

CAPTIONS

Figures

Figure 1. Location of the Talla Earth Observatory Site. The black circle shows approximate position of the peat monolith samples taken by Chambers et al. (1997). (Ordnance Survey topographic material. © Crown Copyright. All rights reserved. OS licence no. 100017897/ 2009)

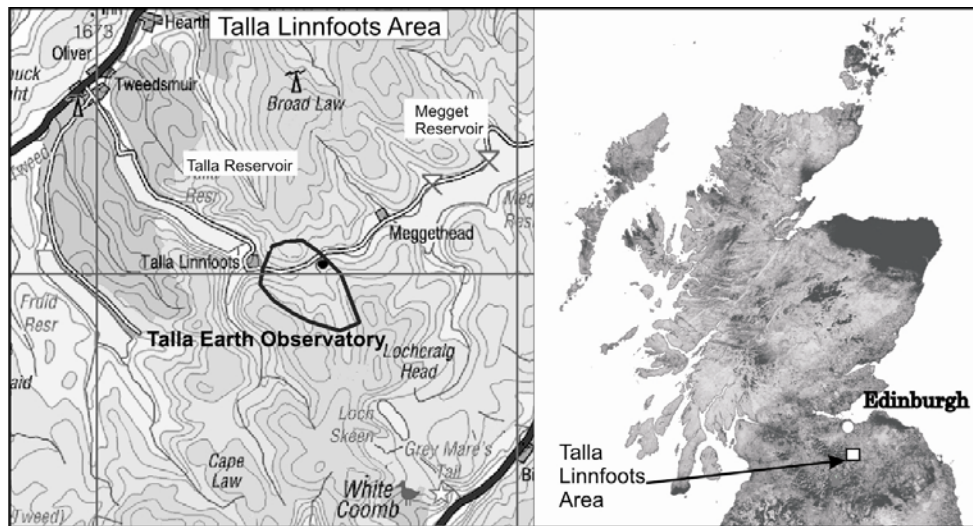


Figure 2. Digital elevation model of the Talla Linnfoots area derived by combining NextMap Britain Elevation data, © InterMap Technologies, and terrestrial LiDAR data; outline shows position of the Observatory site.

