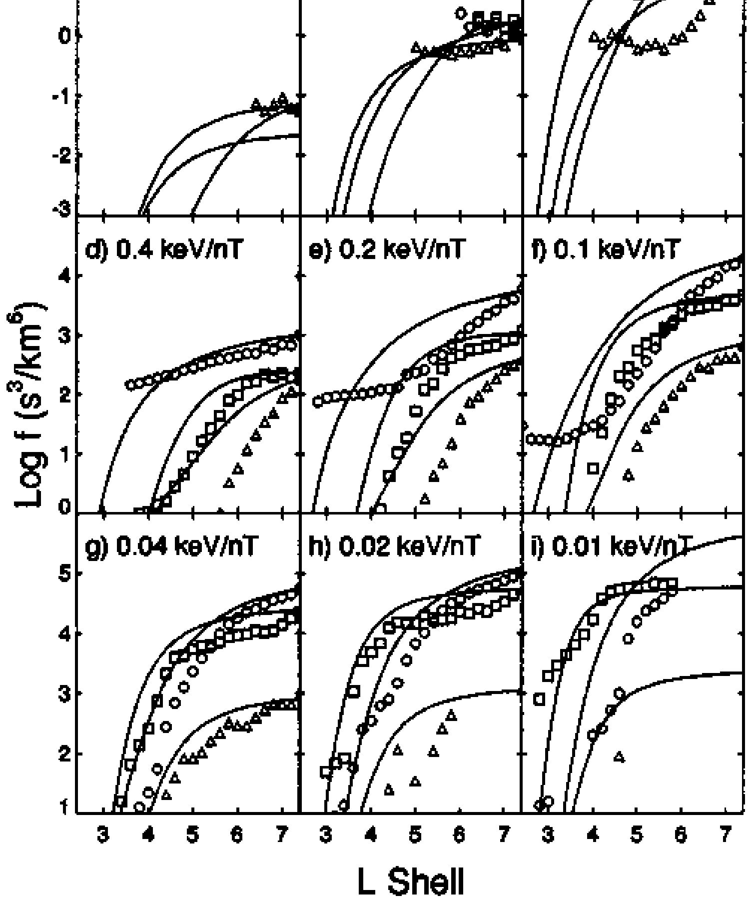

Fig. 11. Radial profiles of phase space densities for the data (symbols) and reference model (curves) taken at constant magnetic moment, M, as in Figure 10 with hp (circle), He^+ (square), and He^{++} (triangle). (Vertical cuts from columns 1 and 2 of Plate 1).

Other Diffusion Parameters (Fits 5–6)

We also tried changing the adjustable parameters in the standard diffusion coefficients. Cornwall allows both the amplitude and the "pulsation time" of the electric field to vary. However, the pulsation time parameter was not fit well, and was driven negative or to zero (Fit 5). Fälthammer gives a slightly different form for the diffusion coefficients, allowing the amplitude and the "spectral exponent" to vary. The minimization procedure did find a slightly smaller minimum (Fit 6), but at the expense of a larger subset of truncated χ^2 points. And the spectral exponent was driven to nearly zero, far from the expected value of 2. Since none of the transport coefficients were able to explain all the data, we turn to the loss rate.

ospheric electron temperature would result in less Coulomb drag at ring current energies, and thus a reduction in the model losses at low energy and possible improvement in the "blue spot" as well. Theoretically the electron temperature should be close to the ionospheric source temperature [*Rasmussen and Schunk*, 1990; *Chiu et al.*, 1979]. However experimental measurement from GEOS 1 [*Decreau et al.*, 1982] reveals a more complex picture, bracketing the temperature between 0.2 eV and ~5 eV, with increasing temperatures toward higher L shells. (Although *Decreau et al.* [1982] note that the MI instrument on GEOS 1 was biased toward lower temperatures.) The electron spectrometer aboard CCE [*Shelley et al.*, 1985] determines an absolute upper bound of 50 eV for the "cold" plasma temperature, since the lowest electron channel would then detect the cold plasma. We have implemented a model that tries to incorporate both features, ramping up the electron temperature from 1 eV at L=2, to 5 eV at L=7. Admittedly these values are on the high side, with more typical values being perhaps 0.2–1 eV, but we want to exaggerate any temperature effects in the model.

Should the "cold" component of the electrons disappear, as expected theoretically outside the plasmapause, there would be a discontinuous jump in the electron temperature making the plasmasphere densities unobservable by the GEOS 1 MI experiment. Under these circumstances, instruments that have low-energy thresholds, 50 eV for AMPTE/CCE/HPCE [*Shelley et al.*, 1985] and 12 eV for AMPTE/UKS electron experiment [*Shah et al.*, 1985] for example, would then accurately measure the electron temperature. Outside the plasmasphere, both HPCE and the UKS electron experiment did measure ~1 keV temperatures (data courtesy of HPCE and UKS pool data files). For the quietest week of the data set, 1987 days 138–142, HPCE (not plotted) shows heated ~1 keV electrons $L>6$. Below this sharp threshold, the electron flux diminishes greatly excepting an adiabatically energized band beginning at 1 keV and rising to 10 keV by L=2. Thus we conclude that although the ion density profiles may not show any plasmapause during quiet time, there may still be a separate high-temperature electron component even after a week of extended quiet conditions.

We model the effect of this high temperature component as follows,

$$kT_e = \frac{N_1 kT_1 + N_2 kT_2}{N_1 + N_2} \tag{8}$$

where N_1 is the density of "cold" electrons with kT_1 ~1 eV, and N_2 is the density of "hot" component. Typical values for the hot component density at 1–10 keV are 0.1 cm^{-3} (S. A. Fuselier, private communication 1990) which remain remarkably stable in the outer magnetosphere. If we use a "cold" electron density profile

TABLE 3. The χ^2 Minimization Fits

	Name	Domain	$C_E \times 10^{-10} R_E^2/s$	χ^2	N-n_{free}	Truncated
A	SSF	all	2.30	7747	11216	315
B	SSF	H	2.30	1797	3856	100
C	SSF	H,L>4	2.30	219	3199	0
1	reference	all	6.84±0.08	4784	11215	21
2	reference	H	6.22±0.14	1134	3855	7
3	reference	H,L>4	3.27±0.12	411.5	3199	10
4	reference	He	7.16±0.10	3632	7359	12
5	$t/t_0 < 1$	H	4.56±0.14	1047	3854	16
			t/t_0=0.0084±0.067			
6	*Fälthhammer*[1965]	H	4.14±0.18	1044	3854	17
			n=0.062±0.029			
7	T_e >1 eV	all	5.83±0.07	5490	11215	34
8	*Farrugia*[1989]	all	7.21±0.15	4772	11214	12
			N=2.83e5±0.16			
9	*Carpenter*[1992]	all	5.12±0.06	5412	11215	92
10	geocorona	all	7.21±0.15	4772	11215	9