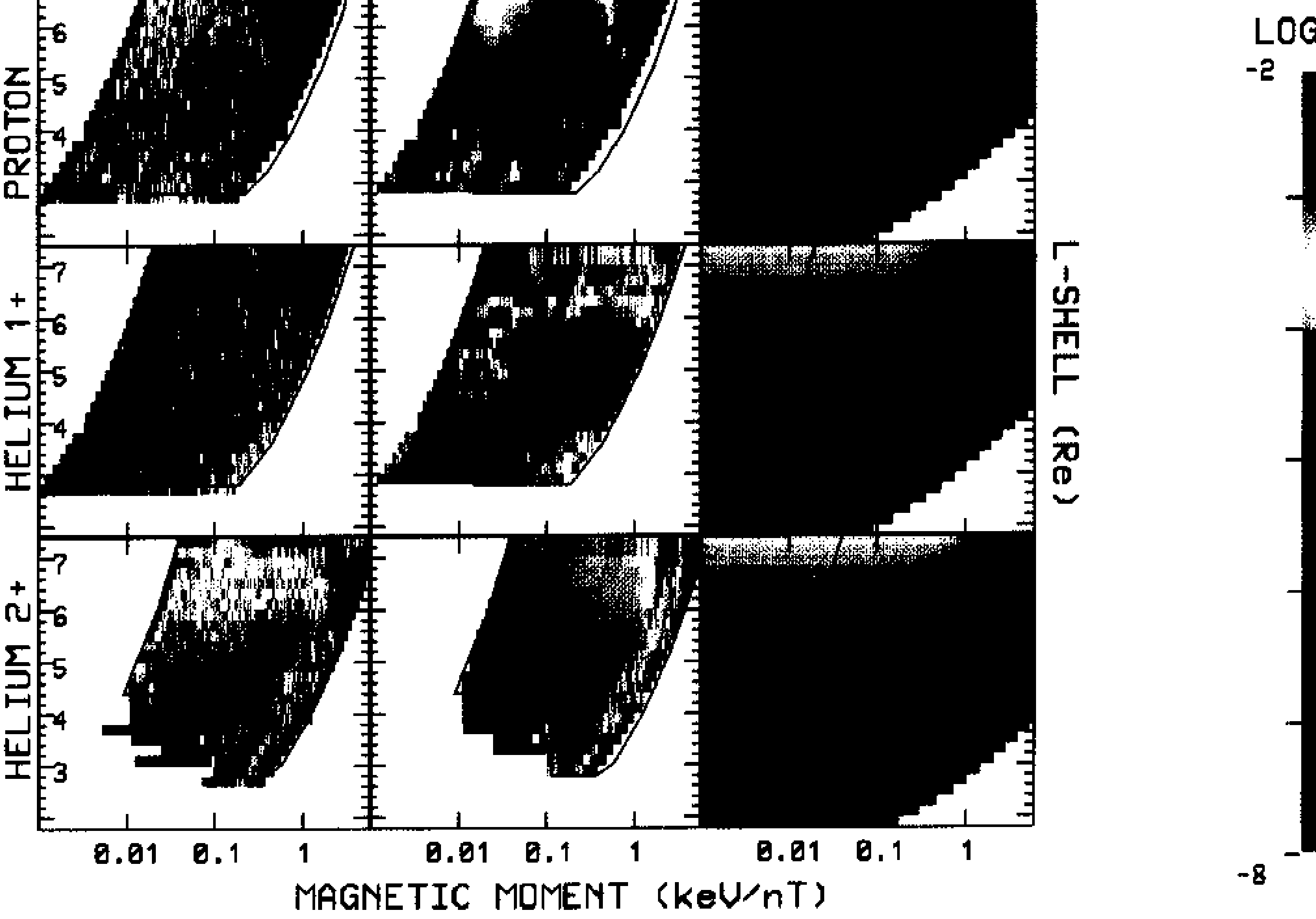

Plate 3. Diffusion coefficients (R_e^2/s) extracted from the quiet time data set using reference model losses. Magnitudes are shown from 10^{-8} (blue) to 10^{-2} (red). Column 1 is the "logarithmic" extraction method, column 2 is the "integral" extraction method, and column 3 is the SSF theoretical coefficient.

loss rates match the shape of this nonmonotonic region. Thus we show not only did the deduced diffusion coefficient not match the theoretical amplitudes, but it did not match the theoretical power law form either.

6. DISCUSSION AND CONCLUSIONS

We have characterized the quiet ring current and have shown the regions of agreement and disagreement with the standard radial diffusion model developed for radiation belt particles. For large radial distances, $L>4$, and for $E>30$ keV, we find good agreement between the standard model and data. Yet even for this region of partial agreement, we found a factor 2 smaller diffusion rate for H^+ than for He^+ and He^{++} (fits 3 and 4 in Table 3); and attempts to extract the radial diffusion coefficient are better described by L independence than by a strong power law in L. That is, the form of the diffusion coefficient is not easily determined from this region, where almost any diffusion rate greater than the loss rate will give similar results. The real test of the model occurs where loss rates are approximately equal to the diffusion rate, and it is in this region, $L<4$ that the model breaks down. The two overlapping regions in which the model grossly underestimates the data occur for the "loss" region, $L<4$, and the "convective" region, $E<30$ keV.

The radial diffusion equation is not expected to apply in the convective region. Ions at these low energies are often not on closed drift paths, but are convecting through the magnetosphere from the plasmasheet to the magnetopause. These ions, though they may contribute to the densities, are not strictly part of th distribution described by radial diffusion. And even those that ar trapped are not maintaining a constant L shell, but are followin distorted elliptical drift paths. Azimuthal averaging of these ion will smear all the radial profiles and appear as enhanced "diffusion Thus any attempt to model these ions must take into account loc time and electric field effects. Fortunately, the boundary betwee convecting and diffusing ions is sharp, which allows us to clearl separate these regions.

In the "loss" region, comparison of the relative rates show th when the model predicts a higher loss rate than the diffusion rat the model phase space densities drop sharply and essentially di appear over a narrow L interval. The data do not show this tren decreasing more gradually to a plateau. It is difficult to reconcile th standard model with these data, since the exponential increase o the neutral H densities with decreasing altitude produces the dom nant loss mechanism at these L shells. That is, with a strong pow law decrease in the diffusion rate, and an exponential increase i the loss rate, one would not expect a gradual decline or plateau i the phase space densities.

Several possibilities exist for explaining the disagreement be tween the model and the data. The much greater flux of ions see at $L<4$ than predicted by the model may be due to low altitud sources, or acceleration mechanisms or time-dependent processe We attempted to eliminate time-dependent processes by requirin a quiet magnetosphere for at least 24 hours previous to an includ