



Thunderstorm Electrification and Renewable Energy?

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The key ingredient for the electrification in clouds (lightning) occurs by the interaction of water molecules - ice crystals, hail pellets & supercooled water droplets (Takahashi, 1978; Saunders, 1998). In other words, the electricity is derived from water in its different phases. Already in 1843 Michael Faraday showed how metal surfaces were charged by the friction of water droplets with these solid surfaces. More recently, Ducati et.al. (2010) have shown that metals spontaneously acquire charge when the atmospheric relative humidity (RH) increases above 50%, with different amounts and polarity of charging occurring for different metals. They showed that different metals can be used to develop a capacitor, acting as a battery. This charging of metals is assigned to the selective adsorption of OH⁻ and H⁺ ions, respectively. When this is exposed to humid air, a potential difference builds up spontaneously on these metal surfaces. Their experiments showed potentials of 0.8V generated in high RH - half the voltage of an AA battery. We have successfully duplicated the experiments of Ducati et.al., and now investigate how to increase the efficiency of the battery by maximizing the surface area of different metal surfaces. Our experiments confirm charge is being built up on metal surfaces only when the relative humidity is high (>60%). Furthermore, while exploring Stainless Steel (SS), our initial results show potentials of -0.9V, while a different type of SS acquired +0.7V. All the metals maintain their acquired voltage as long as the RH is high. This method of producing electricity (hygro-electricity) will work in any area of the globe where the humidity is above 50%. This includes most of the dense population cities in the world, as well as tropical nations of the globe and nations that have large portions of their populations without electricity. The knowledge of thunderstorm charging might lead the way to developing a new innovative renewable source of energy.