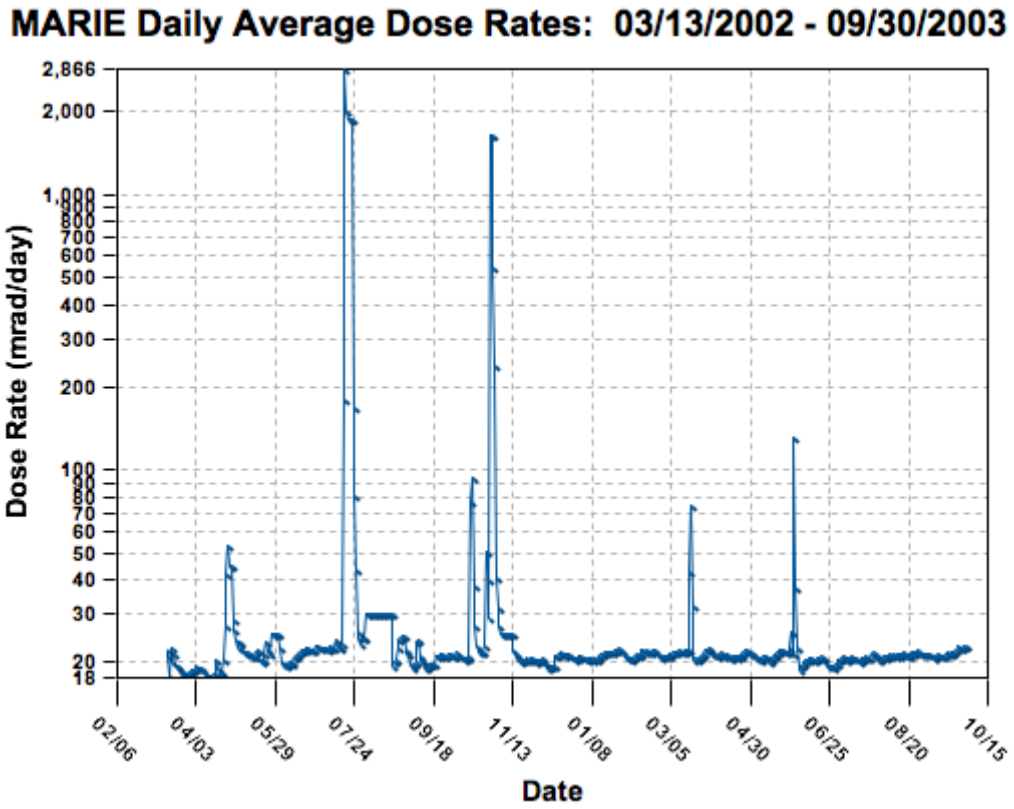
Calculating Total Radiation Dosages at Mars



The NASA, Mars Radiation Environment Experiment (MARIE) measured the daily radiation dosages from a satellite orbiting Mars between March 13, 2002 and September 30, 2003 as shown in the figure above. The dose rate is given in units of milliRads per day. (1 Rad = 2 Rems for cosmic radiation.) The six tall 'spikes' are Solar Proton Events (SPEs) which are related to solar flares, while the rest of the plotted data (the wiggly line!) is the dosage caused by galactic cosmic rays (GCRs).

1. By finding the approximate area under the plotted data, calculate the total radiation dosage in Rems for the GCRs during the observation period between 4/03/2002 and 8/20/2003.

2. Assuming that each SPE event lasted 3 days, and that its plotted profile is a simple rectangle, calculate the total radiation dosage in Rems for the SPEs during the observation period.

3. What would be the total radiation dosage for an unshielded astronaut orbiting Mars under these conditions?

4. Are SPEs more important than GCRs as a source of radiation? Explain why or why not in terms of estimation uncertainties that were used.