NORTHERN ROCKY MTN TRENCH
- E. MARGIN OF INTERMONTANE BELT

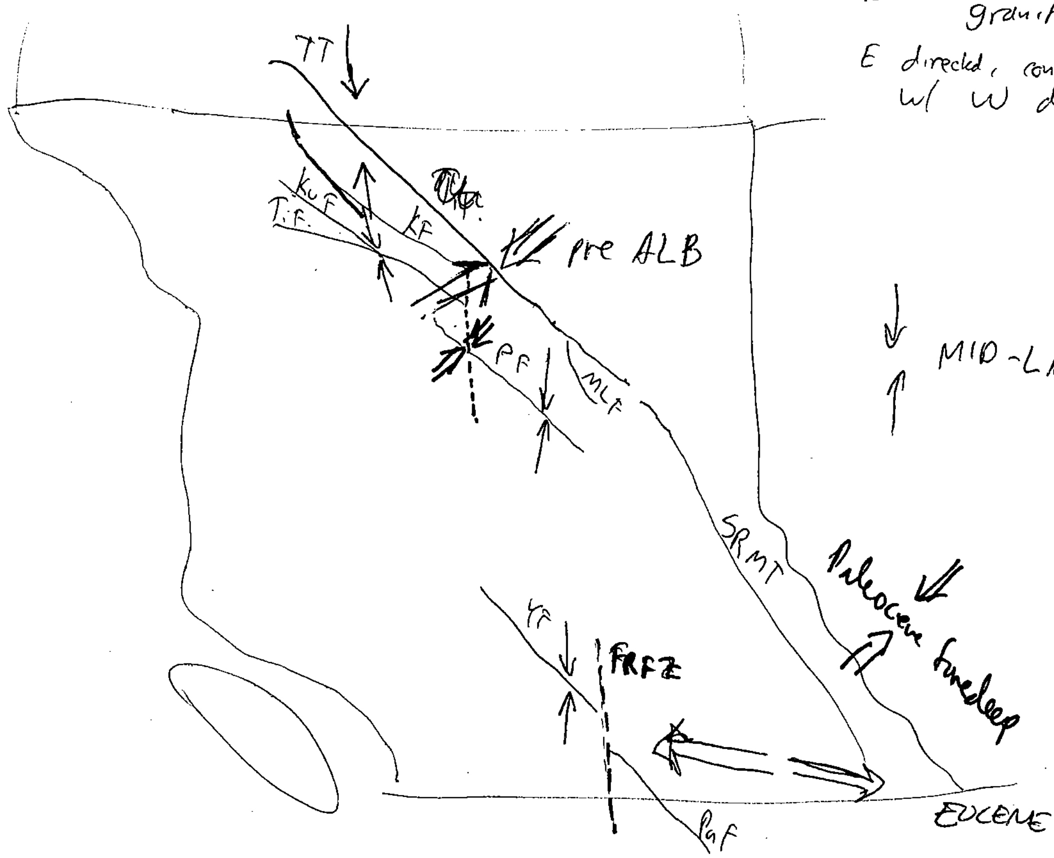
MID-K to Early Cz (EOCENE) : TRANSCURRENT MOVEMENT 750 to >900 km
MOVEMENTS RELATED TO PLUTONISM, VOLCANISM, LAMPROPHYRE DIKES, HIGH HEAT FLOW
SED. IN GRABENS, RAPID UPLIFT OF NW TRENDING RIDGES

IN OMINECA XLINEBELT
~100 my, 70my 50my climactic episodes
of granite emplacement
because of changes from compressional to transional/tensional strain

MAJOR LINEAMENTS SHOW LATE NORMAL FAULTING
but are earlier TRANSCURRENT FAULTING

M.

