

## Supplemental Material

1. A map and photographs regarding the micro-Raman spectroscopic analysis of olivine filling a channel of Horoman peridotite.



Figure S1. Map of eastern Asia. A peridotite including a channel was sampled from Horoman district, which is marked with a star. DPRK and ROK respectively denote the Democratic People's Republic of Korea and the Republic of Korea.



**Horoman Peridotite**

Figure S2. Photograph of Horoman peridotite displayed in a permanent exhibition room in the Hokkaido University Museum. The peridotite is huge, with 170 cm length, 38 cm width, 10 cm thickness, and approximately 200 kg weight.

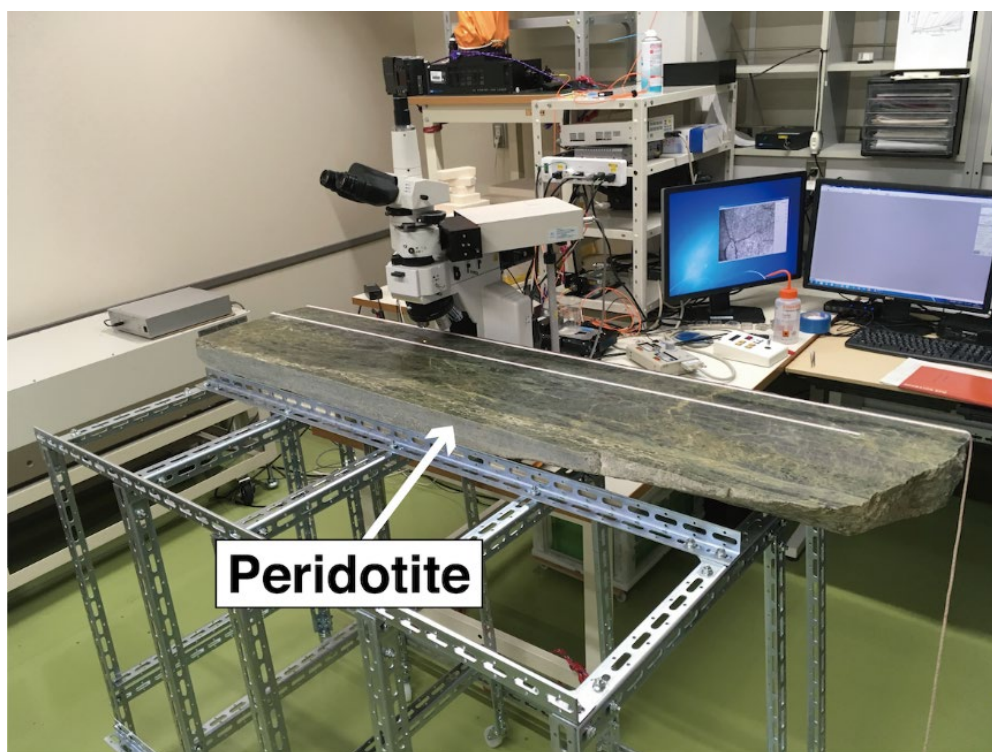


Figure S3. Photograph of Horoman peridotite taken during Raman spectral analysis. 250 mm line analysis was performed at 5 mm intervals.

