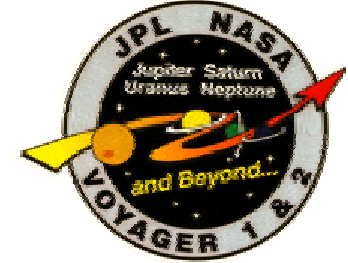




Interplanetary Dust Particles Detected by Voyager Plasma Wave Instruments



- Voyagers 1 and 2 plasma wave instruments have been detecting micron-sized particles on the spacecraft for many years
- Because of high spacecraft velocity (approx 20 km/s), when a small dust particle strikes the spacecraft, the particle is instantly vaporized and heated to very high temperature, about 10^5K

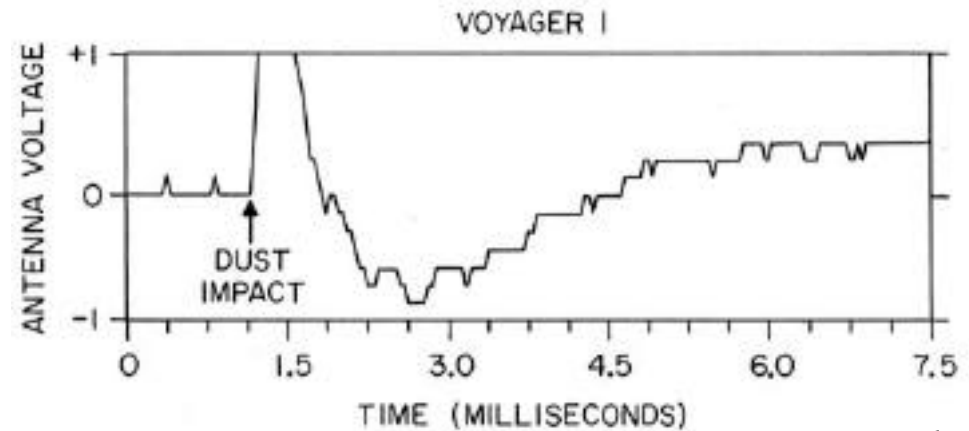


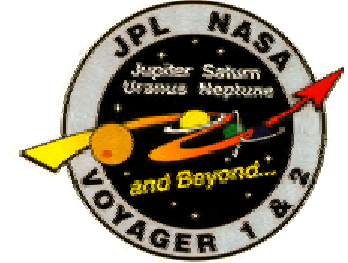
Figure 1

- At this high temperature, the vaporized material is converted to a plasma of electrons and ions.
- As the resulting plasma cloud expands over the plasma wave antenna, it creates a voltage pulse into the plasma wave receiver
- An example of the voltage pulse produced is shown in Figure 1.
 - Typically the voltage pulse has an amplitude of a few millivolts and a duration of a few milliseconds
- By counting the number of impacts per unit time, and knowing the cross-sectional area and velocity of the spacecraft, the number density of the impacting particles can be computed





Interplanetary Dust Particles Detected by Voyager Plasma Wave Instruments... continued



- **Initial report published by Gurnett, et al., in 1997**
 - Available data only extended out to 60 AU for Voyager 1 and 33 AU for Voyager 2
 - Difficult to determine if source was of planetary, cometary or interstellar origin
 - More recent data extends impact rate measurements out to 78 AU (Vgr 1) and 60 AU (Vgr 2)
- **The number density of impact particles is shown in Figure 2 for Voyager 1 and Figure 3 for Voyager 2.**
 - Number density nearly constant out to distances well beyond the orbit of Pluto
 - Number density for Voyager 1, which is proceeding outward at high ecliptic latitude (about 35° N) is the same within statistical accuracy to the number density detected by Voyager 2 which is generally much closer to the ecliptic (currently about 20° S)
- **Particles are most likely of either cometary or interstellar origin**
 - Nearly constant number density, over such a large radial distance and over such a large difference in ecliptic latitude, now strongly suggest that particles do not originate from a planetary source

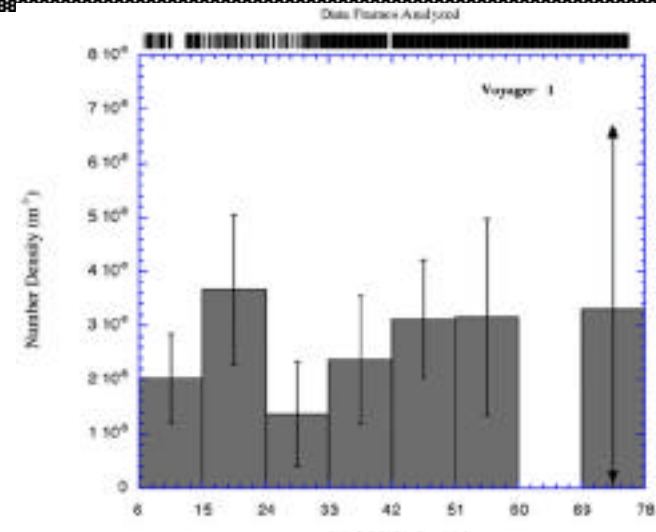


Figure 2

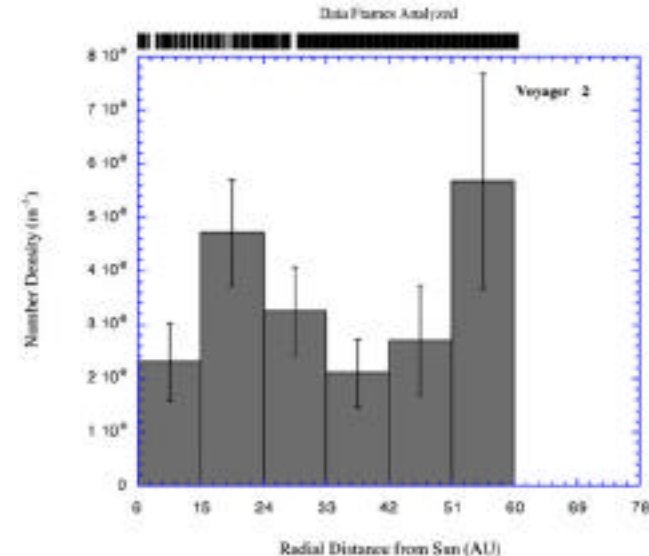


Figure 3