Geol.
W part of Cord orogen
Omineca Xline Belt
- dextral offset slice of orogen (W of NRMT)
BASEMENT:
granitoid gneiss + lower Pz strata
E directed, continuous thrusts & folds
w/ W dipping axial surfaces



TT = TINTINA TRE
NRMT/SRMT N R MTN TRENCH
K = Kechika
Ku = Kutcho
T = Thibert
F = Finlay
P = Pinchi
ML = McLoed Lake
Y = Yalakom
FRFZ = Frazier River
Pa = Pasayten

PRICE, R.A., 1986, JOUR. STRUCT. GEOL., V. 8, 239-254

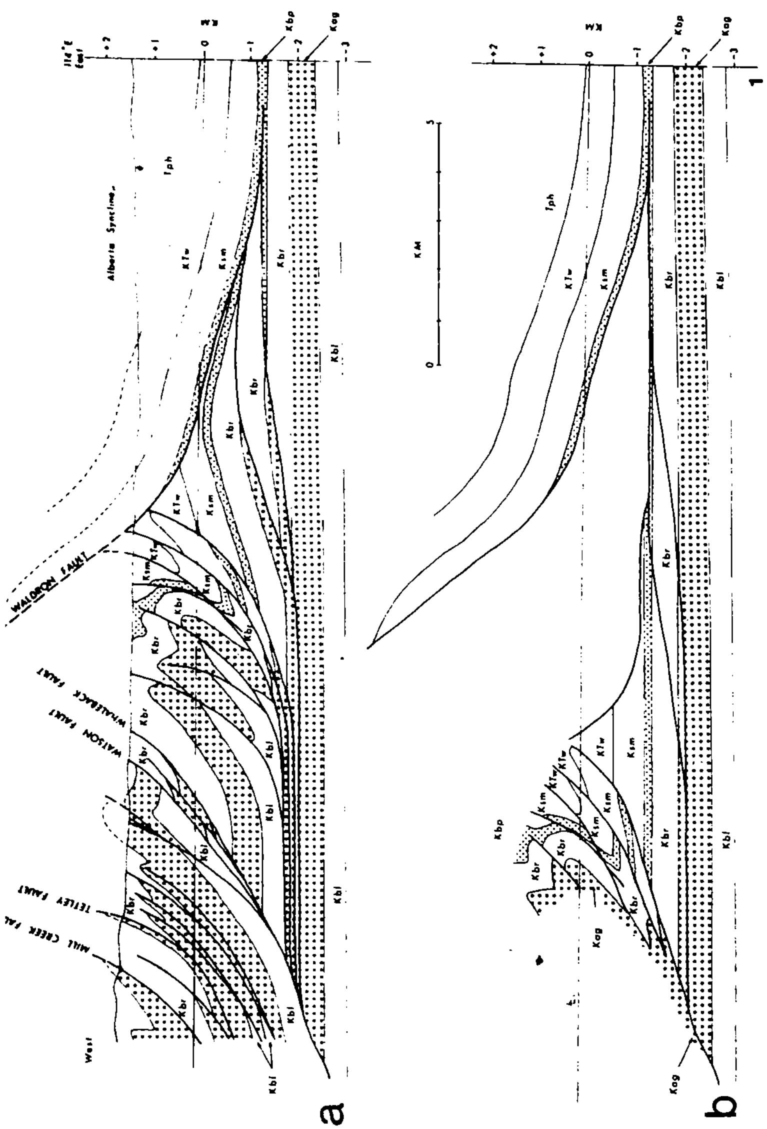


Fig. 3. Tectonic wedging and delamination along the eastern edge of Cordilleran foreland folding thrust belt at 49°, 45' North latitude (after Price 1981). (a) Balanced structure section; (b) partial palinspastic restoration. For location of section see line 1 in Fig. 4. Stratigraphic units are identified as follows: Kbl, Blairmore Group; Kag, Alberta Group; Kbr, Belly River Formation; Kbp, Bearpaw Formation; Ksm, St. Mary River Formation; KTw, Willow Creek Formation; Tph, Porcupine Hills Formation.

