# Overview

This document provides Fortran source code and program manuals for HYPOELLIPSE, a computer program for determining hypocenters and magnitudes of near regional earthquakes and the ellipsoids that enclose the 68-percent confidence volumes of the computed hypocenters. HYPOELLIPSE was developed to meet the needs of U.S. Geological Survey (USGS) scientists studying crustal and sub-crustal earthquakes recorded by a sparse regional seismograph network. The program was extended to locate hypocenters of volcanic earthquakes recorded by seismographs distributed on and around the volcanic edifice, at elevations above and below the hypocenter. HYPOELLIPSE was used to locate events recorded by the USGS southern Alaska seismograph network from October 1971 to the early 1990s. Both UNIX and PC/DOS versions of the source code of the program are provided along with sample runs.

HYPOELLIPSE evolved from the computer program HYPO71 (Lee and Lahr, 1975), developed to locate shallow earthquakes recorded by the dense seismograph network in central California. More adjustable parameters were included in HYPOELLIPSE to address the challenges of locating both crustal and sub-crustal earthquakes recorded by a sparse regional network. In the late 1980s, HYPOELLIPSE was extended to locate seismic sources in a volcanic edifice, some of which may be at elevations above local seismic stations.

HYPOELLIPSE initially ran on a CDC7600 computer (Lahr, 1979) and was subsequently modified to run on other computer platforms and updated with additional features (Lahr, 1980; Lahr 1984; Lahr, 1989; and Lahr 1999). The source code is available for both UNIX and PC/DOS platforms. The UNIX source code has been compiled and linked on Sun Sunos and Sun Solaris computers, and will probably also compile easily on other UNIX or Linux platforms. The PC/DOS source code in Lahey Fortran 90 has been compiled on a PC platform operating under Microsoft Windows XP.

This document updates and supplements the 1999 Version 1.0 of Open-File Report 99-23, a full program manual for HYPOELLIPSE as configured at the end 1998. This document includes not only the full program manual for HYPOELLIPSE, as revised through 2000, but also an abbreviated quick-start manual. Also, included in the UNIX and PC/DOS directories are source code files, as well as test and sample runs. These source code files and runs were formerly available at *http://geohazards.cr.usgs.gov /iaspei_pgms/hypoellipse/*. The UNIX directory also includes the program TTGEN, written by Fred Klein, for generating local, flat-earth, travel-time tables.

John Lahr passed away in 2009. Robert Page, Christopher Stephens and Kent Fogleman compiled and edited this version of the report from materials produced by John Lahr.