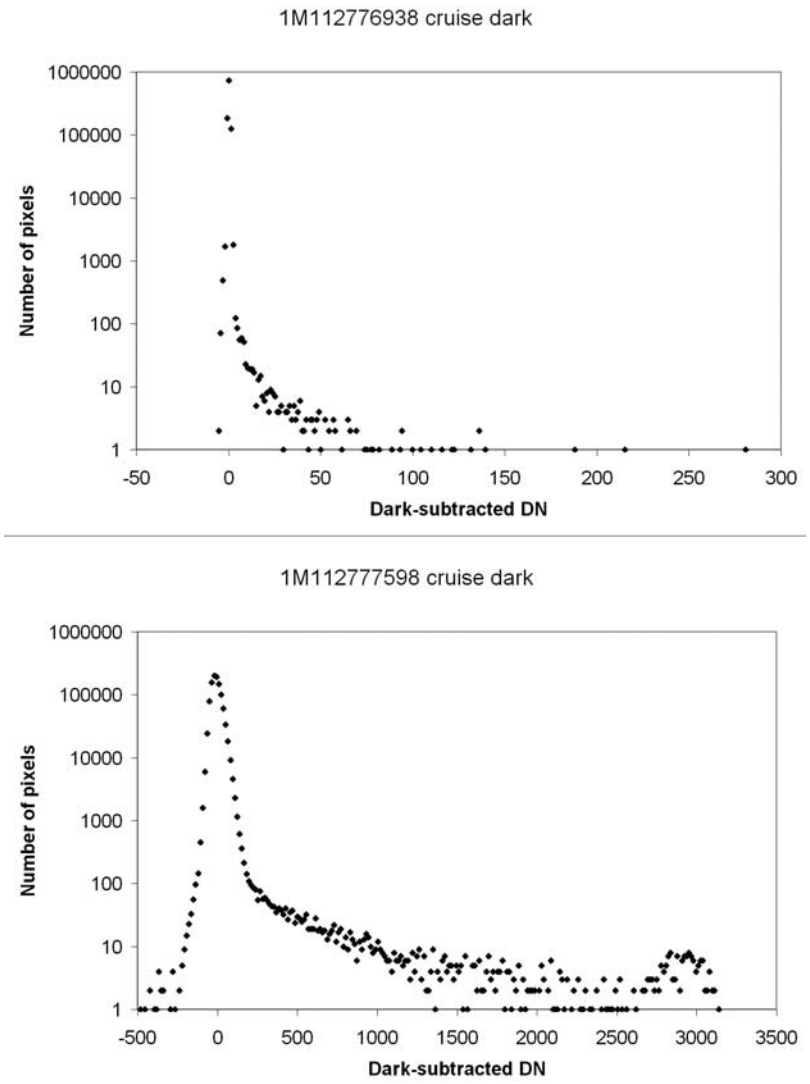

Figure 3. Histograms of MI dark current data acquired during first cruise instrument checkout on 30 July 2003. The MI dark current model was used to subtract average dark current variations from each image. (top) Zero-second exposure image. (bottom) One hundred–second exposure image.

attempted to acquire MI dark current data since Opportunity landed. However, dark current data were acquired twice during Opportunity's cruise to Mars, on 30 July and 4 December 2003. During cruise, Opportunity was encased in its aeroshell, and very little light was expected to illuminate the MI. Analysis of the MI data returned by the instrument checkout sequences indicates that no measurable light was incident on the camera (e.g., Figure 2). The temperature of the MI during the first checkout (CCD at -5.3°C) was higher than during the second checkout (CCD at -22.2°C), providing two data points to compare with the model for dark current temperature dependence. Full frame images and reference pixels were returned, losslessly compressed in each case. The cruise dark current observations are generally consistent with the dark current model developed using preflight calibration data [*Herkenhoff et al.*, 2004a]. Dark current data acquired after the MI was integrated onto the rover compare well with the standalone camera calibration data when the CCD temperature is decreased by 2.5°C. This offset is likely due to the differences in how temperatures were recorded between preflight calibration and flight software.

[7] As expected, the cruise dark frames show the effects of radiation, probably from both the Mössbauer spectrometer and cosmic rays (Figure 2). These radiation sources generate spurious electrons in a few localized pixels, with typical peak amplitudes of a few 12-bit data numbers (DN) up to saturation (note vertical lines in the bottom of Figure 2 caused by "blooming" or spillover of excess charge into adjacent pixels). Such radiation effects are present in all MI data, but their low amplitude and random spatial distribution makes them very difficult to recognize in images of Mars. To evaluate the statistical effects of radiation on MI images, the MI dark current model [*Herkenhoff et al.*, 2004a] was used to subtract average dark current variations from the instrument checkout images. Histograms of the resulting image data are shown in Figure 3; the asymmetry in the histograms is primarily due to radiation effects. Assuming