

The New IASPEI Manual of Seismological Observatory Practice

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ABSTRACT

The last edition of a Manual of Seismological Observatory Practice dates back to 1979. It covered analog techniques only and is out of print. Since that time, computer and communication technologies as well as the availability of modern broadband sensors have revolutionized seismological observatory practice. Related know-how is chiefly available in industrial countries only. Besides this, classical university curricula do not provide suitable education and training of observatory personnel. Therefore, the IASPEI Commission on Practice has launched an initiative to produce within the next few years a New Manual of Seismological Observatory Practice (NMSOP). It will be developed as an electronic database and will be freely accessible, together with the old manual, via the Internet. The systematic tutorial body of the manual, complemented by the use of hypertext features which will guide the user to additional resources, will assist station operators and analysts in their daily work and enable them to retrieve relevant pieces of information or teaching/training modules tailored to their specific needs. When finished, the NMSOP will also be available as a CD-ROM, and the publication of a condensed version as a text book is being considered. This paper outlines the philosophy, structure, and list of contents of the NMSOP and demonstrates it using several examples.

INTRODUCTION

Emil Wiechert (1861–1928) once said that the supreme goal of seismology should be to “understand each wiggle” in a seismic record. Only then would we understand or at least have a good model to explain the complicated system and information chain with its many interrelated components, such as the seismic source, the wave propagation through the real Earth, the additional masking and distortion of “useful signals” by interfering noise, and the influence of the seismic sensors, recorders, and processing techniques on the seismogram (cf. Figure 1 in Bormann, 2000, this volume, page 502).

Despite the tremendous progress made since Wiechert in understanding the most pronounced features in seismic records, long-period ones in particular, we are still well short of reaching the goal he set. In fact, most operators and analysts at current seismological observatories, even those equipped with the most modern equipments, have not yet advanced much with respect to their curiosity and capability to “understand each wiggle” in a seismic record since the mid-20th century. There are several reasons for this lack of progress in the deeper understanding of seismogram analysis by station operators. Early seismic stations were mostly operated or supervised by broadly educated scientists who pioneered both the technical and scientific development of these observatories. They took an immediate interest in the analysis of the data themselves and had the necessary background knowledge to do it thoroughly. After WWII the installation of new seismic stations boomed, and rapid technological advances required increasing specialization. Station operators became more and more technically oriented, just taking care of maintenance and raw data production with a minimum of effort and interest in routine data analysis, and they have tended to become alienated from the more comprehensive scientific use of their data products. Also, the seismological research community has become increasingly specialized, e.g., in conjunction with the monitoring and identification of underground nuclear tests. This trend has often caused changes in priorities and has narrowed the view with respect to the kind of data and routine analysis required to best serve current scientific interests.

Hwang and Clayton (1991) published an analysis of phase reportings to the International Seismological Centre (ISC) by all the affiliated seismological stations of the global seismic network. Most seismic stations, even those equipped with both short- and long-period or broadband seismographs, reported only the first *P*-wave arrival out of the many—often clearly discernable onsets (*i.e.*, later arrivals) in seismograms of strong events, often not reporting even

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