REFLECTIONS ON EVENTS PRECEDING THE TANGSHAN EARTHQUAKE OF 1976

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1. INTRODUCTION

In China, extensive attention has been given to the problem of earthquake prediction since the occurrence of a series of damaging earthquakes in the 1960's. Large-scale programmes of earthquake prediction have also been carried out in Japan, the United States, and the USSR. Determined efforts are under way in all of these countries to make earthquake prediction more reliable. Plate tectonic theory, the development of geophysics and the establishment of the global seismological network have improved our understanding of earthquake phenomena. At the same time, social and economic progress in numerous countries has resulted in increasing needs to mitigate earthquake risks. All of these factors have created a favourable environment for promoting earthquake prediction. Nevertheless, prediction is still in an experimental phase, and no reliable system exists for recognizing and interpreting earthquake precursors. Hence, any existing system of prediction is basically a probabilistic rather than a deterministic one, and failures to make predictions will be unavoidable. Although we have recently made several successful predictions of large earthquakes, we also have had some failures. The failure in predicting the Tangshan earthquake (M=7.8) in 1976 is a typical example and will be the subject of this paper.

Tangshan is an industrialized city which is intensively inhabited. In 1976 it was completely destroyed with heavy loss of lives and property. There is a saying in China which states that "Failure is the Mother of Success". In order to learn useful lessons from the Tangshan earthquake, we need to examine the reasons for the failure to predict it. These lessons will be very important for earthquake prediction and risk mitigation in the future. The purpose of this paper will be to review the studies made by Chinese seismologists in Tangshan and the surrounding area, with special reference to the evaluation of earthquake risk at that time.