Earthquakes- detecting them and causing them with microwaves.

Earthquakes have long been associated with death and destruction; hence it would be of interest to the general population to have a better understanding of them. The data presented in this paper indicate that it is not only possible to detect Earthquakes before they happen- but it is also possible to cause them to occur- hence current human technology may be causing them accidently without us being aware of it.

To begin, I must mention that there is a direct connection between Earthquakes and microwaves- not the conventional microwave oven, but the actual energy form known as microwaves. Maeda, T. et al (2007) states that “It was experimentally shown that rock crash by static pressure caused radio wave emissions at 300MHz, 2GHz and 22GHz. This result suggests that this microwave is emitted in the result of Earthquakes”. Takano, T. et al (2008) states that “Microwaves could be used to detect Earthquakes and volcanic activities”. A paper by Zhongyin Xu, et al (2010) states that “Scholars have found microwave radiation anomaly appearing before Earthquake” and “The experimental results showed that microwave emission energy changed along with the change of stress (in granite rock). The microwave emission energy varied little in the beginning loading stage, increased in the elastic loading stage, decreased in the plastic loading stage, and increased again in the fracturing stage”. From this and other data, Zhongyin Xu, et al (2010) states that “These experiment results indicated that it was possible to use the microwave remote sensing for monitoring the stress variation and fracturing of rock masses, including Earthquakes”. Zhongyin Xu, et al (2010) also provides an overview of microwaves, hence we can deduce why the experimental results obtained by Zhongyin Xu, et al (2010) are the way they are. Zhongyin Xu, et al (2010) explains that any substance that has a temperature above 273.15 K will radiate microwaves, and that according to the Rayleigh-Jeans law the microwave emission energy is in direct proportion with emissivity and the physical temperature of the object. From this, Zhongyin Xu, et al (2010) states that: \( T_b = \varepsilon T \), where \( T_b \) = brightness temperature, \( \varepsilon \) = emissivity and \( T \) = physical temperature. Thus, the scale used by Zhongyin Xu, et al (2010) for microwave detection was a brightness temperature versus time curve, which is presented in figure 1.

From the formula \( T_b = \varepsilon T \) and the results obtained by Zhongyin Xu, et al (2010), we see that the time curve in figure 1 is broken up into different sections- namely sections I, II, III, and IV. Section I is the initial loading phase, section II is elastic loading, section III is plastic loading, and section IV is rock fracture. We see that the brightness temperature hence microwave emission increases during elastic loading and rock fracture, decreases during plastic loading, and remains relatively constant during initial loading. During elastic loading, the rock sample resists crack generation and tries to absorb the applied load. This absorption of energy due to the applied load during elastic loading no doubt results in some energy being emitted as heat and microwaves, hence in figure 1, we see that the curve increases during section II. When plastic loading occurs, tiny cracks begin to appear in the rock as the energy associated with the applied load is not absorbed, but rather, plastically deforms the rock sample. Hence, during section III of the time curve in figure 1, we see a decrease in brightness temperature. During section IV, there is an overall increase in brightness temperature, most likely due to rock particles generating friction between each other, hence an increase in brightness temperature. From this data, we see that microwaves are emitted when rock undergoes elastic loading and failure.
Electromagnetic waves are currently understood to travel at the velocity of light (c) when moving through a vacuum and it is accepted that this speed is related to frequency and wavelength by the equation: \( c = f \lambda \) (Serway (1996)). Serway (1996) tells us that microwaves have wavelengths that range from 1mm to 30cm, and are capable of being generated by electronic devices. Serway (1996) also presents us with a figure, which is presented below, depicting where microwaves occur in relation to other energy types of differing wavelength and frequency.
Figure 2: From Serway (1996): The electromagnetic spectrum.

Note from figure 2 that microwaves and infrared frequencies show some crossover- hence microwaves can be observed as infrared radiation (heat). Zhongyin Xu, et al (2010) states that “many authors reported thermal anomaly change around epicenter before earthquake”. Hence, microwaves have a heat association- but this is already known- and is the basis for the functionality of the conventional kitchen microwave oven. Hintenlang, D.E. (1999) states that “Microwave ovens cook food by generating intermolecular friction between the molecules of the food. The microwaves cause water molecules to vibrate; the increased friction between the molecules results in heat.” Hence, from this simple statement and the experimental results obtained by Zhongyin Xu, et al (2010), we see that it would be theoretically possible to stimulate an Earthquake to occur at a fault line using microwaves, where pre-existing pressure exists. This is because if Earthquakes are known to emit increasingly higher levels of microwave radiation during elastic loading, and if materials can be heated with microwaves because of friction generated at an intermolecular level, then applying microwaves to rock already undergoing elastic loading will increase intermolecular friction between this rock, and push it into plastic loading (as in figure 1). While under plastic loading, the rock would be even more sensitive to microwaves, because intermolecular friction would increase the appearance of cracks that appear during plastic loading in the rock- pushing it to failure hence Earthquake.

From this, we see that the use of equipment that emit high-power microwaves should be avoided near fault lines, and areas of known Earthquake occurrence. A machine that pumps powerful microwaves into fault lines already under pressure is thus an Earthquake machine.
References:


