DISPLAY B1

Sedimentary evolution of the Lower Clair Group, Devonian, west of Shetland: climate and sediment supply controls on fluvial, aeolian and lacustrine deposition.

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Sandstone units in the Devonian Lower Clair Group vary from (a) thick, well-sorted, medium sands deposited by aeolian processes, to (b) amalgamated fluvial channel deposits of coarser sand, to (c) thin sheets of fine sand deposited in floodplain or shallow lake settings.

The six lithostratigraphic subdivisions (units I to VI) of the group are differentiated by changes in the predominance of fluvial, aeolian and lacustrine facies which are in turn controlled by sediment supply and climate.

During periods of high sediment supply and relatively humid climate (Units II, IV and V), fluvial conditions dominated in the form of sandy to pebbly fluvial distributary systems on the alluvial plain. The sand body characteristics vary from stacked, coarse channel fills deposited by high energy braided rivers (Unit II) to decimetre sand sheets interpreted as the deposits of poorly channelised flow at the margins of the terminal fan (Unit V).

At times of relative aridity, the fluvial system retreated and aeolian reworking resulted in extensive sheets of well-sorted sands deposited as dunes or more commonly on sand-flats (Unit III). Periods of wetter climate and reduced clastic input resulted in lacustrine facies fed by rivers which formed lake deltas which were coarse, fan deltas (Unit I) of fine-grained deltas (Unit VI).

The Devonian Clair Basin is an example of deposition in a basin of internal drainage which was predominantly controlled by climatic and sediment supply variations: a predictive model for sand body character and distribution can be developed using an understanding of these controls on the depositional systems.

Plate A

Well: UKCS 206/8-8 Interval: 1701 m – 1702 m

Lower Clair Group Unit VI. Fine sandstone with concretions of calcium carbonate.

Interpreted as a calcrete formed by soil processes: individual pedogenic nodules coalesce to form a laminated calcrete in the upper part of the profile.

Plate B

Well: UKCS 206/8-8 Interval: 1761 m – 1763 m

Lower Clair Group Unit VI. Mudstone and siltstone with horizontal, wavy and disrupted lamination.

Interpreted as lake margin deposits: silts and muds deposited out of suspension or low energy currents highly disrupted by pedogenic modification.

Plate C

Well: UKCS 206/8-8 Interval: 1784 m – 1785 m

Lower Clair Group Unit VI. Finely laminated siltstone with micro-deformation features and fine, laminated sandstone.

Interpreted as lake deposits: the laminated silts show soft-sediment deformation and features which indicate that the sediment remained wet after deposition. The sands were deposited by flows into the lake from a river/delta.

Plate D

Well: UKCS 206/8-8 Interval: 1835 m – 1837 m

Lower Clair Group Unit VI. Interbedded fine laminated sandstone and highly disrupted layers of fine sandstone and mudstone, including mud intraclasts.

Interpreted as shallow lake and lake margin facies. Grey to purple mudstones show wavy lamination and micro-slump soft-sediment deformation features. Sandstone beds are sharp-based in normally-graded units formed by input from rivers, and include rip-up clasts. Disruption of mud and silt beds may be by pedogenic processes at the lake margin.

Plate E

Well: UKCS 206/8-8 Interval: 1972 m – 1973 m

Lower Clair Group Unit IV. Normally-graded units of coarse to very fine sandstone with low-angle cross-stratification.

Interpreted as the deposits of poorly-confined flows at the margins of a 'terminal fan' which may have formed sheet-like depositional units less than a metre thick.

Plate F

Well: UKCS 206/8-8 Interval: 2009 m – 2011 m

Lower Clair Group Unit IV. Finely laminated grey mudrock overlain by very coarse, stratified sandstone.

Interpreted as a shallow lake/lake margin setting into which pulses of coarser grained material were introduced from a river. The sandstone is normally graded from coarse to fine in units approximately a metre thick.

Plate G

Well: UKCS 206/8-8 Interval: 2080 m – 2081 m

Lower Clair Group Unit IV. Very-coarse to coarse sandstone with large mud rip-up clasts.

Interpreted as the deposits of a sandy bedload river. The mudclasts show internal structures which indicate pedogenic modification of the original unit. These mud clasts would have resulted from erosion of the banks of a river.

