



Pre-earthquake processes associated with the M6.4 of Nov 26, 2017 In Albania. A Multi parameters analysis.

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We present a multi parameters analysis of satellite and ground data that revealed a transient phenomenon in the atmosphere before the M6.4 earthquake in Albania on Nov 26, 2019. The observational methodology consists of data from five physical measurements: (1) Satellite Thermal Anomalies (data obtained from NOAA) on the top of the atmosphere; (2) Atmospheric chemical potential (ACP) obtained from the NASA assimilation models; (3) Measurement of Radon level variations (two gamma stations in Central Italy); (4) VHF propagation in the lower atmosphere from ground observations and; (5) Electron density variations in the ionosphere via GPS Total Electron Content (GPS/TEC)

On Nov 21, 2019 our NOAA STA daily analysis over the Mediterranean detected a strong abnormal pattern between Italy and Albania. We estimated that a possible earthquake could occur in the Adriatic Sea between Italy and Albania with M5.5+ and start cross parameter validation with other observations. On Nov 26 an earthquake occurred near STA anomaly of Nov 21. The epicenter of the M6.4 earthquake in Albania is situated about 500 kilometers NE of the two-radon monitoring stations in Central Italy. Real-time hourly data show an increase in both sensors on Nov 20 (6 days before the M6.4 of Nov 26, 2019). From the satellite data these increases in radon coincide with an increase in the atmospheric chemical potential (on Nov 21), measured near the epicentral area. VHF data observed from two stations located 300 km from the epicenter in Northeast Bulgaria, indicated an intensity modulation about 90 hours (3.5 days) before the mainshock. The GPS/Total Electron Content data indicated an increase of electron concentration in the ionosphere 1-2 days before the M6.4 earthquake. We observed a synergetic abnormal response from ground and satellite data, although the ground data (radon and VHF) sensors were far from the epicenter (500 and 300 km, respectively). Starting six days before the M6.4 Nov 26 earthquake, the anomalous patterns were inside the Dobrovolsky-Bowman area of preparation. We examined the possible correlation between different pre-earthquake anomalies and the relationship between magnitude and the spatial size of the preparation zone in the framework of the Lithosphere -Atmosphere

-Ionosphere Coupling (LAIC) concept.