

Table S3. Terrigenous lithofacies

Lithofacies	Descriptions	Depositional environments
Massive diamictite	Unstratified, sheared or unsheared, wackestone with matrix-supported heterolithic pebbles and boulders, generally subrounded, faceted and striated clasts	Subglacial and ice-proximal subaqueous settings, lodgement-, sublimation- and melt-out tills, in some cases redeposited downslope
Stratified diamictite	Laminated and bedded suspension fallout containing outsized dropstones with impact-related features (e.g., punctured layers, raised rims, overturned flaps), turbidites and debrites, slumps and cryokinetic structures	Subaqueous periglacial, ice grounding-zones particularly of ice streams, proximal ice-shelf rafting, far-travelled iceberg rafting, hypopycnal suspension plumes
Sorted diamictite	Well-sorted arenite or fine-grained rudite containing outsized dropstones, climbing ripples, crossbedding, commonly channelized within massived diamictite or as wedges within stratified diamictite	Sub- and intraglacial melt-water tunnels, grounding-line tunnel-mouth fans, sub-ice shelf tidal channels
Conglomerate	Clast-supported rudite, clasts subrounded to well-rounded, generally stratified with sand-rich lenses and zones, graded or reverse graded, paleo-calcrete	Alluvial fans and steep-gradient rivers, proglacial outwash (sandur)
Sandstone	Grain-supported arenite, generally well-bedded, commonly crossbedded, ripple marks, current lineation, pebble lags and lenses may be present	Aeolian, riverine, deltaic, and wave- or tide-dominated coastal systems, off-shore bars, slope channels and fans
Siltstone	Grain-supported siltstone, generally thin-bedded, may be interstratified with fine-grained sandstone and/or argillite, low-angle cross-stratification, wave or current ripples, turbidites, mudcracks if desiccated	Riverine levees and deltas, open and semi-restricted shelves, slope-channel levees and fans
Argillite	Terrigenous mudrock, massive to foliated, parallel-sided laminae, terrigenous or carbonate turbidites, authigenic sulfide and carbonate	Lakes, coastal lagoons, restricted shelves, basin floors