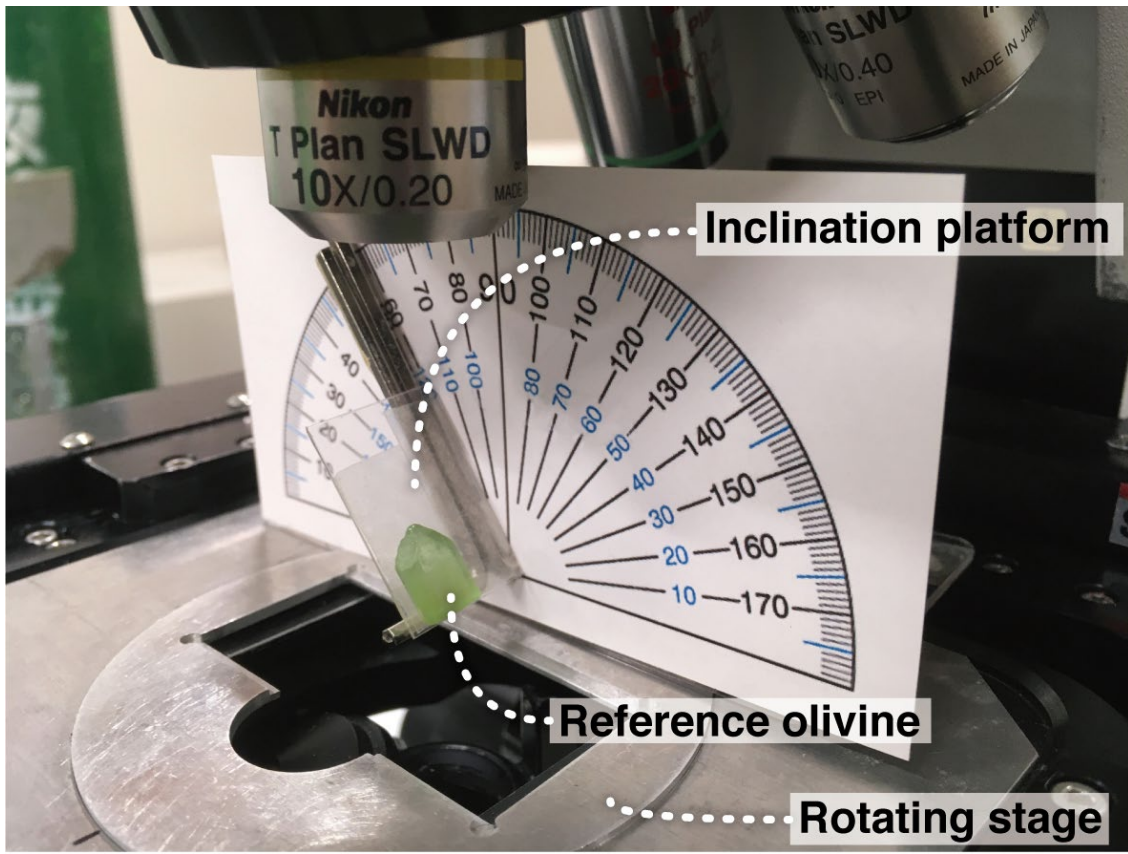


Figure S4. Photograph of a reference euhedral olivine from Pakistan taken during Raman spectrum analysis.

