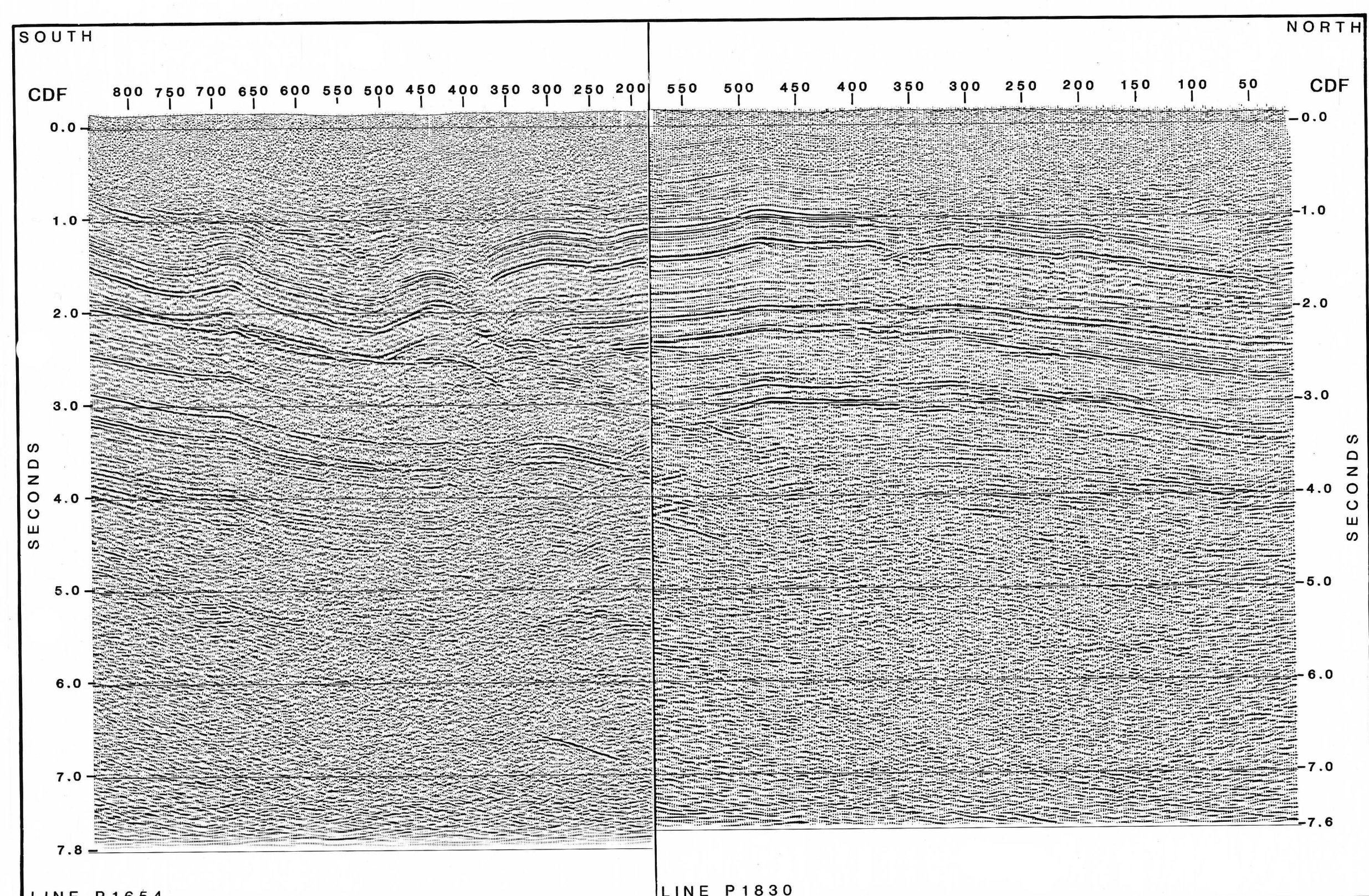
