axis ranges from 0 to 500.
- Figure 5 (Top Right):** A plot of "Power" (y-axis, $\times 10^4$) versus "Period (hours)" (x-axis, 0 to 350). A prominent peak is labeled "Period = 22.0714".
- Figure 5 (Bottom Right):** A "Periodogram" plot showing "Power" (y-axis, $\times 10^4$) versus "cycles" (x-axis, 0 to 0.5).

The Windows taskbar at the bottom shows the system time as 22:46 and includes icons for MATLAB (R2011a), TomTom, BBC Russian, and other applications.

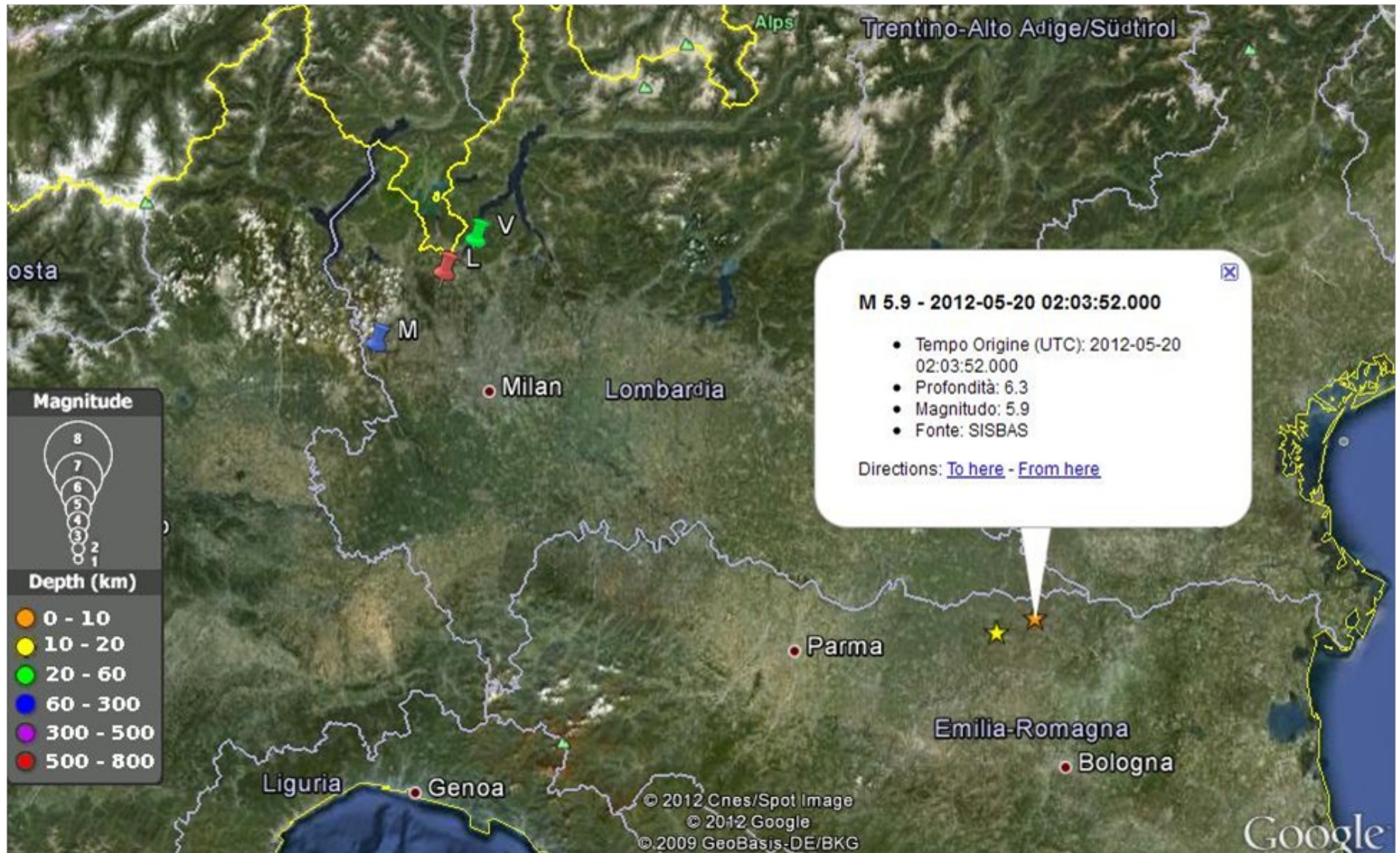
Elastic rebound theory of earthquakes

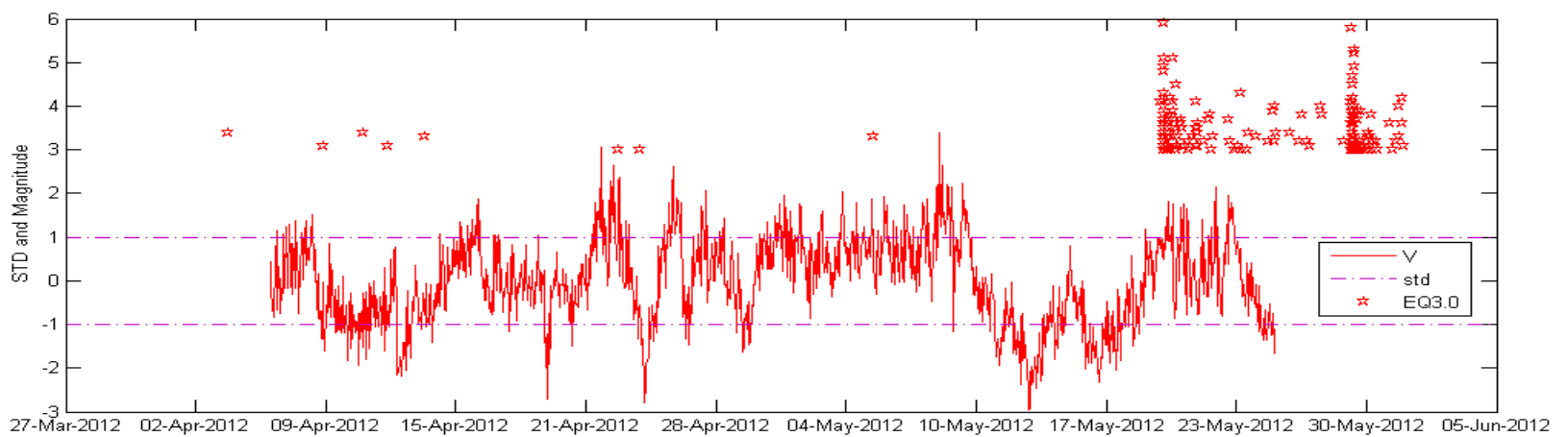
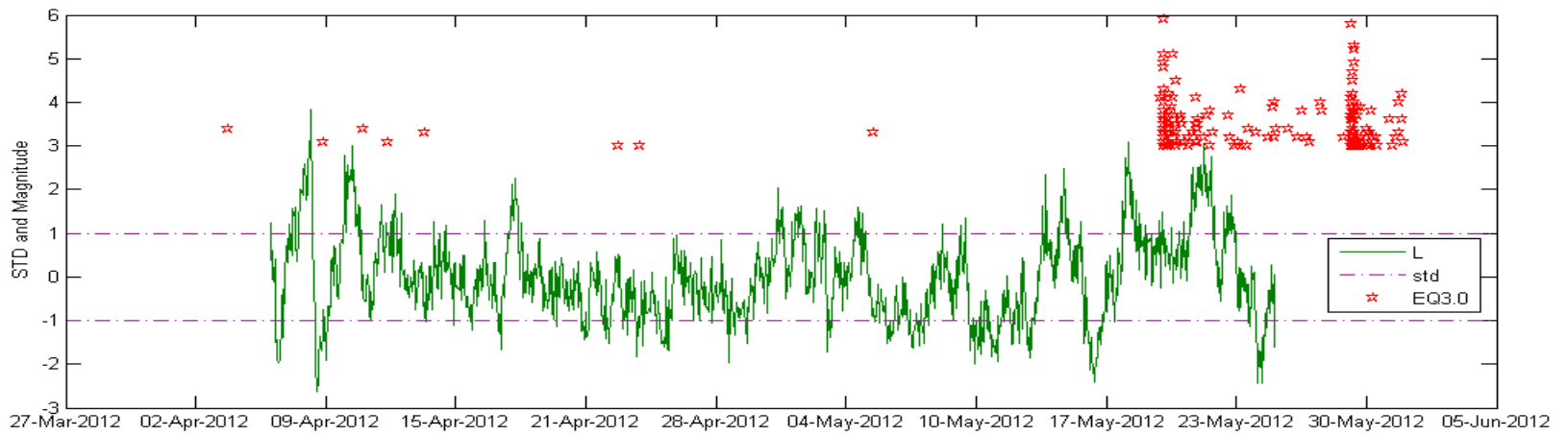
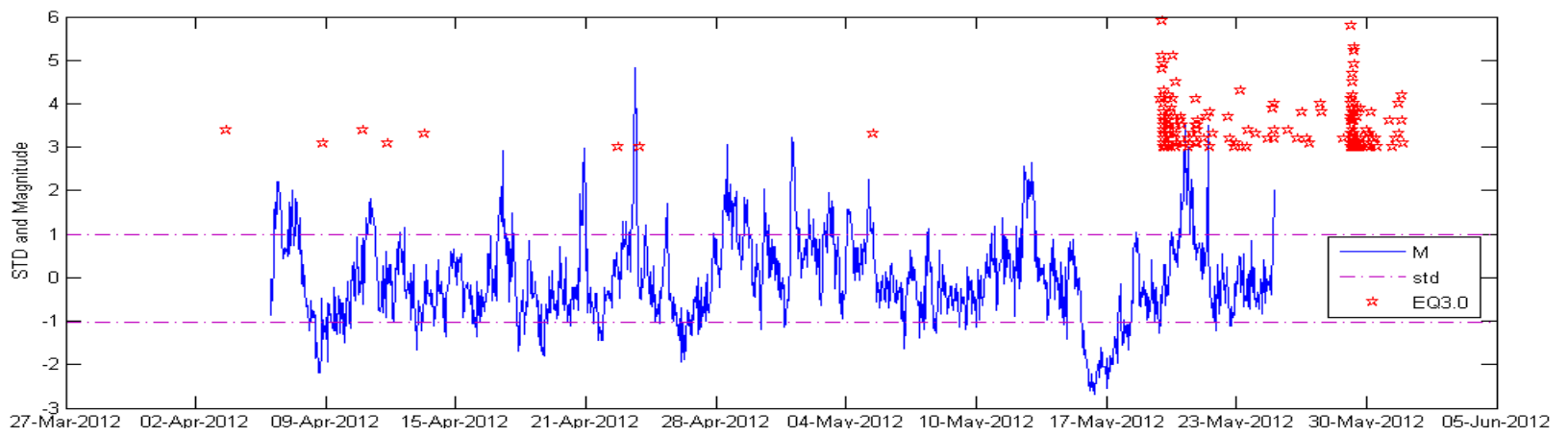


