Descriptions of Zircon Used for LA-ICP-MS

The zircon descriptions herein are to accompany file "LA-IFP-MS_Zircon_images.pdf".

Sample 18lo11-1

Zircon CL images from sample 18lo11-1 show grains range from 33 to 250 µm wide and 100 to 430 µm long, and generally have regular oscillatory growth zoning with irregular dark rims. Several grains have brighter or darker cores that are crosscut or resorbed by later zonation, indicating inheritance from an older source.

To determine zircon grains that are inherited, a combination of zircon morphology, evident in backscattered electron (BSE) and cathodoluminescence (CL) images, $\delta^{18}O_{zircon}$ (G. Jones, unpublished data), and $^{206}U/^{238}Pb$ ages of the zircons were used. Grains 35, 22, and 8 were identified as inherited from an older source. Grain 35 is interpreted as an xenocryst, as it has a bright core surrounded by a dark rim, a $\delta^{18}O$ signature (4.68±0.20‰) below average for this sample (7.44‰), and is significantly older (234.7±3.2 Ma) than the estimated age of the sample (127.9±0.8 Ma). Grain 22 has a bright, rounded core that is crosscut by later growth zonation, a $\delta^{18}O$ signature (12.22±0.24‰) above average for this sample (7.44‰) and is older (137.4±1.8 Ma) than the estimated age of the sample (127.9±0.8 Ma). Grain 8 has a thin core surrounded by a wide, dark rim, a $\delta^{18}O$ signature (6.54±0.25‰) below average for this sample (7.44‰) and is older (136.1±1.7 Ma) than the estimated age of the sample (127.9±0.8 Ma). Grains 22 and 8 may be antecrysts from earlier magmatic pulses.

Sample 18lo12-7

Zircon CL images from sample 18lo12-7 show grains range from 60 to 200 µm wide and 200 to 460 µm long, and generally have fine, regular oscillatory growth zoning around an irregular core. Several grains have brighter, rounded cores that are crosscut by later zonation, indicating inheritance from an older source.

Grain 49 was identified as inherited from an older source, as it has a bright, rounded core crosscut by later growth zoning.

Sample 18lo17-1

Zircon CL images from sample 18lo17-1 show grains range from 50 to 150 µm wide and 150 to 500 µm long. Most grains are only partial fragments and display a combination of irregular and oscillatory growth zoning.

Sample 18lo20-4

Zircon CL images from sample 18lo17-1 show grains range from 50 to 300 µm wide and 85 to 425 µm long. Most grains have irregular or metamict cores surrounded by oscillatory growth zoning, and approximately half the grains are only partial fragments.

Sample 18lo25-2a

Zircon CL and BSE images from sample 18lo25-2a show two main types of grains; subset "z1" grains range from 100 to 260 µm wide and 130 to 260 µm long and are clear, partial fragments with irregular or oscillatory growth zoning. Subset "z2" grains range from 200 to 400 µm wide

and 400 to 800 µm long and are brown, metamict partial fragments, with several grains showing relict oscillatory growth zoning in the BSE image.

Sample 18lo22-1a

Zircon CL images from sample 18lo22-1a show large grains with low aspect ratios, ranging from 225 to 600 µm wide and 250 to 900 µm long. Most grains have a combination of irregular or sector and oscillatory growth zoning.

Sample 19GJ12-1

Zircon CL images from sample 19GJ12-1 show small grains that range from 25 to 65 µm wide and 65 to 200 µm long, and generally have regular, oscillatory growth zoning. Several grains have wide, brighter or darker cores, or disturbed oscillatory growth zoning, indicating possible inheritance from an older source.

Grains 55 and 51 were interpreted as inherited from an older source. Grain 51 has a wider, darker core with a thin, oscillatory growth-zoned rim, a $\delta^{18}O$ signature (7.58±0.20‰) that is above average for this sample (5.67‰), and is older (141.4±2.5 Ma) than the estimated age of the sample (134.1±0.5 Ma). Grain 55 has a core crosscut by a disturbed oscillatory growth-zoned rim, a $\delta^{18}O$ signature (6.27±0.20‰) above average for this sample (5.67‰) and is older (141.1±1.9 Ma) than the estimated age of the sample (134.1±0.5 Ma).

Sample 19GJ12-4

Zircon BSE images from sample 19GJ12-4 show small grains that range from 40 to 160 µm wide and 70 to 280 µm long, and generally have a combination of irregular internal textures and oscillatory growth zoning. Most grains have radial fractures and inclusions.

Sample 19GJ13-3

Zircon CL images from sample 19GJ13-1 show grains ranging from 70 to 200 µm wide and 150 to 425 µm long. Most grains have a combination of irregular or sector and oscillatory growth zoning, with rare rounded cores.

Sample 19GJ13-5a

Zircon CL images from sample 19GJ13-5a show grains ranging from 50 to 110 µm wide and 110 to 250 µm long. Most grains have a combination of irregular or sector and oscillatory growth zoning, with several tabular zoned cores.