Plate H

Well: UKCS 206/8-8 Interval: 2165 m – 2166 m

Lower Clair Group Unit III. Fine to medium well-sorted sandstone beds showing horizontal lamination, cross-bedding.

Interpreted as aeolian dune deposits.

Plate I

Well: UKCS 206/8-8 Interval: 2204 m – 2205 m

Lower Clair Group Unit III. Fine to medium well-sorted sandstone beds showing horizontal lamination, cross-bedding and a ‘crinkly lamination’.

Interpreted as aeolian dune cross-beds interbeded with interdune, sand-flat facies, the ‘crinkly’ appearance of which resulting from wetting and drying of the depositional surface to produce adhesion-like structures.

Plate J

Well: UKCS 206/8-8 Interval: 2210 m – 2212 m

Lower Clair Group Unit I. III. Fine to medium well-sorted sandstone beds showing horizontal lamination and a distinctive 'crinkly lamination'.

Interpreted as aeolian sand-flat deposits, the 'crinkly' appearance resulting from wetting and drying of the depositional surface to produce adhesion-like structures.

Plate K

Well: UKCS 206/8-8 Interval: 2253 m 2254 m

Lower Clair Group Unit II. Pebble conglomerate and pebbly sandstone interbedded with coare-grained, cross-bedded sandstone.

Interpreted as the deposits of a pebbly to sandy braided river. Individual channel-full successions are commonly amalgamated but fining-up successions indicate channels approximately 3.5 m deep. The provenance is from the Lewisian basement throughout the Lower Clair Group

Plate L

Well: UKCS 206/8-8 Interval: 2305 m – 2307 m

Lower Clair Group Unit I. Fine-grained deposits with horizontal and wavy lamination overlain by granule to pebble conglomerate.

Interpreted as lacustrine facies: the conglomerate represents the deposits of a coarse fan-delta which prograded into a lake with relatively low energy sedimentation. Clasts in the conglomerate indicate a provenance from Lewisian basement rocks

Display B1 Plate A

Well UKCS 206/8-8

1701 m

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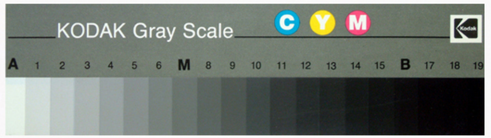
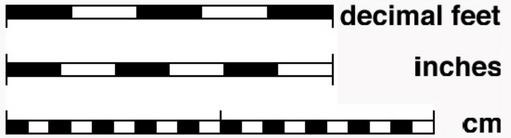
Colin Oakman (*Colin Oakman Associates*)





Display B1 Plate B

Well UKCS 206/8-8

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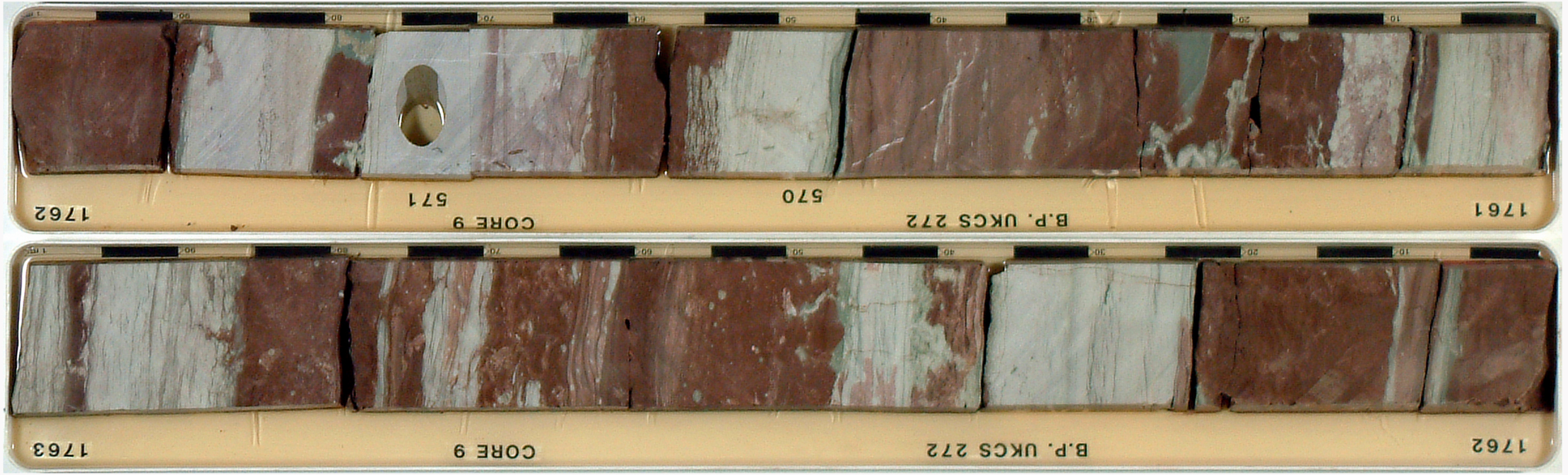
KODAK Color Control Patches
Blue Cyan Green Yellow Red Magenta White 3/Color Black