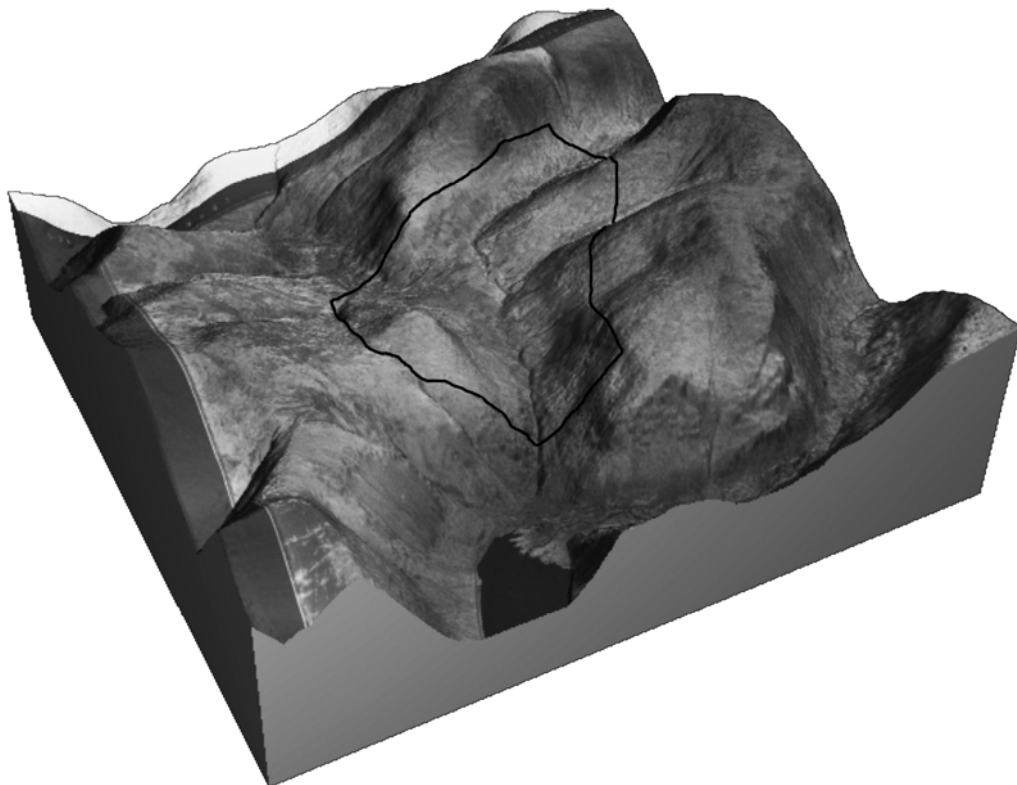


Figure 4. Quaternary geology map of the Talla Linnfoots area showing the distribution of auger survey points across the Observatory site.

