1 Lithofacies

14 samples were cored from Abbey Arms Wood borehole from 10m to 140m, comprises of Helsby Sandstone Formation and Wilmslow Sandstone Formation (Table 1). According to its appearance and structure, it can be divided into 5 facies: Coarse-grained fluvial channel fill, Aeolian sandy sabkha, Aeolian dune, Aeolian sand sheet and massive sandstone.

Table 1 Principal lithofacies of SSG samples in the Abbey Arms Wood borehole

Sample	Facies code	Depth (m)	Formation	Facies	Facies Description	Facies Interpretation
S_1	Fx	21	Helsby Sandstone Formation	Coarse-grained fluvial channel fill	Sandstone, generally reddish brown or orange-brown, fine-coarse grained, moderately to well sorted, cross-bedded, contains mud-clasts often lining erosion surfaces	Deposition of sand in a fluvial channel environment by the lateral and downstream migration of dunes and bars
S_2		27.95				
S_3		32				
S_4		38				
S_5	Aw	60	Wilmslow Sandstone Formation	Aeolian sandy sabkha	Sandstone, generally dark reddish brown, fine-medium grained, poorly sorted, moderately cemented, distinctive wavy lamination highlighted by thin silty laminae and irregular lenses of sand	Deposition of windblown sand, silt, and clay on a siliciclastic sabka by the adhesion and trapping of sediment on and under salt crusts
S_8		79.85				
S_{11}		101				
S_6	Ax	66		Aeolian dune	Sandstone, generally reddish brown, or pale reddish brown, fine-coarse grained, moderately sorted, moderately cemented to friable, high-angle cross lamination	Deposition of wind-blown sand on a slip-faced aeolian dune
S_{10}		94.53				
S_7	Al	70		Aeolian sand sheet	Sandstone, generally reddish brown, or pale reddish brown, fine-coarse grained, moderately sorted, moderately cemented to friable, distinctive low angle / horizontal pinstripe (wind-tipple) lamination	Deposition of wind-blown sand as a low-relief sand sheet where wind ripples form the dominant sedimentary structure and dune slip faces are absent
S_9		87				
S_{12}		104				
S_{13}	Sm	117		Massive sandstone	Sandstone, generally reddish brown, or dark reddish brown, fine-coarse grained, moderately to well sorted, can include carbonate cemented zones generally as bedding parallel layers and nodules	Pedogenically destratified sands of fluvial or aeolian origin. Carbonates probably represent early digenetic calcretes precipitated from Ca-rich groundwaters in the near-surface zone
S_{14}		136.5				

2 XCT data analysis

X-ray CT data was processed by Avizo software, and porosity and permeability were calculated. CT imaging results showed that most of the samples have well-connected pore networks.

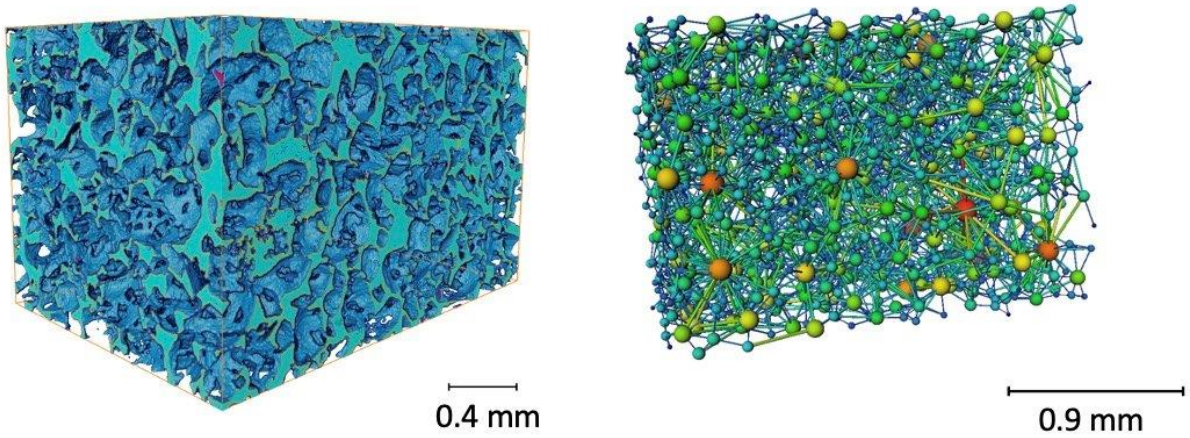

Figure 1 XCT images of Sample 1