Harry Fielding Reid



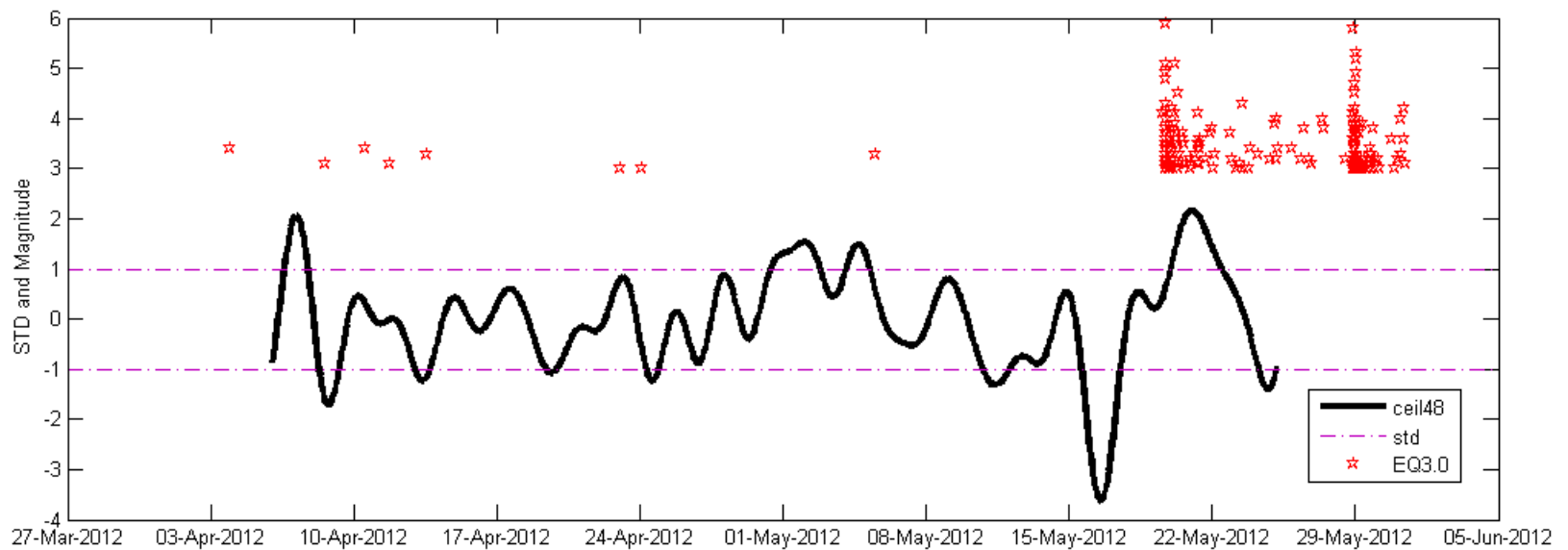
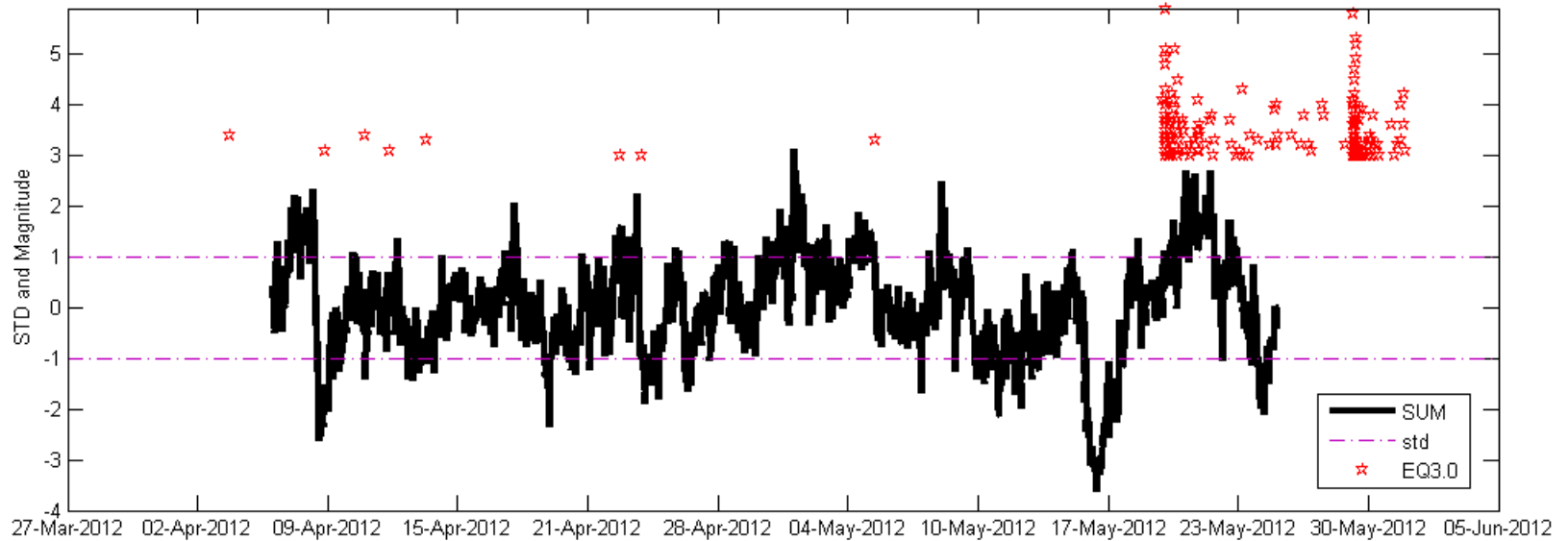
“In HOME of 3(три)” campaign MAP