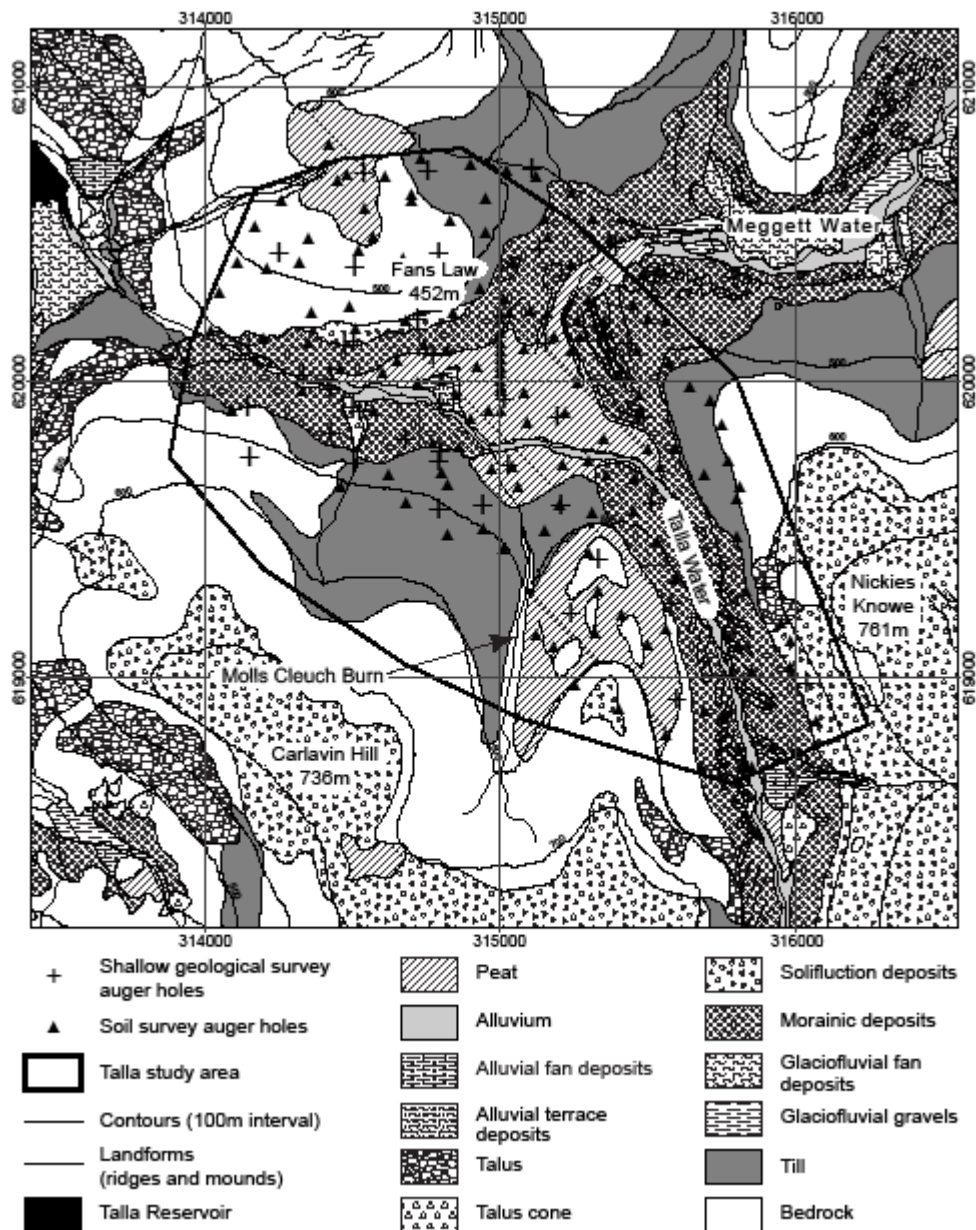


Figure 5. Hummocky recessional moraines in the upper reaches of the Talla Water catchment, viewed to the NW (towards the Talla Reservoir).



Figure 6. Toposequence of deposits on the southern side of the valley of the Talla Water.

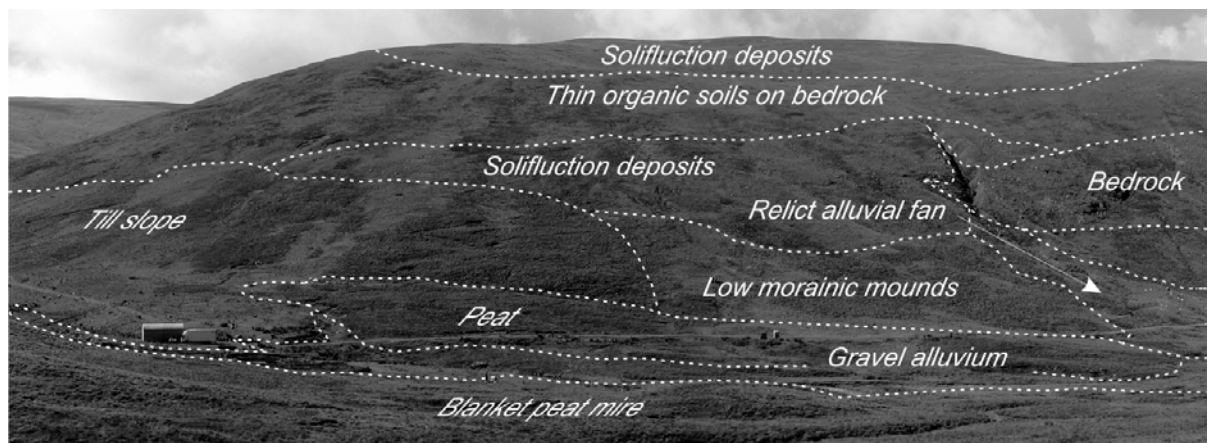


Figure 7. Soil series map of the Talla site, showing the positions of trial pits, cored boreholes and ERT profiles.

