Application of Ground Penetrating Radar combined with 222Rn (Radon) measurements for search geological faults in Mexicali Baja California, Mexico

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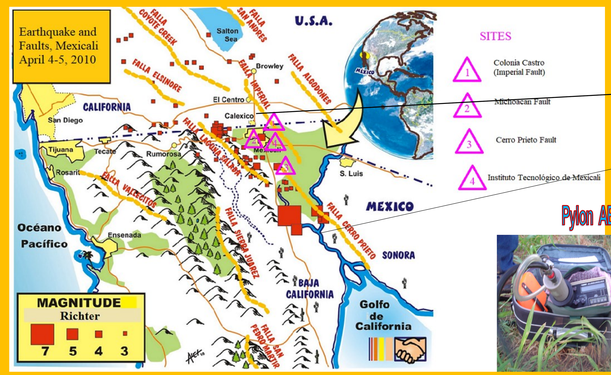
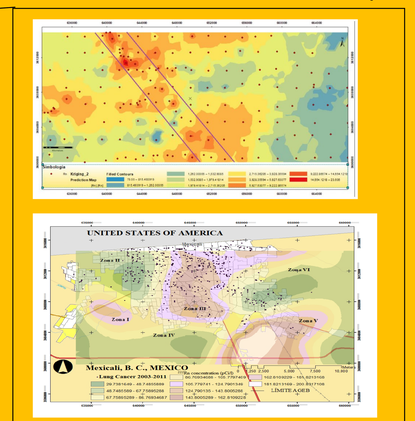
INTRODUCTION

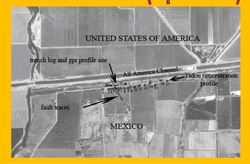
The City of Mexicali and its Valley are located within the extension to the SE of the San Andres fault system, a geological fault system generated by the activity of the Pacific and North American tectonic plates, the principal faults at this boundary are Imperial Fault and Cerro Prieto. In this work we present our results related to the search of traces of geological faults using ground penetrating radar technique combined with Radon gas (^{222}Rn) concentration measurements at Imperial, Cerro Prieto and Michoacan faults. Beside we include a detailed survey at Instituto Tecnológico de Mexicali where we use a seismic reflection profile for validate our GPR and Radon results. On the other hand we present the Radon gas concentrations measurements maps of the Mexicali and Morelia cities, the first map has been related with 855 lung cancer deaths between 2003 to 2011, the second map is related with potentially seismic fault and Subsidence-Creep-Fault Processes. Finally, we show a GPR and Radon profiles over la Colina Fault in Morelia City. We can conclude that GPR and Radon gas concentration measurement in soil are very useful for search geological fault traces in the field and Radon gas maps are useful for know Radon hazardous areas in a city.

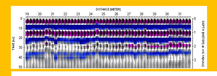




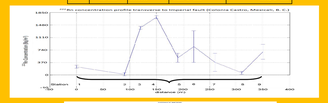
Mexicali City
Radon and lung cancer deaths (2003-2011)

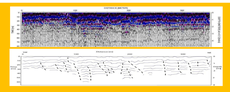
Site 1 Colonia Castro (Imperial Fault)



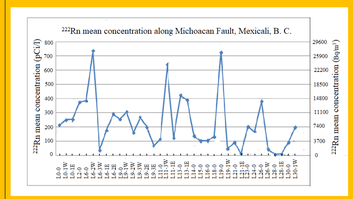


Station	Latitude (UTM)	Longitude (UTM)	Concentration ^{222}Rn pCi/l	Concentration ^{222}Rn Bq/m^3
1	Un 0652862	3 616235	0.60 ± 1.20	244.2 ± 44.4
2	0652960	3 616237	0.60 ± 1.20	22.2 ± 44.4
3	0653052	3 616235	37.80 ± 1.20	1422.37 ± 44.4
4	0654014	3 616238	46.31 ± 1.20	1709.77 ± 44.4
5	0654047	3 616234	11.80 ± 2.60	518.4 ± 133.2
6	0654097	3 616232	21.80 ± 11.60	1011.2 ± 466.2
7	0654092	3 616238	10.20 ± 7.20	377.4 ± 266.4
8	0654117	3 616234	1.80 ± 1.20	66.6 ± 44.4
9	0654174	3 616235	18.60 ± 6.00	688.2 ± 222
10	0654196	3 616242	4.20 ± 2.40	574.8 ± 1200.6
11	0654292	3 616271	7.20 ± 0.60	266.4 ± 24.42
12	0654354	3 616276	74.83 ± 18.4 6	2768.71 ± 680.2
13	0654446	3 616329	0.60 ± 0.60	195.2 ± 24.42
14	0654522	3 616392	6.0 ± 1.80	222 ± 66.6
15	0654586	3 616365	62.42 ± 4.20	2309.54 ± 155.4
16	0654695	3 616445	18.00 ± 1.20	555 ± 44.4
17	0654781	3616441	18.60 ± 0.00	688.2 ± 0.00



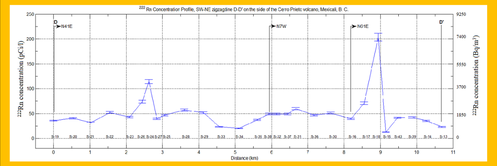


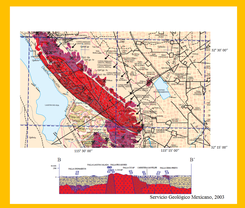
Site 2 Michoacan Fault

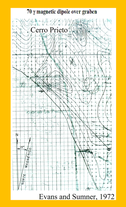


Site Lázaro Cárdenas-Río Nuevo

Site 3 Cerro Prieto Fault

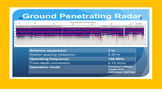


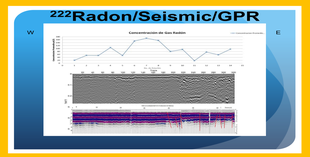




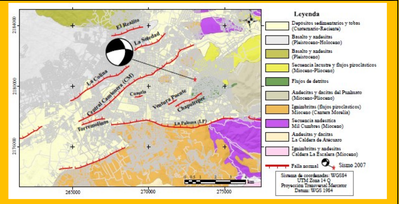
Evans and Sumner, 1972

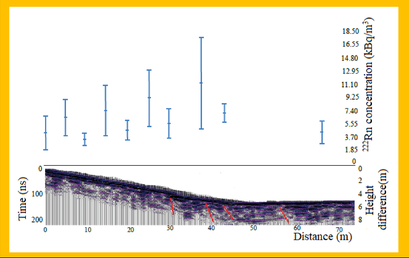
Site 4 Instituto Tecnologico de Mexicali

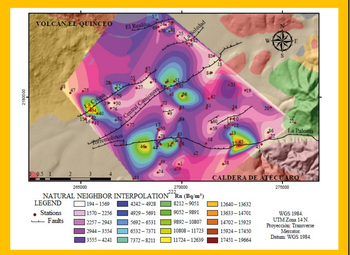




Morelia City, Michoacan







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