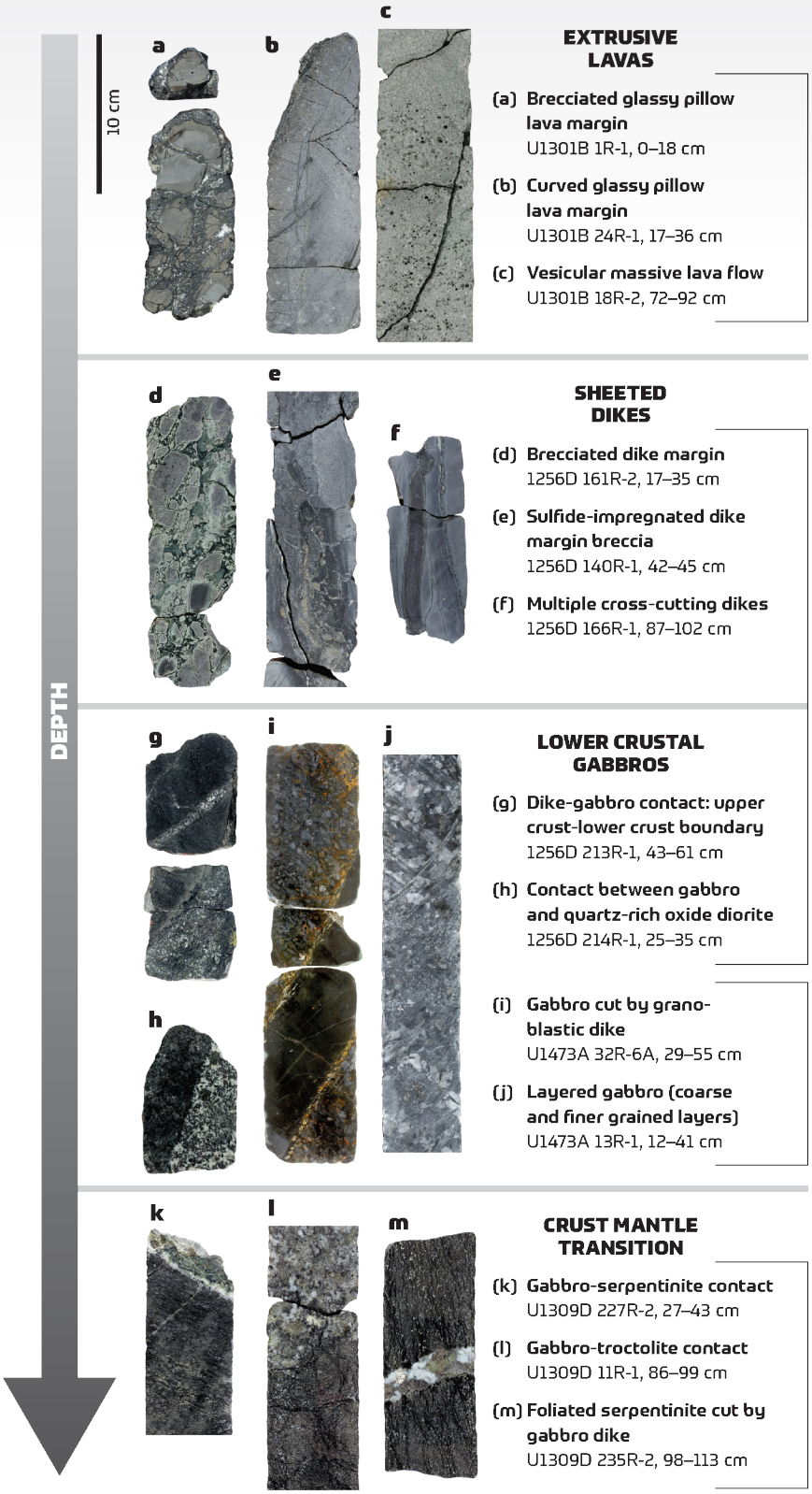


**a–c.** Lavas (a–c) are from IODP Hole U1301B, which penetrates ~320 m into 3.5 million year old intact, in situ upper oceanic crust formed at an intermediate-rate spreading center (~6 cm/yr full rate) now overlain by ~265 m of sediment.[1]

**d–h.** The sheeted dike cores (d–f) are from ODP Hole 1256D, which penetrates ~1,270 m into 15 million year old intact, in situ oceanic crust formed at a superfast spreading rate (>20 cm/yr full rate) at the East Pacific Rise, now overlain by ~250 m of sediment.[2]

Hole 1256D cored ~800 m of lavas and ~345 m of sheeted dikes, penetrating lower crustal gabbros at 1,157 m subbasement (g) and the uppermost 100 m of the dike-gabbro transition zone (h).

**i–j.** IODP Hole U1473A, located at the summit of Atlantis Bank, an 11–13 million year old elevated oceanic core complex on the slow-spreading (1.6 cm/yr full rate) Southwest Indian Ridge, penetrates ~809 m into uplifted, unsedimented massive gabbros cut by isolated dikes (i), with intervals of igneous layering within the gabbros defined by variations in grain size (j) or modal mineralogy.[3]

**k–m.** IODP Hole U1309D, located on the Atlantis Massif—a 0.5–2 million year old oceanic core complex on the slow-spreading (2.4 cm/yr full rate) Mid-Atlantic Ridge, penetrates into an uplifted and faulted lower crustal section, cut by diabase sills.[4] The U1309D crustal section comprises a stack of gabbroic bodies that surround pre-existing serpentinized peridotites and zones of olivine-rich troctolite formed by interaction with gabbroic melt (k–m).

Scientific ocean drilling has advanced our understanding of the structure and accretion of oceanic crust by recovering cores from different stratigraphic levels, allowing us to construct "composite stratigraphies" through the oceanic crust. However, this requires the compilation of results from crustal sections of differing age, produced at a range of spreading rates recovered from diverse tectonic settings. To further advance our understanding of crustal accretion we need longer continuous sections through the lower crust and into the underlying mantle. *[1]Fisher et al. (2005), https://doi.org/10.2204/iodp.proc.301.2005; [2]Teagle et al. (2006), https://doi.org/10.2204/iodp.proc.309312.2006; [3]MacLeod et al. (2017), https://doi.org/10.14379/iodp.proc.360.2017; [4]Blackman et al. (2006), https://doi.org/10.2204/iodp.proc.304305.2006*