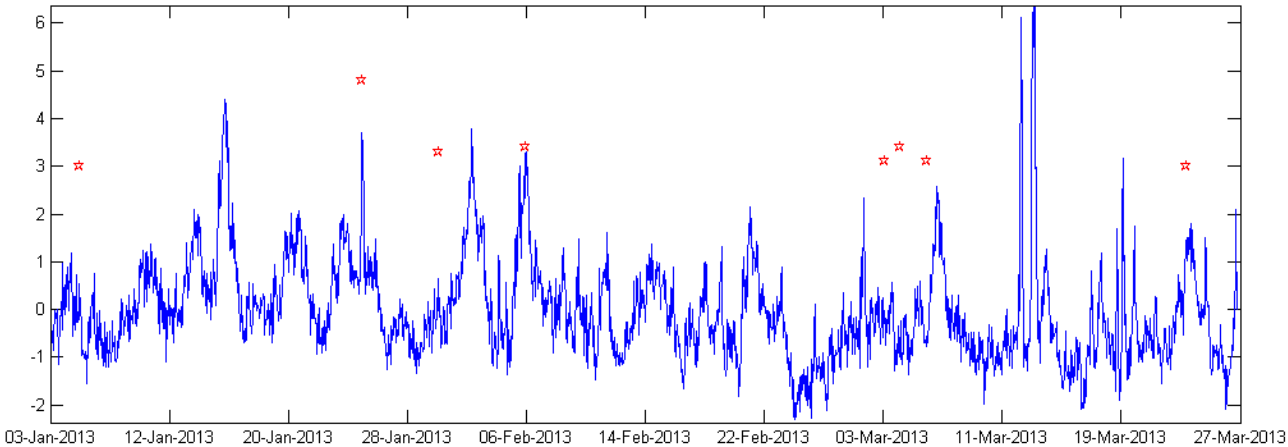
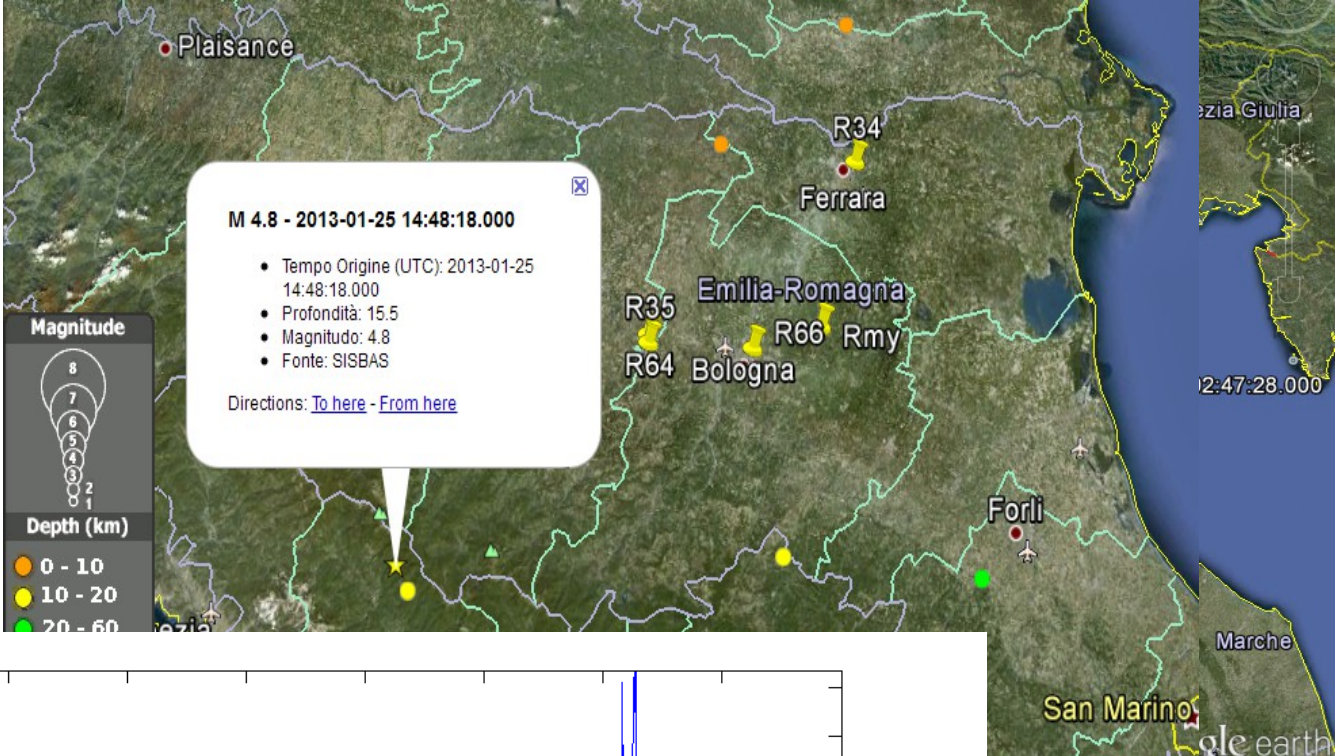


