J164-004 **Room: Ocean B** **Time: May 25 16:15-16:30**

The patchwork of volcanic lava flows and ultramafic rock outcrops, an example in the Knipovich Ridge, northern Atlantic Ocean

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The Knipovich Ridge is one of the slowest spreading ridges in the world. The ultra-slow spreading rate is 1.4 cm/yr (full rate, NUVEL-1A). Because the ridge trends ~north-south and the direction of plate motion is ~307 deg., up to 46 deg. of very high obliquity characterizes the Knipovich Ridge. The 'effective spreading rate' becomes 0.8 cm/yr because of the very high obliquity, and the rate approaches the world's slowest spreading ridge, the eastern end of the Gakkel Ridge (less than 1 cm/yr).

Strike of the Knipovich Ridge changes ~20 deg. at the middle part of the ridge. Southern half of the ridge ('southern section') has higher obliquity and slower effective spreading rate than northern half ('northern section'). Bathymetric character is different between two sections: two prominent seamounts develop at 100 km interval in northern section, and three smaller seamounts develop at 78 km intervals and relatively smoother bathymetry characterizes the southern section.

We conducted scientific cruise in summer of 2000 along the both sections of the Knipovich Ridge. Long sidescan sonar imagery and water and rock samples in several points were obtained.

We found hummocky terrains which are interpreted as accumulated pillow basalts in the northern section. Prominent two seamounts in the northern section are mostly covered by the hummocky terrain. Large faults develop over the section. On the other hand, smooth-surface and high backscattering terrains ('smooth-surface terrain', which is interpreted as smooth-surface lava flows) mostly covers the southern section. The largest lava flow was found near the connecting point of both sections, and is at least 44 km long. Hummocky terrains are found around smaller seamounts. Large faults also develop over the southern section, but are buried by lava flow in several points. Over both sections, crinkly and undulated planar feature are found at least four places. We recognize the planar features separately from smooth-surface terrains, and call the feature as 'chaotic terrain'.

The finding of widely distributed lava flows indicates that active volcanism occurs along such a slow spreading ridge. On the other hand, scattered chaotic terrains may suggest the feature incompatible with active volcanism. Connelly et al (2008) reported discovery of anomalous water column which may be influenced by ultramafic rocks at a chaotic terrain of southern end of the Knipovich Ridge. The chaotic-terrain-like sidescan sonar imagery was also observed at ultramafic outcrop site in the Southwest Indian Ridge, another ultraslow spreading ridge. These results may indicate the existence of ultramafic outcrops at the chaotic terrain along the Knipovich Ridge.

How do volcanic lava flows and chaotic terrains make patchwork along the ridge? Ultramafic rocks were found along fracture zones and on oceanic core complexes in the global mid-ocean ridge system, suggesting melt-starved seafloor spreading. The chaotic terrain in our sidescan sonar imagery may also indicate melt-starved spreading along the Knipovich Ridge, although megamullion structures are not found. On the other hand, widely distributed lava flows along the Knipovich Ridge may be modeled as follows. First, position of segment center seems to be changed within a few tens kilometers area. Second, smooth seafloor between seamounts is a kind of segment boundary comparable to non-transform discontinuity exposing deeper crust/mantle materials, and that the highly oblique structure induces occasional volcanism within the originally amagmatic portion, analogous to leaky transform faults. I will report detail sidescan sonar imageries and will discuss relationships between volcanism and spreading rate in the meeting.