KODAK Gray Scale
A 1 2 3 4 5 6 M 8 9 10 11 12 13 14 15 B 17 18 19

decimal feet
inches
cm



1761 m

1762 m

Display B1 Plate C

Well UKCS 206/8-8

1784 m

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Display B1 Plate D

Well UKCS 206/8-8

1835 m

1836 m

1837 m

decimal feet

inches

cm

KODAK Gray Scale

KODAK Color Control Patches

Blue Cyan Green Yellow Red Magenta White 3/Color Black

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Display B1 Plate E

Well UKCS 206/8-8

1972 m

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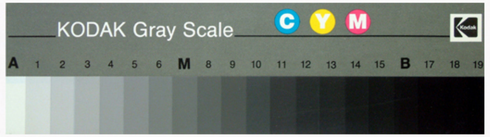

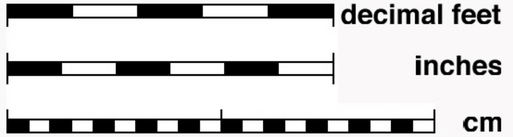

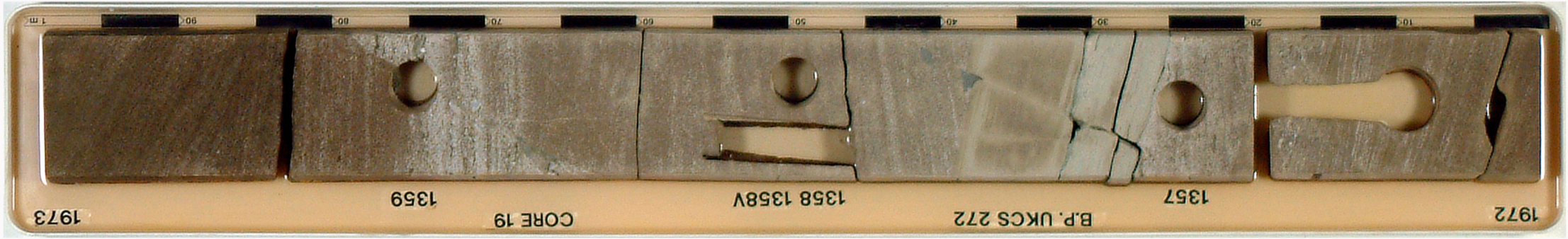

Display B1 Plate F

Well UKCS 206/8-8

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Display B1 Plate G

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2080 m

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Display B1 Plate H

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2165 m

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Display B1 Plate I

Well UKCS 206/8-8

2204 m

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Display B1 Plate J

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Display B1 Plate K

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2253 m

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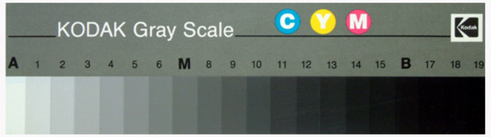

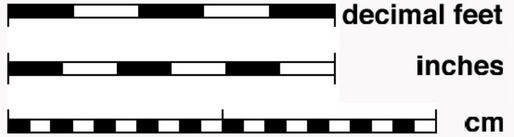

Display B1 Plate L

Well UKCS 206/8-8

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