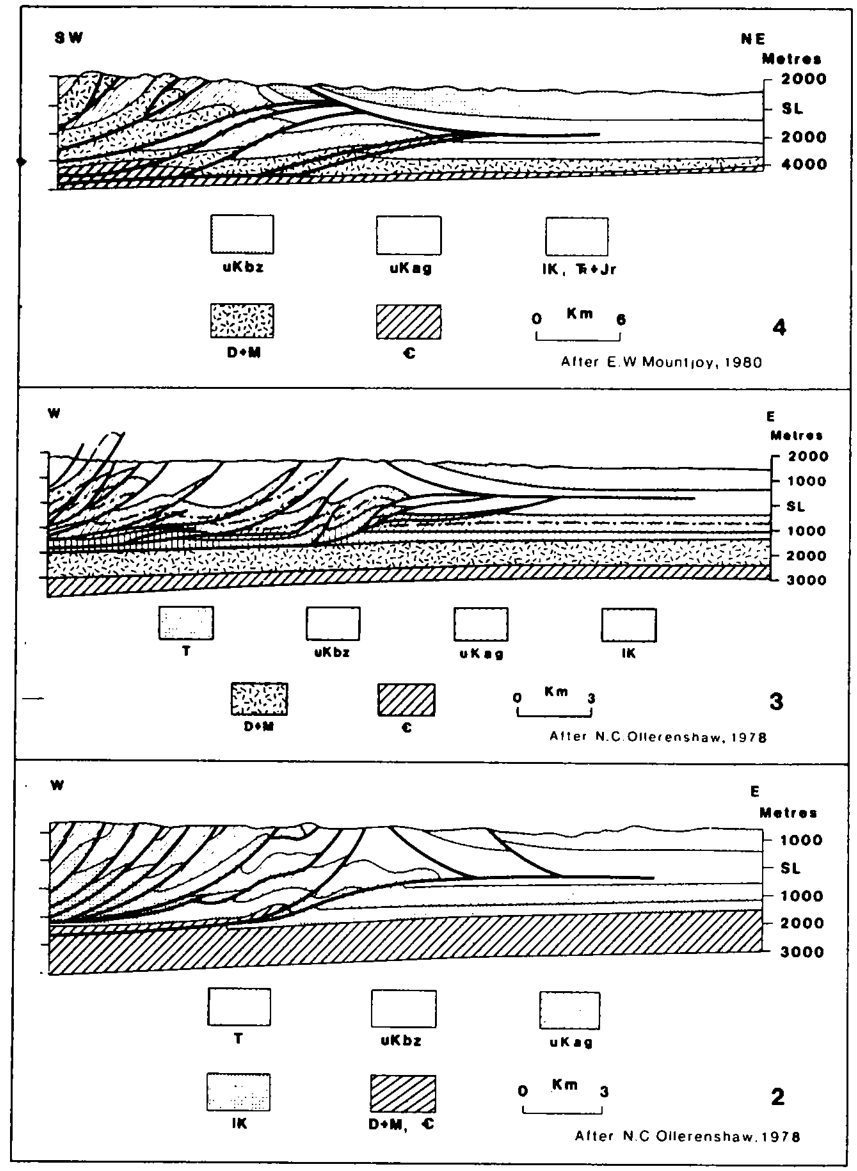


Fig. 5. Tectonic wedging and delamination along the eastern edge of the Cordilleran foreland thrust and fold belt in the southern Canadian Rockies. For location of sections see lines 2–4 in Fig. 4. Stratigraphic units are identified as follows. Section 2: T, Tertiary units, undivided; uKbz, Brazeau Formation; uKag, Alberta Group; lK, lower Cretaceous units undivided; D + M, Є, Devonian, Mississippian and Cambrian units, undivided. Section 3: T, Tertiary units, undivided; uKbz, Brazeau Formation; uKag, Alberta Group; lK, lower Cretaceous units, undivided; D + M, Devonian and Mississippian units, undivided; C, Cambrian units, undivided. Section 4: uKbz, Brazeau Formation; uKag, Alberta Group; lK, Tr + Jr, lower Cretaceous, Triassic and Jurassic units, undivided; D + M, Devonian and Mississippian units, undivided; Є, Cambrian units, undivided.