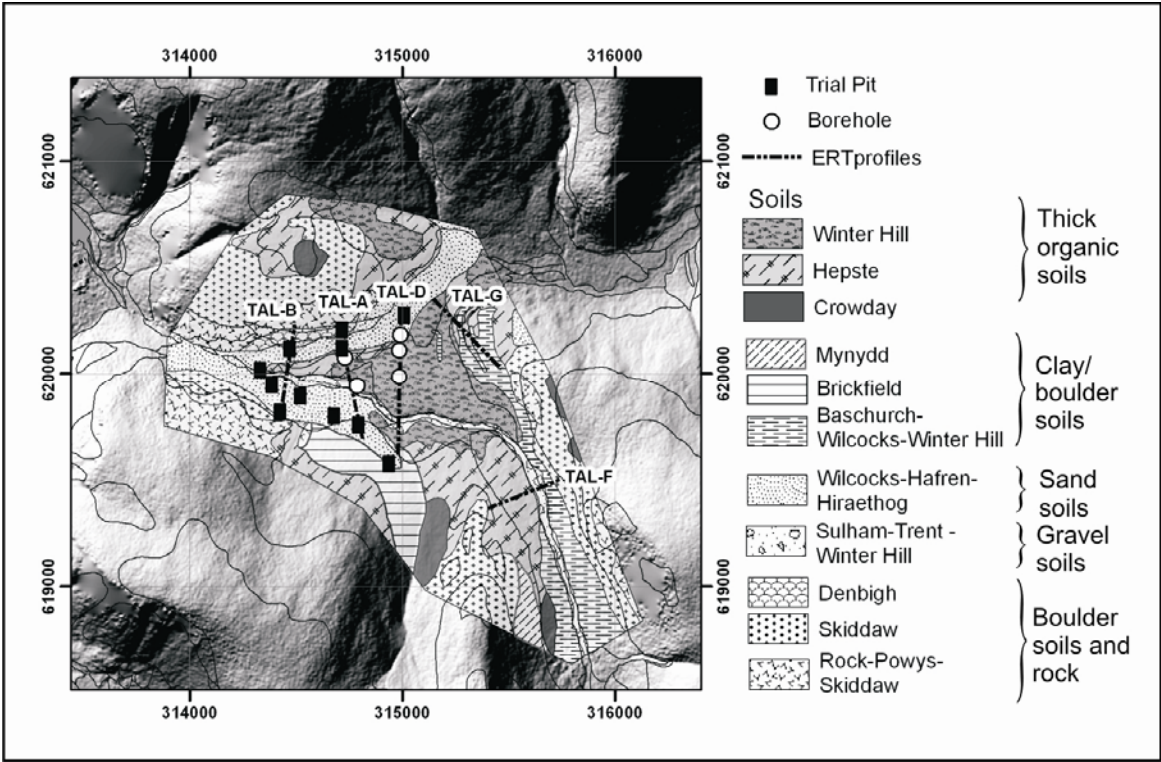


Figure 8. 3D multiple-scan point-cloud image shaded by intensity. Viewed from adjacent to Molls Cleuch burn, looking north (towards northern side of the valley). Inset: Riegl LPM-i800HA laser scanner in operation.

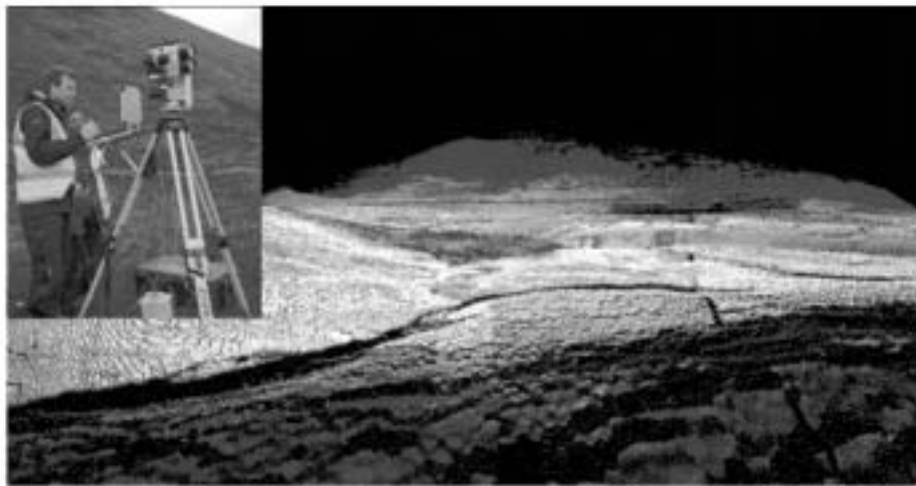
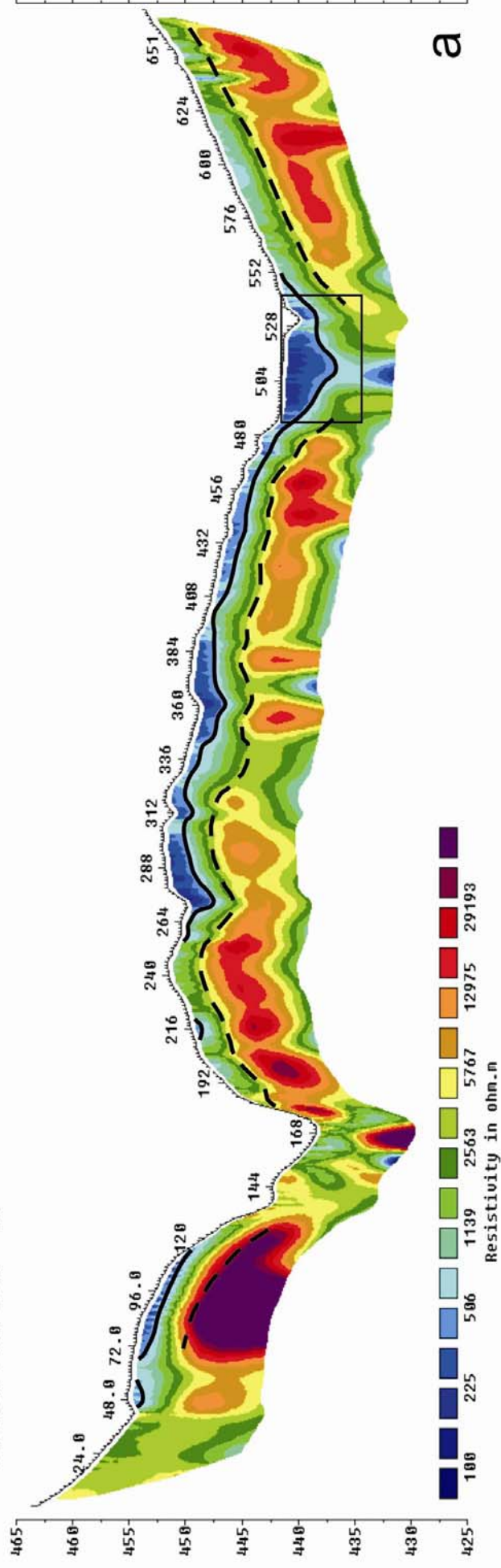


