

All body waves travel at a velocity proportional to the density of the medium in which they are travelling. They tend to follow the fastest path and therefore pursue routes deep in the Earth, where the material is more dense. P-type body waves have a cycle of about one second. It is these higher frequency body waves that are felt by humans and cause damage in the region of a strong earthquake. S-type body waves, which may be recorded by seismographs in the case of earthquakes, are usually absent or of little importance in the case of explosions.

Surface Waves

Surface waves, (also called Rayleigh waves, after the first scientist to describe them) behave like ripples on the surface of a pond. They travel much more slowly than body waves and have a much lower frequency of vibration — surface waves have a period of about 20 seconds — yet have an important part to play in detection seismology, particularly when it comes to identifying the source of an event.

"Different Signatures"

When an Earth shock of sufficient magnitude occurs within the range of a given listening station, the first signal to be recorded will be a P-type body

wave. This may be followed by other P waves that follow different and slower routes, and then, particularly in the case of a deep subterranean earthquake, by what are known as pP waves which first travel upwards and then are reflected downwards again by the Earth's surface.

Perhaps 20 or 30 minutes later, if the shock is a distant one, low frequency surface waves will probably be recorded. The difference in the arrival times of P-type body waves and the surface waves will usually provide an approximate estimate of the distance of the seismometer from the source event.

Whereas an earthquake usually provides a complicated assortment of seismic waves because of the large area of geologic movement involved, explosions provide relatively simple signatures. As a result, to the experienced seismologist the waves created by explosions tend to appear very different from those of earthquakes. Those of explosions, for example, are usually of higher frequency and shorter duration. Also, the initial P-type body wave from an explosion tends to be larger than that caused by an earthquake.