What is a Ground Swell

"Ground Swell" or 'ground potential rise' is a term that the Surge Protection Industry informally introduced; however, the term (Ground Swell) was never formally adopted. Ground swell is based upon the occurrence of a close proximity lightning strike. As a natural phenomenon, lightning is unpredictable.

Lightning can occur within a cloud (most common), cloud to ground, and cloud to cloud (rare). The frequency of cloud to ground lightning varies with geographic location, topography, season and the year-to-year weather changes. Florida has one of the highest lightning flash densities within the United States. Therefore, cloud-to-ground or cloud to cloud lightning strikes, which can lead to "ground swells" are the focus as they are one of the causes of consequential damages seen by homeowners.

Homeowners may experience damage due to a cloud-to-ground or cloud-to-cloud lightning strike. They assume that the consequential damages are due to the failure of the surge protection device; however, in reality, the surge may not have passed through the AC Service Entrance. As you will note by the below excerpt from IEEE's (Institute of Electrical and Electronic Engineers) "How To Protect Your House and Its Contents From Lightning" (Cohen et al., 2005), lightning may enter the home via 4 different modes, with three of those modes completely bypassing the meter and the service entrance SPD (Surge Protective Device) protection.

(Mode 1)

> The most common damage mode...arises from a lightning strike to the network of power, phone and cable television (CATV) wiring. This network, especially if it is elevated, is an effective collector of the lightning surges. The wiring then conducts the surges directly into the residence, and then to the connected equipment. While..., lightning can also travel through the ground (soil), reaching underground cables or pipes. This is another route for lightning to come into a building, and can also damage the cables.

(Mode 2)

> The second most common mode...results from strikes to, or near, the external wiring network common to most suburban and rural houses. Air conditioners, satellite dishes, exterior lights, gate control systems, pool support equipment, patios and cabana, phone extensions, electronic dog fences, and security systems can all be struck by lightning, and the lightning surges will then be carried inside the house by the wiring.

(Mode 3)

> As..., lightning may strike nearby objects (trees, flagpoles, signs) that are close to, but not directly connected to the house (mode 3). In this situation, the lightning strike radiates a strong electromagnetic field, which can be picked up by wiring in the house, producing large voltages that can damage equipment.

(Mode 4)

> Finally, (mode 4) a direct lightning strike to the structure. This type of strike is very rare, even in high-lightning areas. It can severely damage a structure without a lightning protection system (LPS), and will generally damage most electronic equipment in the house.

For our purpose of evaluating warranty claims, based upon all information provided by the homeowners as well as the evidence shown by the returned Meter-Treater unit, MTI's definition of ground swell meets the third modality of IEEE's description as stated above regarding lightning striking nearby objects.

If you are interested in an educational resource for surge protection, such as the guide from which the above excerpt was taken, you may order direct from IEEE Press Publications by calling 1-800-678-IEEE or visiting http://standards.ieee.org/.

Source:

Cohen, Richard L. et al. "How To Protect Your House And Its Contents From Lightning: IEEE Guide For Surge Protection of Equipment Connected To AC Power And Communication Circuits. IEEE Press Publications. 2005.