Figure 9. ARP survey at the Talla Observatory using towed resistivity array.

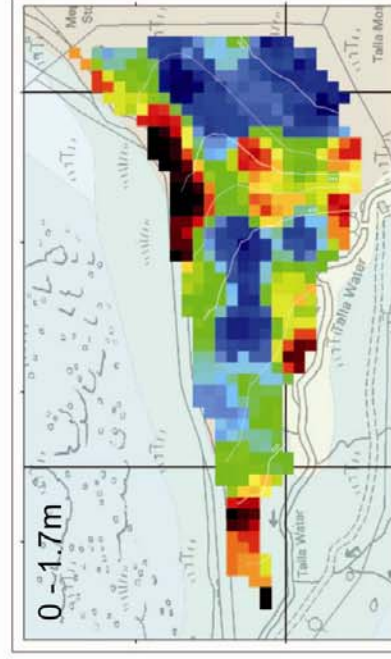
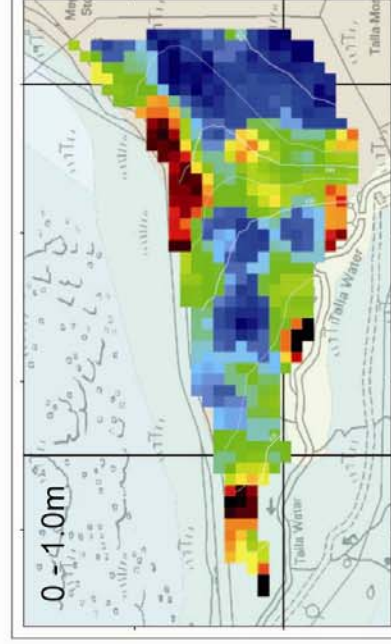
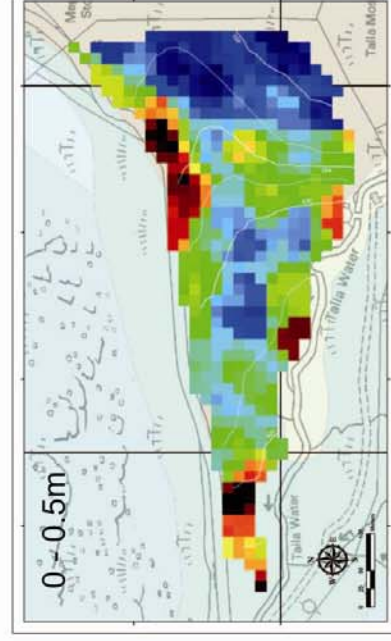


