

## A signature of heat along a micro-fault in Hikurangi margin, New Zealand: IODP Expedition 375, Site U1518

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In Hikurangi margin, New Zealand, slow slips have been observed every 1-2 years repeatedly, and the slip could reach around the shallow portion at the trench axis. In this study, we measured reflectance of carbonaceous material (R) along a micro-fault within a core sample obtained from IODP Expedition 375 to examine a signature of heating event around the micro-fault.

The sample is taken from the depth of 290 m below seafloor (mbsf) in Site U1518 which is located at the frontal thrust. A thrust fault zone with fault breccia is located around 300 mbsf close to the sample location. Therefore, the micro-fault at the bottom of the sample can be expected to be related to the fault zone. The surface of half-cut sample was polished and scanned by a fluorescence microscope. Grains with black in the scanned image by a fluorescence microscope and with reflective in the reflection microscope can be identified as carbonaceous materials. Reflectance of the grains were measured with the positions in the samples. Additionally, R for background value was measured on carbonaceous grains separated from the bulk samples.

The number of measured grains is 950. The R ranges about 0.1-15 %. The measured grains include both primarily matured one in situ and previously matured detrital one. To pick the primarily matured one, a statistic examination was conducted. The histogram for all R shows the peak at 0.6 %. While the distribution of R below 0.6 % with a function of the distance from the fault at the bottom of the sample indicates decrease trend in R with distance, such trend was obscured in the distribution of R for all data, which suggests that the grains with R above 0.6 % are randomly distributed due to the detrital origin. In addition, the minimum baseline of the distribution of R below 0.6 % consistent with the background value of 0.1-0.2 %, whereas the minimum baseline of the distribution of R for all data indicates significantly higher value than the background value. Therefore, the R below 0.6 % was taken as the value for the primarily matured grains in situ.

The decrease trend from the micro-fault suggests that a heating event was recorded in the sample by frictional heating or hot fluid migration. The distance of the decrease trend is about 10 mm. If the frictional heating makes the trend, the slip duration is estimated as 6.25-25.0 s, which is consistent with the VLFs.

Keywords: Heating along a micro-fault, Hikurangi margin, New Zealand, IODP Expedition 375, reflectance of carbonaceous material