FFT result

Time Series Plot: Magnitude



Geo campaign 2012-2013



Online Radon data monitoring

RADICAL RADon - Mozilla Firefox

File Edit View History Bookmarks Tools Help

RADICAL RADon x

46.37.13.17/RadicalRadon/fe/rep_env_data.jsp

Italy eBay eBay.co.uk

Valery Chmill

Map Report Measurements Registry

Report Environmental Parameters

10: (mm/dd/yyyy)

Open: Yes No

Closed: Yes No

Search Results

Measure Campaign

Name	Start Date	End Date	Area
Valery_Radim+	06/07/2013	07/02/2013	Radim_valery
Environmental	06/07/2013	08/01/2013	supsi_environ
!Lombardy_Lin	07/02/2013	07/29/2013	LINE_1
R47	07/11/2013		R47
!Brunate+	07/30/2013		!Brunate+
!Como_Uni	07/30/2013		Como_Uni
!Alberobello	07/31/2013		Alberobello
2_cluster_Bell	08/02/2013	08/10/2013	Bellinzona
!2_cluster_Bell	08/11/2013		Bellinzona-Car

Details Environmental Parameters

Temperature
 Humidity Relative
 Pressure
 Chart
 Table
 (Show on map)

Relationship between Radon concentration and environmental parameters

Radon [Bq/m3]
 Humidity Relative [%]

