

Transition from arc to intraplate magmatism in northern Sikhote Alin area associated with the opening of the Japan Sea

Keiko Sato[1], Yoshiyuki Tatsumi[2], Takahiro Tagami[3], Vladimir Prikhodko[4]

[1] Inst.Geotherm. Sciences, Kyoto Univ., [2] IFREE, JAMSTEC, [3] Earth and Planetary Sci., Kyoto Univ., [4] Inst. Tectonics and Geophysics

<http://member.nifty.ne.jp/tokinokay/index.html>

The Sikhote Alin area located side of the Sea of Japan. There are two volcanic belts, which are named ESAVB and WSAVB. The age distribution and the chemical variations in the northern Sikhote-Alin basaltic lavas can provide us with the timing of changing volcanism which associated with the opening of Sea of Japan. The 70 results indicate that volcanic activities in the northern Sikhote Alin area occurred in three stages. During 40-25 Ma only in ESAVB, which excelled arc-type basalts. During 25-20 Ma, and was basically inactive stage caused during opening event. The volcanic activity in both ESAVB and WSAVB seem to be excelled plume-type basalts, and was basically active stage caused intraplate volcanism, and the arc magma chemistry is not confirmed for any lava erupted during 20-5 Ma.

Where is the home of the Japanese Islands? This is a critical question for an understanding of the tectonic evolution of the eastern part of the Asian continent. To answer this, Niitsuma et al. (1988) and Jolivet et al. (1995) conducted plate-tectonic reconstruction for the Japan Sea region. They suggested that the NE Japan arc sliver was a part of the Asian continent at the present Sikhote Alin region, Far Eastern Russia, as intuitively expected from the topography around the Japan Sea. Moreover, intensive volcanism has continued in that region since the Late Cretaceous. It is thus anticipated that documentation of temporal variation both in the distribution of magmatism and the lava compositions may provide a new insight into the dynamic processes in the mantle occurring during the backarc opening.

In this poster, attention will be paid to magmatism in the northern part of Sikhote Alin, simply because that region was attached to the NE Japan arc. In order to document the magmatic activity more comprehensively, the analyses will cover the whole region of the Northern Sikhote Alin, although previous works focused solely on the coastal range. The final goal of this thesis is to discuss the linkage between such magmatism and the backarc-rifting event.

K-Ar ages and major / trace element compositions were obtained from 70 fresh lavas from the northern Sikhote Alin, Far East Russia, in order to document the secular variation in volcanism and upper mantle processes during backarc opening. This region is distinct in that it was the home of the NE Japan arc sliver before the opening of the Japan Sea backarc basin. Also, the distribution of lavas from the coastal region to the inner part of the continent is the characteristic feature of this region. Northern Sikhote Alin can be divided into two volcanic belts, that is, the East Sikhote Alin volcanic belt (ESAVB) along the Japan Sea coast, the West Sikhote Alin volcanic belt (WSAVB).

The volcanic activity in the north Sikhote Alin took place during 40-25 Ma and 20-5 Ma, and was separated by a marked hiatus in volcanism during 25-20 Ma, which is synchronous to the period of the major rifting event in the Japan Sea backarc basin. It should be stressed that the volcanic activity during the pre-rifting stage of the Japan Sea occurred in the entire ESAVB along Japan sea, whereas no volcanism in the WSAVB. Such an arc-like distribution of volcanism may suggest the location of a continental arc-trench system in this region before the formation of the backarc basin. On the other hand, the volcanism during 20-5 Ma exhibits "spot-like" distributions both in the WSAVB and ESAVB.

All lavas erupted in the ESAVB during 40-25 Ma have compositions typical of subduction-zone magmas (high-K and medium-K series), implying that the ESAVB formed a continental arc before the opening of the Japan Sea. It is further suggested that the backarc rifting is initiated at the volcanic front, rather not in the backarc region. Thus, the present data clearly demonstrate that the opening of the Japan Sea initiated at least 25-20 Ma, earlier than 15 Ma as suggested previous based on paleomagnetic data. On the contrary, the arc magma chemistry is not confirmed for any lava erupted during 20-5 Ma, indicating that such subduction-related volcanism was terminated due to the opening of the Japan Sea. During 20-5 Ma, intraplate-type lavas with typical hotspot magma compositions typifies the Sikhote Alin volcanism and may be caused by mantle upwelling beneath the Cenozoic intraplate basalt province in the northeast China and Far East south Russia.