Chapter 9. Acknowledgements

This computer program is one of a series of hypocenter programs developed at the U.S. Geological Survey. The program draws heavily on previous location programs. Eaton (1969) wrote the first USGS program based on the principles of Geiger's method (Geiger, 1912), determined how to calculate travel times, magnitudes, etc. Lee made major modifications to Eaton's program to make it computationally more efficient, to use stepwise multiple regression, to use azimuthal weighting and Jeffrey's weighting, and to greatly improve the output format. Lee and Lahr (1972) further modified Lee's program to use S minus P interval time and to facilitate user modification of the iteration controlling parameters.

The first-motion plotting routine is adapted from an unpublished program by M.S. Hamilton. The use of secondary refraction arrivals was suggested and first implemented by P. Papanek. The azimuth and apparent-velocity routine was adapted from an unpublished program by H.M. Iyer. J.C. Lahr developed the method for solving the regression equations and finding the standard error ellipse. P.L. Ward and F.W. Klein considerably modified the travel-time routine, originally written by Eaton. B.R. Lienert's travel-time routine was used as a guide for modifications allowing stations to be embedded within the velocity model (Lienert and others, 1986). The program for generating a travel-time table (TTGEN) and the subroutines for interpolating travel times from the table were modified only slightly from F.W. Klein's HYPOINVERSE location program (Klein, 1985). J.A. Snoke made helpful modifications to the travel-time-table subroutines.

J.C. Lahr and P.L. Ward extensively modified the overall control logic and computational details from the Lee and Lahr (1972) version of HYPO71. W. Gawthrop wrote the linear velocity over a half-space travel-time subroutines. The distance and azimuth are calculated using a subroutine written by B.R. Julian. With this subroutine there is no longer a limit of 70 N. to 70 S. (as in pre-1982 versions of HYPOELLIPSE) and distance and azimuth determinations are more accurate. Correspondence with J.A. Snoke has been instrumental in clarifying the relationship between the error ellipsoid and other error estimates. The program has benefited from many discussions with C.D. Stephens and A.G. Lindh and early manual reviews by W.H. Bakun and R.A. White. Many corrections and revisions to the current version were made at the suggestion of C.D. Stephens.

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