

Horta Plasma

Rock Disintegration by Plasma Incursion

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An old method of mining was to heat the rock and then apply water. This would create a temperature gradient. If the temperature beneath the rock surface were above the crystalline phase change temperature, of certain components within the rock, this could generate significant internal pressures. The internal pressure generated could cause material to flake off the surface or to shatter the rock. Microwaves used for cutting and drilling as shown in William C. Mauer's book "Novel Drilling Techniques" are one approach of achieving a thermal inversion. I suggest that in the vacuum of space, microwaves and artificially generated plasmas could use thermal inversion to create an efficient rock disintegrating or cutting method.

Heating the rock surface, with lasers or electric arcs of sufficient energy, could create high temperature plasmas. The plasma created may have a longer half-life (the period in which it remains hot enough to remain conductive) in the vacuum of space, than in Earth's atmosphere. Plasma is a highly conductive gas with an abundance of free electrons, and an electrical conductivity that can exceed many ordinary conductors. Because of its high conductivity, the plasma can be heated and manipulated by magnetic fields, electrostatic fields, and electromagnetic waves. Plasma created on the rock surface could then be positioned by electric, magnetic, or microwave fields. Positioning the plasma outside the surface opening of a deeply penetrating fissure would be the first step in using the plasma.

The plasma positioning fields would then force a portion of the plasma down into the fissure. With the plasma positioned in the fissure, electromagnetic (Radio frequency or Microwave) generators will now maneuver and maintain the plasma. Electromagnetic (EM) fields with longer wavelengths will be able to penetrate up to several meters further into the rock, than shorter wavelength EM fields. If there are conductive elements within the rock, the plasma should absorb the electromagnetic waves more readily than the surrounding conductive material.

The microwave (or RF) generators will be operating at angles with a clear line of sight to the plasma. The leading edge of the plasma would be advanced into the fissure by the microwave beams directed at it. When the pocket of plasma has been moved to a sufficient depth, the microwave beam generators would then go to their maximum power. This would rapidly heat and expand the plasma pocket within the fissure. The expanding plasma could then explosively detach the rock between the plasma pocket and the rock surface. Alternatively, the plasma could also explosively expand or thermally erode the walls of the fissure through which the plasma had been moving.

*The Horta was the creature in the Star Trek episode "The Devil in the Dark" that lived in rock and was able to tunnel through the rock at will.