Figure 10. (a) Resistivity values along ERT line TAL-D; solid line ~ interpreted base of peat, dashed line ~ interpreted basal contact of morainic deposits on bouldery till and bedrock. Rectangle shows location of the linked GRP/Panda penetrometer profile given in Figure 11b. (b) Gridded values for ground resistivity of the Talla blanket peat mire from ARP survey at depth intervals of 0-0.5 m, 0-1.0 m and 0-1.7 m depths.

Elevation Iteration 5 RMS error = 2.7



a



b

Figure 11. (a) Extract of a GPR pseudo-section (TAL-D). The first strong reflector is the water table, weaker continuous reflectors beneath show peat stratification; (b) Detail of GPR section between 474-546 m with location of combined borehole/Panda log at 495 m shown in 11c; (d) Interpretation of GPR cross-section 11b; (e) Classification of alluvium underlying the Talla Water floodplain; comparison between cone penetration resistance and engineering borehole log.

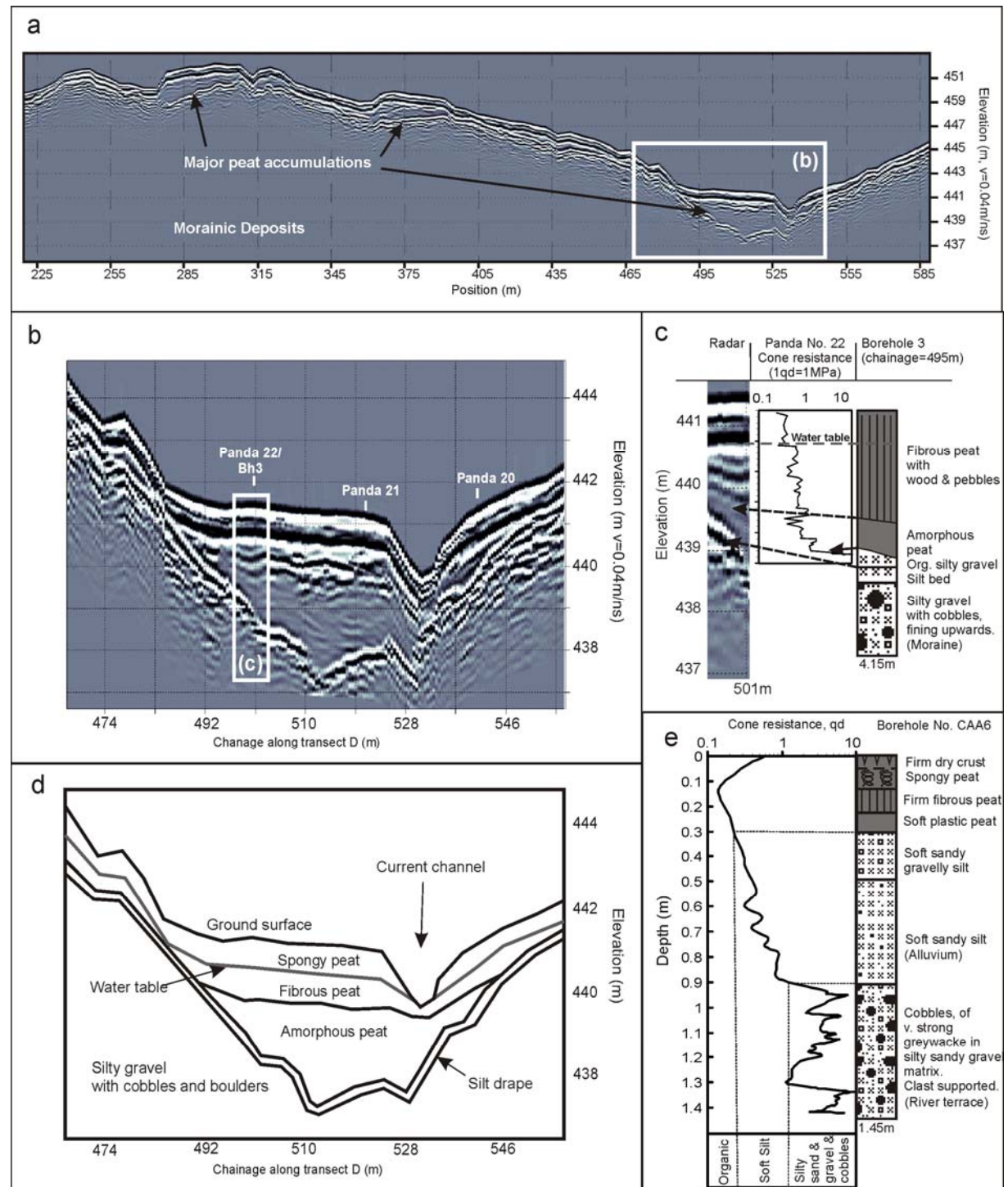
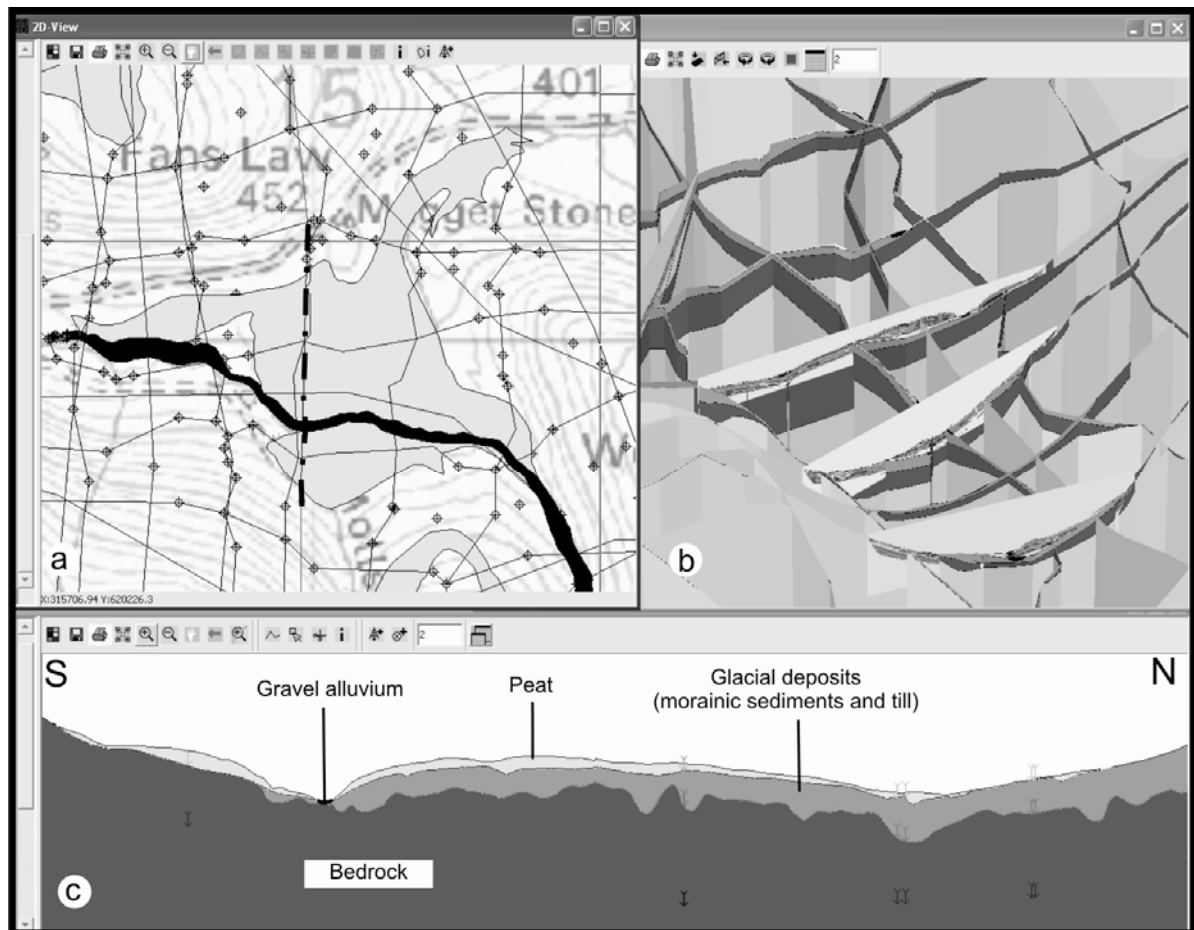


