

1-2 The Feature and Origin of the Flood Basalt around the World

1-2-1 Introduction

The classification of PGE ore deposits in the world is shown in Table II-1-2-1.

There are some PGE ore deposits that were generated by large scale basaltic igneous activity like flood basalt. For example, the Talnakh intrusive rocks (Noril'sk ore deposit) in the Siberian Trap, Insizawa-Ingeii intrusive rocks of the Karoo flood basalt in Africa, and Duluth composite rocks and the Crystal Lake gabbro of the Keweenawan basalt in North America are well-known flood basalt areas. This chapter will consider the characteristics and genesis of flood basalt, and the relationship between flood basalt and PGE ore deposits, for the estimation of PGE ore deposit mineralization within the Paraná flood basalt.

1-2-2 Characteristics of the Flood Basalt

(1) Distribution and Setting

Large-scale volcanic rocks such as flood basalt are called Large Igneous Province (LIP). The distribution of LIP in the world is shown in Fig. II-1-2-1. The age of forming, the starting period of activity, period of activity and distribution area of major flood basalt are reviewed in Table II-1-2-2.

Flood basalt is distributed in the Paraná basin of South America, the Ontong Lava plateau of the Pacific Ocean, the Deccan plateau of India, the North Siberian basin of Russia and the Columbia River in North America. The widest distribution area is the Paraná flood basalt and the erupted volume the Ontong Java is the largest.

The huge volume of basalt magma (several hundred km³ at a time) is erupted from the fissure that concentrated in a narrow area in a short time. Those are the characteristics of the eruption style of flood basalt. The period of eruption is about 1 Ma in major flood basalt. The period of the activity of flood basalt was comparatively short. For example, the period of main activity of the Paraná flood basalt was approximately less than 1 Ma, and that of the Etendeka flood basalt was approximately 2 Ma, making it a pair with the former.

Some flood basalt accompanied the continental breakup. In particular, there are many activities that erupted at the early stage of the drift of the super-continent. Therefore, each flood basalt has a counterpart, for example, the Deccan Trap and the Seychelle, the Paraná and the Etendeka, and the Ethiopia and the Yemen (the Red Sea), and so on (White and McKenzie, 1989, etc). When a fault of huge scale was formed, as a similar event in deep sea, plateau or basin was formed. Almost all the plateaus or basins are considered to have accompanied the sea-floor spreading activity on the triple junction of the mid-oceanic ridge.