We have examined several sets of coincident orbits where the ground track is nearly identical. In these cases the crust and upper mantle magnetic anomalies should be the same, but different ring current contributions would be expected because the orbits occur at different times, several weeks to months apart. Figures 1 and 2 show the results for two different sets. The polynomial fitting is based only upon the data between 50°N and 50°S latitudes. The best-fitting computed polynomial trends are then subtracted from the entire half-orbit to obtain the anomaly estimates. The higher the order of polynomial fit, generally the smaller are the magnitudes of the estimated anomalies. Our initial studies suggest that a third order polynomial provides the best anomaly estimate. The second order polynomial fit provides good consistency in the region of fitting, between 50 degrees north and south latitudes, however, the third degree provides a slightly better degree of consistency both within that same region as well as farther north and south beyond those bounds. Note how well the residuals from the third order polynomial agree with each other in both figures even though the original curves show considerable departures from each other presumably due to time-varying ring current effects. Thus a third order polynomial is the lowest polynomial order that appears to provide the best consistency of residual anomalies between coincident orbits. Because some half-revs yield residual crustal and upper mantle anomalies discordant with data from other nearby orbits, we, like Langel et al., 1982, delete values more than two standard deviations from the mean when interpolating data about a point.

The estimates of crustal and upper mantle magnetic anomalies above 50°N and below 50°S show considerable variation between coincident orbits, and among the residuals using different orders of polynomial fitting. Thus, for the immediate future we plan to concentrate our efforts on the region between those two latitudes. However, we are retaining those values in our digital data library because with further examination, selection criteria for identifying valid crustal anomalies may be developed.