400
320
240
160
80

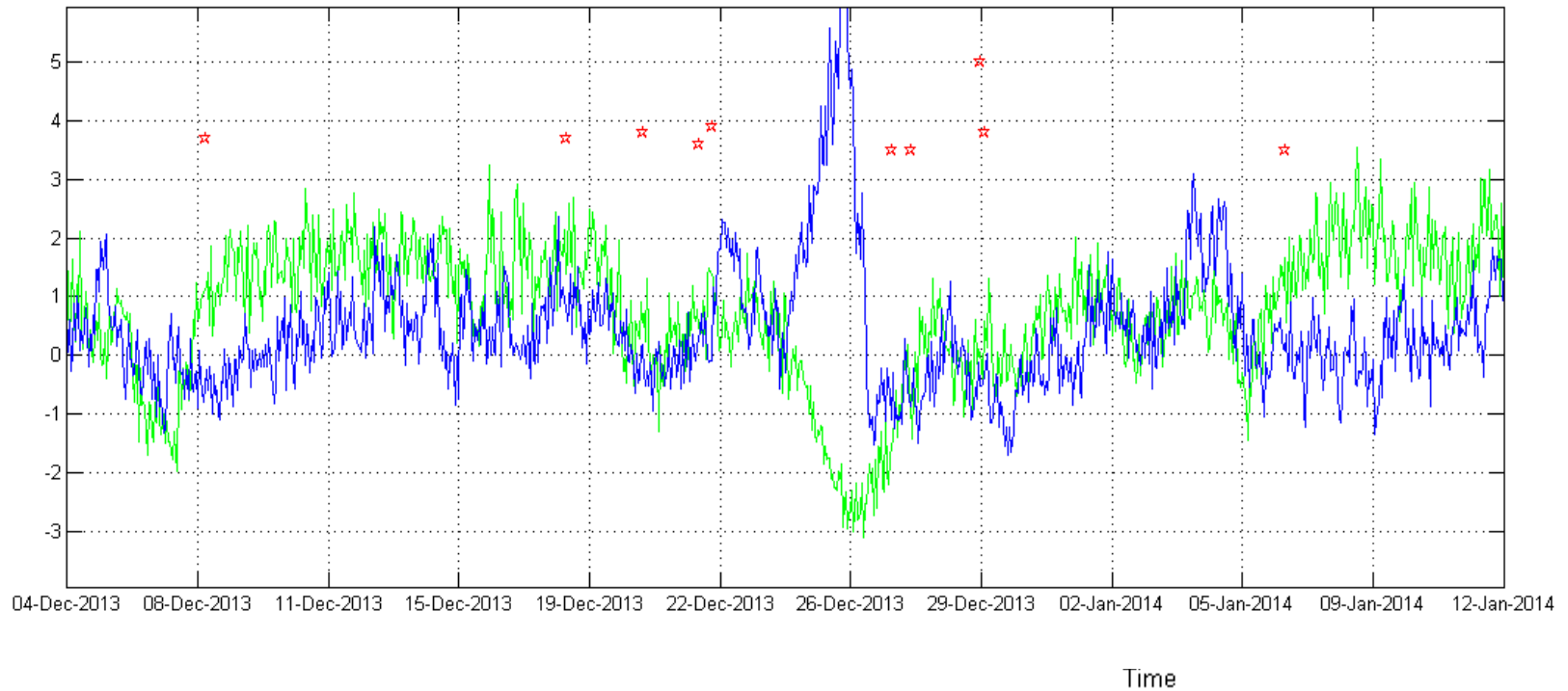
1...
75
50
25
0

Aug 15, 2013 Aug 22, 2013 Aug 29, 2013 Sep 5, 2013 Sep 12, 2013 Sep 19, 2013

Sep-2013 Oct-2013 Nov-2013 Dec-2013 Jan-2014 Feb-2014 Mar-2014 Apr-2014

LAST campaign “in CASA of 2(due)”

Time Series Plot:Radon concentration



Thanks for your attention!