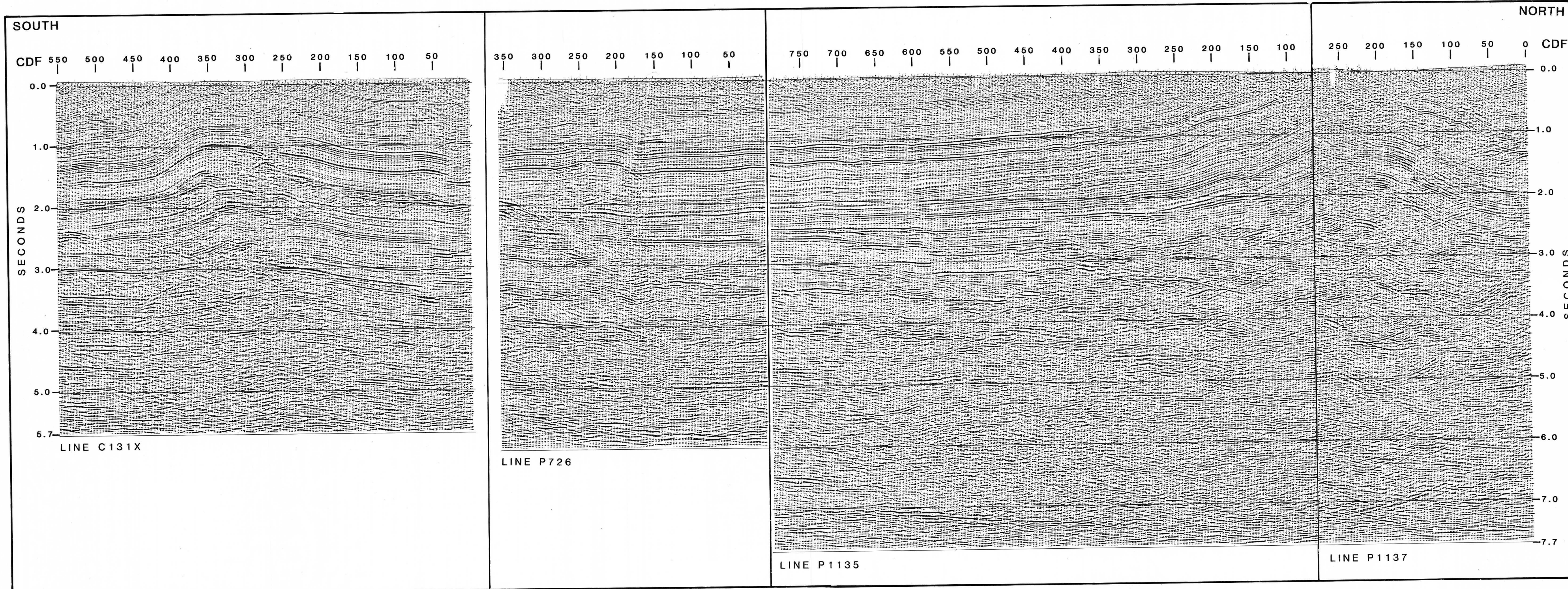