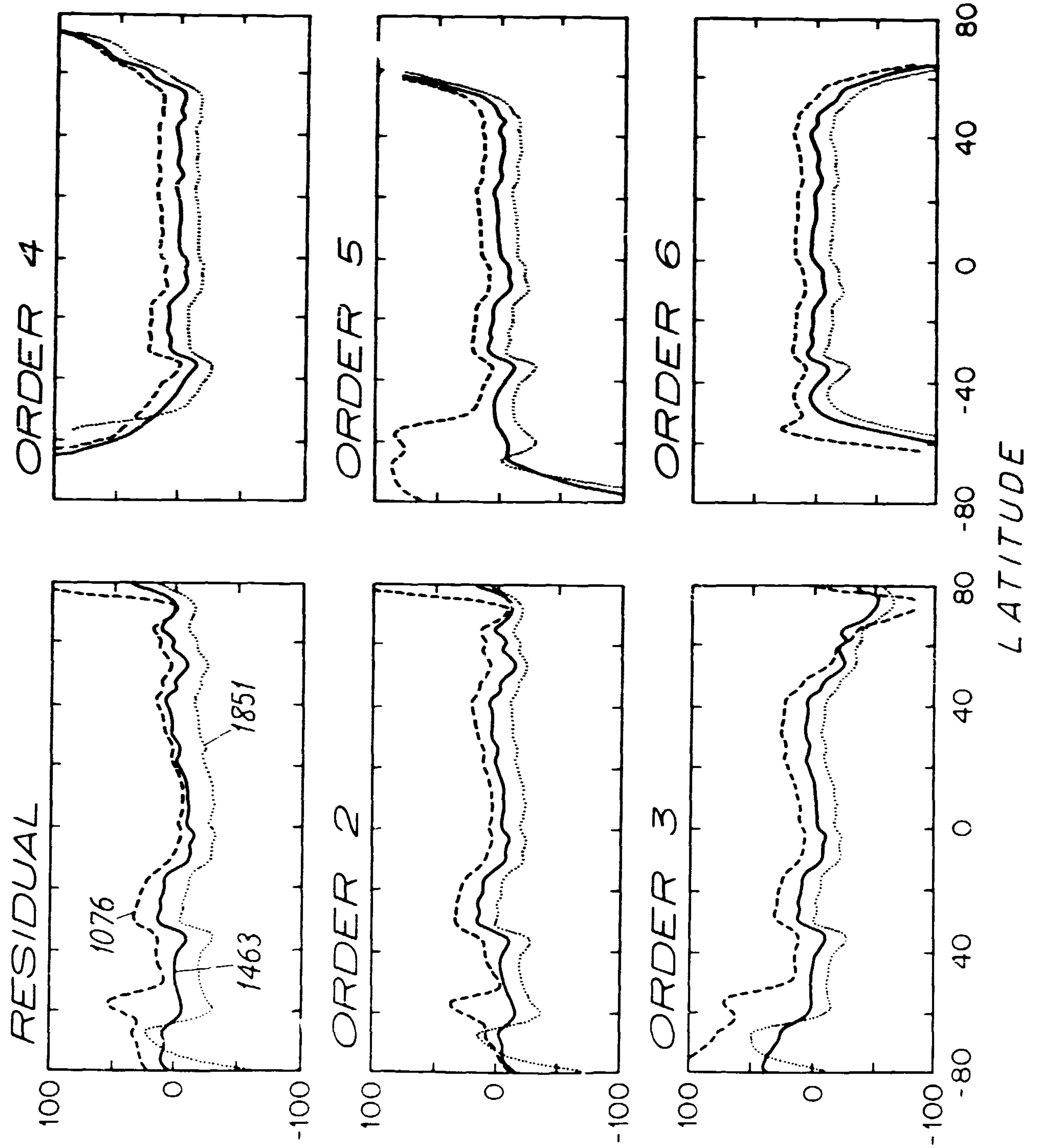

Figure 1 Comparison of data from three coincident MAGSAT orbits. In the upper left hand corner are shown the MAGSAT residual anomaly profiles after removal of a core field represented by spherical harmonic coefficients through degree and order 13 (Langel et al., 1981) for half-orbits 1076, 1463, and 1851. The remaining panels show the residual anomalies remaining after subtraction from the aforementioned residuals of a polynomial trend of the degree indicated. The polynomial trends were computed only from data between 50 N and 50 S, although the continuation of those trends to higher latitudes enable residuals to be calculated over the range

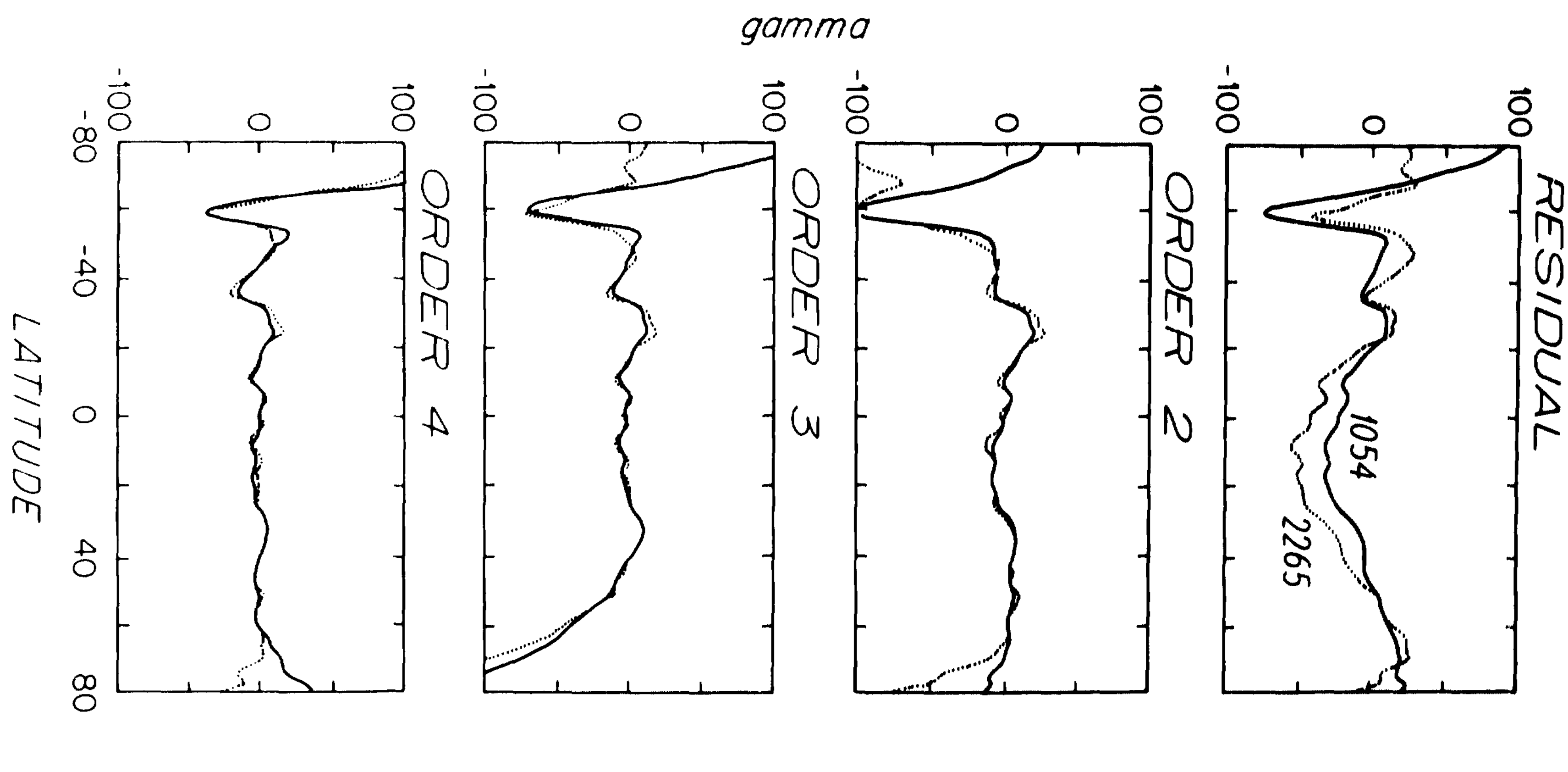

Figure 2 Comparison of data from two coincident MAGSAT orbits. The residuals after removal of core field effects for half-orbits 1054 and 2265 exhibit considerable departures from each other, particularly in the mid-latitudes. These departures are presumably owing to different ring current effects at the different times for the orbit passes. See caption for Fig. 1 for explanation of the profiles.

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