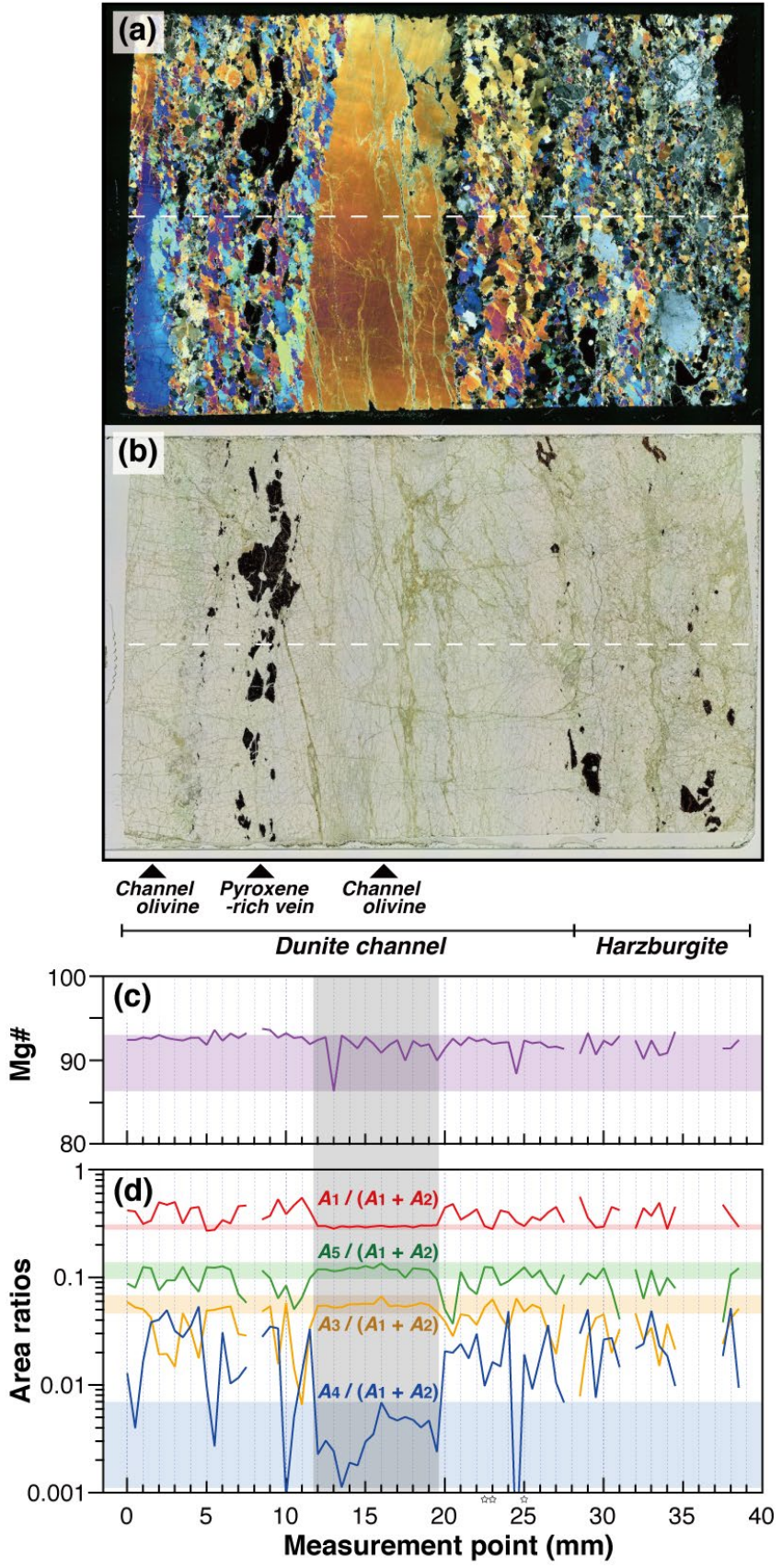


Figure S5. Photographs and line profiles of Raman spectra of a thin-section. The white dashed lines in the photographs indicate the locations where the line analysis was performed. (a) a photograph of a thin-section of the sample “1.6OL” taken under transmitted cross-polarized light. The thin-section is identical to the one shown in Figure 3 of Yoshikawa *et al.* (2019) as "1.6OL-I" though the front and back are reversed. (b) a photograph taken under transmitted light. (c) line profiles of Mg#. Note that the gray shaded area is the measurement area of channel olivine. The purple shaded area indicates the range of Mg# of the channel olivine. Some of the data is not shown because the sites were composed of pyroxene or spinel. (d) line profiles of Raman peaks of olivine. Horizontally long shaded areas of various colours indicate the range of area ratios of the channel olivine. The three stars at the bottom outside the column indicate the measurement points where values falling into the channel olivine range were found for all  $A_1/(A_1+A_2)$ ,  $A_3/(A_1+A_2)$ , and  $A_5/(A_1+A_2)$ . Although their  $A_4/(A_1+A_2)$  are not in the range of channel olivine values, the difference implies a 10–20° difference in  $\phi$  from the channel olivine. Considering their distribution in the thin-section, the fine-grained olivine would have originally been part of the channel olivine. In the Dunite channel region, the fine-grained olivine with a crystallographic orientation substantially different from that of the channel olivine are found predominantly in the 0–11.5 mm measurement point, and they show an overall homogeneous Mg# that is slightly higher than that of the channel olivine. It suggests the possible occurrence of the fine-grained olivine not caused by fragmentation of the channel olivine. Further study of the fine-grained olivine may provide the key to understanding the development of the dunite channel.