Figure 12. Screen shot of the Talla GSI3D model construction. The map window (a) displays constructed lines of section, the position of down hole information, the surface extent of alluvium (black) and peat (grey). The 3D window (b) shows intersecting geological and ERT cross-sections used in model construction (viewed to the south-east across the project area). The section window (c) displays a constructed interpolated north-south cross section [dashed line on (a)]. Tick arrows show the depth at which the base of a unit has been drawn on an adjacent intersecting section.



Tables

Table 1. Landforms, features and soils typical of a mountain catchment in the Southern Uplands of Scotland. Asterisk indicates features that are present in the surrounding area.

	Present at Talla	Absent at Talla
Organic soils	X	
Immature bouldery soils	X	
Clayey and loamy soils	X	
Floodplain alluvium	X	
Active alluvial fans	X	
Active talus		X*
Debris cones and debris flows	X	
Blanket Peat	X	
Hill Peat	X	
Relict alluvial fans	X	
River terraces	X	
Relict talus	X	
Frost shattered rock		X
Blockfields and block slopes		X
Stone circles, stone stripes and patterned ground		X
Solifluction lobes	X	
Glaciofluvial outwash terraces and fans		X*
Recessional moraines and erratic blocks	X	
Till mantled slopes	X	
Glacially steepened rock walls	X	
Rock basin lakes		X*
Glacially smoothed and striated bedrock		X

Table 2. Evaluation of investigative techniques used for establishing baseline data for modelling Quaternary deposits, landforms and soils at the Talla Earth Observatory.

Feature	Technique for recognition of feature				Technique for evaluation of feature							
	1st Phase		2nd Phase		2nd Phase		3rd Phase					
	Remote sensing	Geological/geomorphological survey	LiDar Scanning	Soil surveying	Auger traverses	APR	ERT	GPR	Panda Penetrometer	Trial pits	Terrier drilling	
Overall site morphology	■	■	■	□	□	■	□	□	□	□	□	□
Organic soils	■	■	□	■	■	□	□	□	■	■	■	□
Immature bouldery soils	□	□	□	■	■	□	□	□	□	■	■	□
Clayey and loamy soils	□	□	□	■	■	□	□	□	■	■	■	□
Floodplain alluvium	■	■	■	■	□	~	■	■	■	~	■	■
Active alluvial fans	■	■	■	□	~	~	~	~	~	~	~	~
Debris cones and flows	■	■	■	□	□	~	~	~	~	~	~	~
Blanket Peat	■	■	■	■	■	■	■	■	■	■	■	■
Hill Peat	■	■	■	■	■	~	~	~	~	~	~	~
Relict alluvial fans	■	■	■	□	■	~	~	~	~	■	~	~
River terraces	■	■	■	□	□	■	■	■	■	~	~	~
Relict talus	■	■	■	□	□	~	~	~	~	~	~	~
Blockfields and slopes	□	■	■	□	■	~	~	~	~	~	~	~
Solifluction lobes	□	■	■	□	□	~	~	~	~	■	~	~
Recessional moraines	■	■	■	□	■	■	■	■	■	■	■	□
Till mantled slopes	■	■	■	□	□	~	■	■	■	■	~	~
Glaciated rock walls	■	■	■	□	□	~	~	~	~	~	~	~

■ provides very useful data for interpretation and modelling

■ provides some useful data for interpretation and modelling

□ provides little useful data for interpretation and modelling

~ Technique not applied at Talla