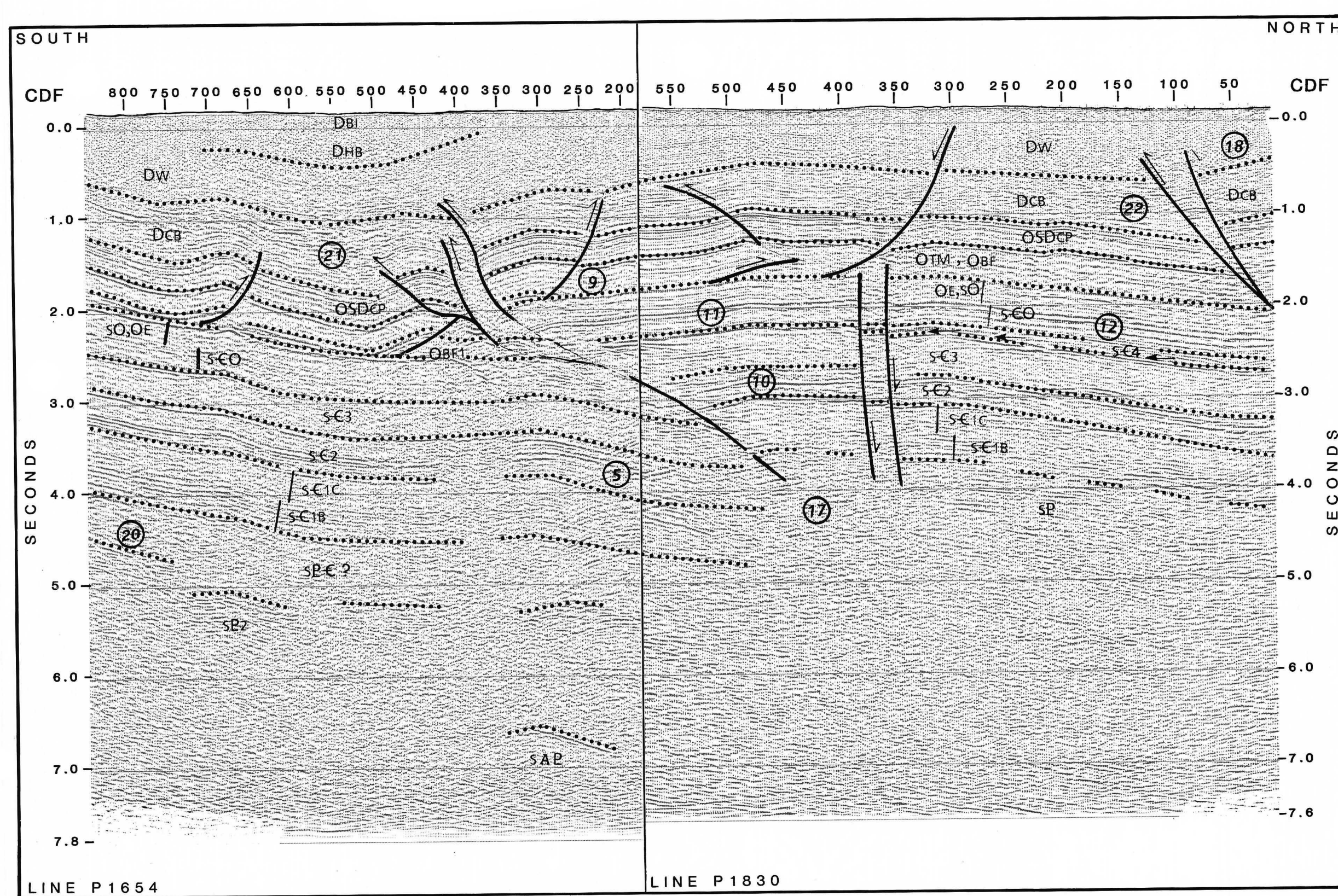
SEISMIC REFLECTION DATA



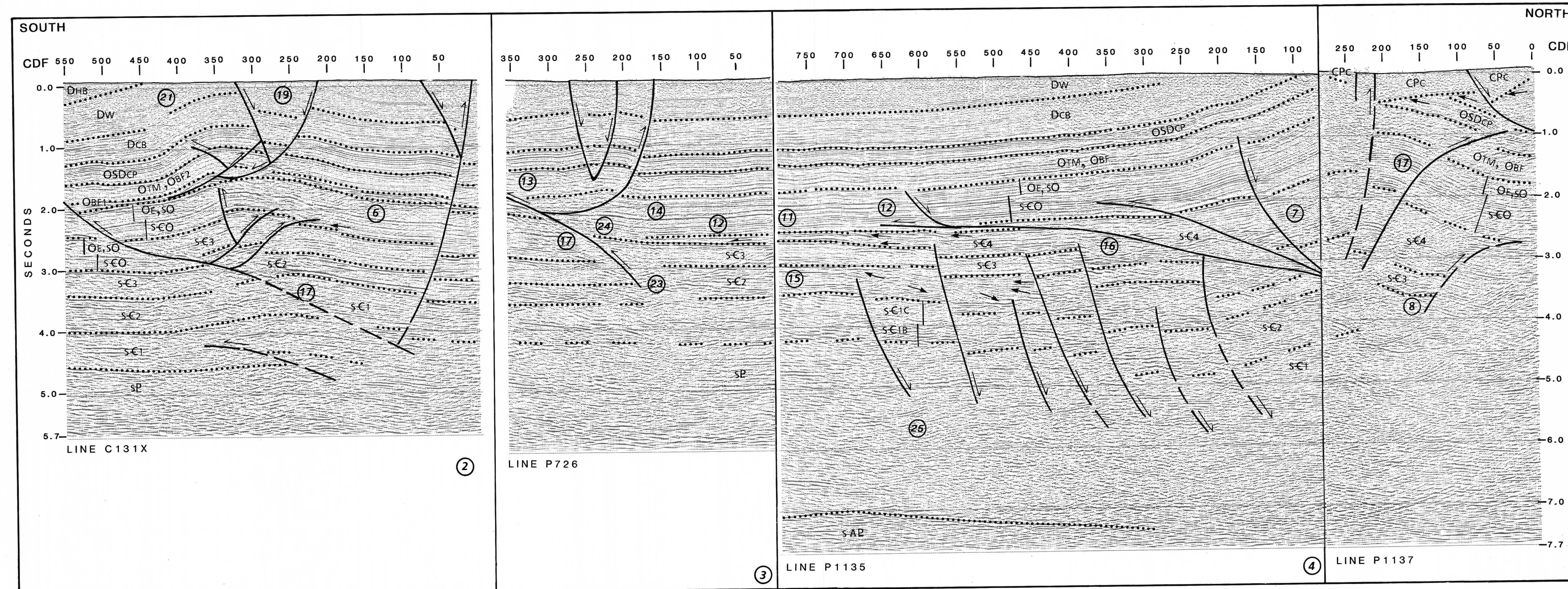
SEISMIC REFLECTION DATA



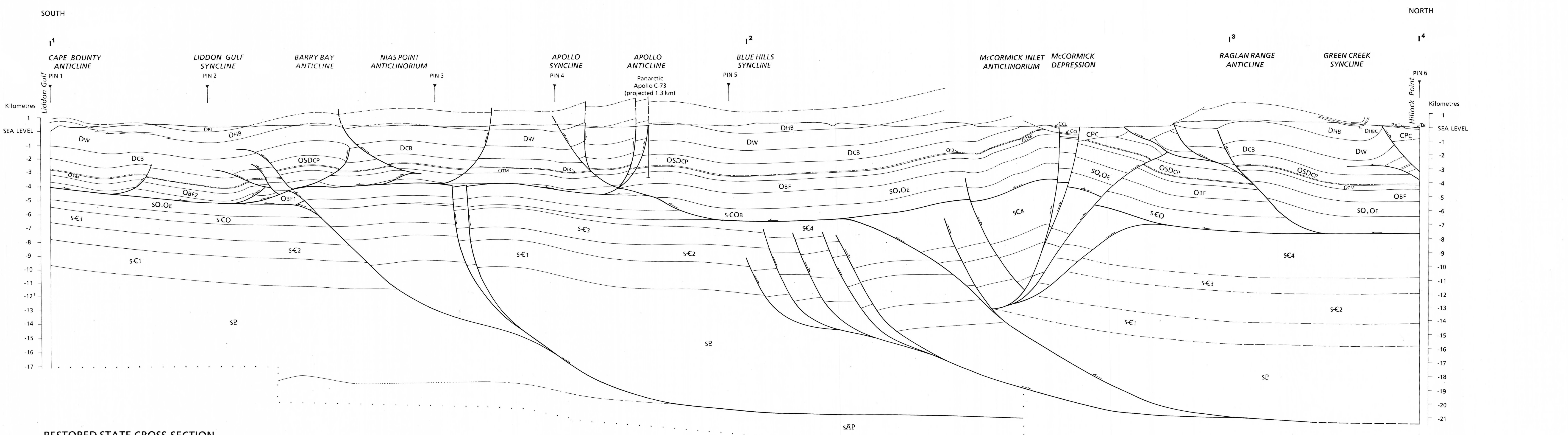
INTERPRETED SEISMIC DATA



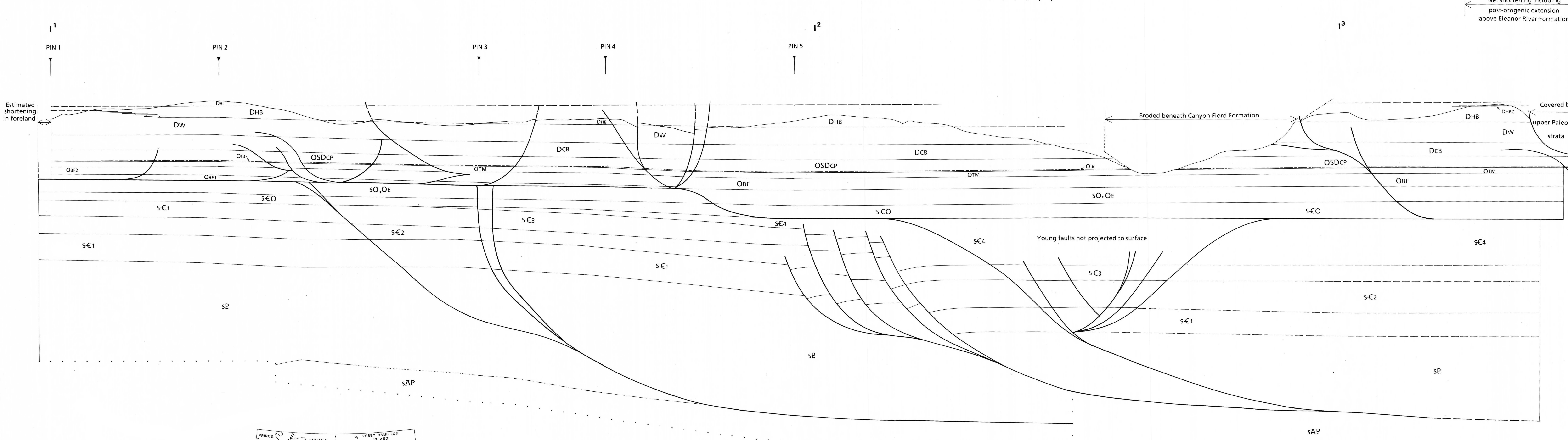
INTERPRETED SEISMIC DATA



DEFORMED STATE CROSS-SECTION



RESTORED STATE CROSS-SECTION



SECTION I
CAPE EDWARDS ON LIDDON GULF TO
HECLA AND GRIPER BAY NEAR HILLOCK POINT,
MELVILLE ISLAND
Scale 1:125,000

Location of structure sections and seismic profiles

Line of structure sections (with offset)

Seismic reflection profile (contoured)

Seismic reflector profile (contoured only)

NOTES TO ACCOMPANY SECTION I
(Lines P1654, P1830, C131X, P726, P1135, P1137)

