

Figure F1. Map of study area showing Svalbard (Spitsbergen) Archipelago and surrounding ocean bathymetry, Site U1618. Sites U1618 and U1619 are on Vestnesa Ridge, northernmost Expedition 403 sector. Site U1618 is on eastern terminus of Vestnesa Ridge, ~22 km from shelf edge of Kongsfjorden glacial trough in northwestern Spitsbergen. Red = Site U1618, yellow = other Expedition 403 sites (St. John et al., 2026), pink = Ocean Drilling Program Leg 151 sites (Myhre, Thiede, Firth, et al., 1995).

Figure F2. Programmatic XRF scanning coverage, Site U1618. Black = low-resolution scanning, yellow = high-resolution scanning.

Figure F3. Correlation matrix between elements (Mg, Ti, Al, Si, Rb, K, Cr, Zn, Fe, Co, Zr, S, Ni, Mn, Ca, and Sr) measured at low resolution, Site U1618. Lower left triangle is representation of complete correlation between elements; upper right triangle is representation of only statistically significant correlations with p -values < 0.05 . Correlations with p -values > 0.05 are left blank in upper triangle. Correlation is represented on color gradient from intense blue (positive correlation; Spearman $\rho = 1$) to intense red (negative correlation; Spearman $\rho = -1$).

Lighter blue and red indicate weak positive and negative correlations, respectively.

Figure F4. MS, NGR, and low-resolution XRF counts for Al, Si, Rb, Ca, S, Fe, Zr, and Br, Site U1618. instr.units = dimensionless instrumental units, cps = counts per second. Dashed line = Subunit IA/IB boundary.

Figure F5. MS, NGR, and low-resolution XRF scans, Site U1618. XRF ratios shown as ln ratios: Al/Ti, Si/Ti, Ca/Ti, Fe/S, Fe/Rb, Br/Rb, and Zr/Rb. instr.units = dimensionless instrumental units, cps = counts per second. Dashed line = Subunit IA/IB boundary.

Figure F6. MS, NGR, and high-resolution XRF scans (Subunit IA), Hole U1618A. XRF ratios shown as ln ratios: Al/Ti, Si/Ti, Ca/Ti, Fe/S, Fe/Rb, Br/Rb, and Zr/Rb. instr.units = dimensionless instrumental units, cps = counts per second.