Processing and Acquisition

- Lines P1654 and P1830 do not intersect. Splice is made where the two lines are closest. CDF 580 on P1830 is 3.8 km east and on strike from CDF 180 of P1654.
- Lines C131X and P726 do not intersect. There is a gap in the dip direction of 1.2 km between the ends of each line.
- Lines P726 and P1135 do not intersect. Splice is made where the two lines are closest. CDF 790 of P1135 is 8.6 km east and on strike from CDF of P726.
- Lines P1135 and P1137 do not intersect. Splice is made where the two lines are closest. CDF 285 of P1137 is 14.6 km west and on strike from CDF 65 of P1135.
- Residual diffractions obscure the primary signal at and below 3000 ms on both P1654 (CDF 180 to 300) and P1830 (CDF 475 to 575).
- Residual diffractions are common at the contact between the lower and upper Bay Fiord members (Oa1 and Oa2) between CDF 50 and 200 on C131X. This pattern is attributed to a gradual northwesterly facies change of evaporites to carbonates with diffractions generated at the southern terminations of carbonate beds. This suggestion is supported by the observation that the competent Oa2 carbonate unit thickens progressively to the north as the evaporites of Oa1 thin to zero.
- Residual diffractions mask some subhorizontal primary reflections below 1500 ms on P1135 (CDF 65 to 160).
- Over migration hyperbolae mask primary reflection segments below 3500 ms on most of P1137.

Seismic Stratigraphic Features

- Rapid thickening of the upper Bay Fiord interval (Oa2) and a parallel thinning to zero of Oa1 occurs north of CDF 350 on P1654 (see also note 6).
- Unit SC2 is interpreted to thin abruptly north of the fault at 3200 ms, below CDF 525, P1830. A similar phenomenon is observed north of the fault at 3000 ms below CDF 250, P1135 (see also note 24).
- There is a dramatic increase in the occurrence of strong semi-continuous internal reflections within unit SC2 north of CDF 250 on P726. This is accompanied by the appearance of a lowstand and transgressive unit at the base (SC4).
- Onlap patterns at the base of unit SC4 indicate the existence of a sequence boundary above SC4 (CDF 75 to 300, P1830, CDF 0 to 100 on P726, and CDF 525 to 700 on P1135; in the latter area, onlap and thickening of SC4 is paralleled by thinning (erosional truncation) of the top of underlying unit SC3).
- Impedance contrasts generated by the stratigraphic contact between carbonates of the upper Bay Fiord (Oa2) and evaporites of the lower Bay Fiord (Oa1) are absent in the subsurface north of the fault below CDF 325, P726. Disappearance of this reflector is attributed to replacement of the evaporites by carbonates across the fault.
- There is a profound change in the seismic character of unit SC1 and the Eleanor River (Oa) interval north of CDF 325 on P726. The upper reflection is substantially weakened (note 13); the unit thickens marginally and strong continuous parallel reflections dominate the internal reflection pattern.
- Unit SC2 contains northerly dipping sigmoidal clinoform reflections between CDF 710 and 400 on P1135. Onlap patterns have been identified at two locations on the upper surface of these clinoforms. This is taken to be evidence that southward, a sequence boundary may occur near the base of seismic unit SC2.
- Unit SC4 thickens dramatically northward on P1135. Thickening is associated with extensional growth faults that terminate upwards in this unit.

Structural Observations

- Contraction faults, originating from below the Bay Fiord interval, are a typical feature of the seismic lines of Section I. One of these faults, located below CDF 150, P1135, steepens downward. The attitude of other faults and their depth to detachment is uncertain. The model favoured here is that most contraction faults steepen downward. Other models, that would flatten these faults into one of several possible intermediate detachment levels, are rejected because the growth faults (CDF 200 to 600, P1135) apparently active during deposition of unit SC4, are not offset by the contraction faults that affect units as young as the Hecla Bay (Dw).
- Reflectors above the base of the Bay Fiord Formation, north of CDF 85, P1830, are correlated into the Panarctic Apollo C-73 well which is located 3.3 km to the north on the same structure.
- A good example of repeated slip on a common detachment occurs beneath CDF 325 on C131X. Both thrusts and normal faults merge into the detachment at the base of the Bay Fiord evaporites (Oa1).
- Tilt of the sub-SC1 reflector south of CDF 475, P1830, indicates involvement of Precambrian seismic units in deformation related to tilting.
- A good example of repeated slip on a common detachment occurs beneath CDF 325 on C131X. Both thrusts and normal faults merge into the detachment at the base of the Bay Fiord evaporites (Oa1).
- Tilt of the sub-SC1 reflector south of CDF 475, P1830, indicates involvement of Precambrian seismic units in deformation related to tilting.
- Apparent ductile behaviour of the Washwell (Dw) and Cape De Bray (Dca) formations is implied by thickness variations within these units south of CDF 375 on P1654, and south of CDF 400 on C131X.
- Minor folds, defined by the reflectors above the Thumb Mountain (Otm) and Cape Phillips (Oscp) formations below CDF 135 to 225, P1830, do not affect the reflector above the Eleanor River Formation (Oa). These folds have developed near the northwestern limit of obvious slip on the sub-Bay Fiord (Oa1) detachment.
- If the correlation is correct, the dramatic change in thickness of unit SC2 north of CDF 175 on P726 may be due to extensional growth faulting on a fracture that was subsequently reactivated as a reverse fault. It might also be possible to generate these patterns by a single phase of strike slip faulting.
- Divergence of reflectors and folding above the reflection at 2200 ms below CDF 225 on P726 is considered evidence for a local detachment near the base of unit SC1.
- Southerly dip of some deep reflections below 4800 ms (CDF 540 to 750) on P1135 is attributed to block rotation on listric extension faults (not shown) that flatten downwards into a detachment that must exist above a subhorizontal reflector at 7000-7300 ms.

Depth Conversion

- CPC: 3.7 km s⁻¹
Dw, Dca: 3.7 km s⁻¹ (south) - 3.8 km s⁻¹ (north)
Dca, Dw: 3.6 km s⁻¹
Oa2: 4.5 km s⁻¹ (south) - 4.7 km s⁻¹ (north)
Oa1: 6.4 km s⁻¹ (south) - 6.0 km s⁻¹ (north)
Oa1: 5.3 km s⁻¹
SC1: 5.7 km s⁻¹
below SC1: 6.2 km s⁻¹
- Method of Cross-section Construction and Restoration**
Bed length measurement and balancing of the contacts above SC4, SC3, Oa1, Oa2, Oa3, and OSCDP between adjacent pairs and sets of pin lines. Slip on the contact beneath Oa1 is assumed to be negligible north of Apollo Anticline.
Bed length measurement and balancing of the contacts above SC1, SC2, and SC3 between adjacent pairs and sets of pin lines.
Bed length measurement of the contacts above Dw (or Dw).
- Area measurement and restoration of Oa1, Dca, Dw, and Dca between pairs of adjacent pin lines**
This method assumes that horizontal shortening of units Oa1, Dca, Dw is the same as that expressed by bed lengths of contacts above Oa1-OSCDP.

Results

- Section length: 99.9 km
Post-extension extension: 1.5 km
Pre-extension section length: 99.9 - 1.5 = 98.4 km
Bed length of Otm (this section): 106.9 km
Shortening of Otm (this section): 106.9 - 98.4 = 8.5 km (8.0%)
Estimated shortening in foreland: negligible
Total shortening of Otm from foreland: 8.5 + 0.9 = 9.4 km (5.8%)
Bed length of Oa (this section): 106.8 km
Shortening of Oa (this section): 106.8 - 98.4 = 8.4 km (7.9%)
Estimated shortening in foreland: negligible
Total shortening of Oa from foreland: 8.4 km
Deformed state bed length of Dw (or Dw): 105.2 km
Apparent shortening of Dw (this section): 105.2 - 98.4 = 6.8 km (6.5%)
Estimated apparent shortening in foreland: negligible
Total apparent shortening of Dw from foreland: 6.8 + 0.2 = 7.0 km (4.4%)
Range of assumed tectonic thickening of Dw-Dca: 2 - 4%
- *Foreland shortening is estimated from unmigrated seismic lines of Dundas Peninsula.

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