J.P. Platt, 1986, GSA Bull., v.97, no.9. p. 1037-1053.

can. As the latter are among the oldest known Franciscan rocks, it is unlikely that they were overlain by previously accreted material. They must almost certainly have been subjected to high-P metamorphism as a result of being carried beneath the leading edge of the American plate; that is, the Coast Range ophiolite and the underlying mantle. The ophiolite remains. We must account for 25–30 km of more or less serpentinized peridotite that originally lay beneath it.

Uplift by Underplating and Extension

The model discussed here and illustrated in Figure 6 is a variant of the generalized model for a subduction complex described in the previous section. The main difference is that the earliest stages of subduction involved underthrusting deep beneath the ophiolitic leading edge of the American plate (Fig. 6A). I postulate that this became fully involved in the extension caused by underplating and destabilization of the wedge, so that fragments of ophiolite and underlying mantle rocks, bounded by normal faults, became dispersed within the Franciscan (Fig. 6B). This suggests an alternative interpretation of the relationship between the Coast Range ophiolite and the Franciscan. They were originally juxtaposed along a Late Jurassic thrust (the subduction zone, in fact), but most of the present contacts are low-angle normal faults formed at a later stage which brought high-level ophiolitic rocks against originally deep-seated Franciscan. This explains the paradoxical nature of the Coast Range "thrust," which may in fact be a composite of late extensional faults and the offset and reactivated early thrust surface (Fig. 6B).

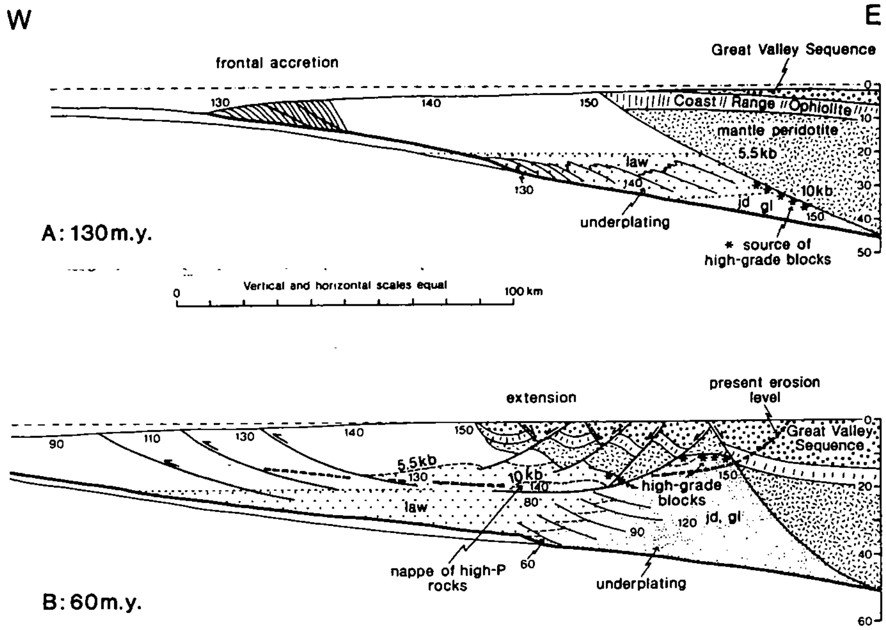


Figure 6. Tectonic evolution of the Franciscan Complex, California. A. Early Cretaceous. High-P/low-T metamorphism took place in sediment subducted beneath the leading edge of North America (represented by the Coast Range ophiolite and the underlying mantle wedge). Amphibolite, eclogite, and high-grade blueschist formed a metamorphic sole beneath the peridotite; this provided the source for Franciscan high-grade blocks. B. Early Tertiary. Underplating and resultant extension have stretched the mantle wedge (now partly serpentinized) together with the overlying ophiolite and fore-arc basin sediments (Great Valley Sequence). As a result, most of the contacts between ophiolite and Franciscan are low-angle normal faults. The high-P rocks have risen within reach of subsequent erosion and have been transported laterally over younger, lower-P rocks. High-grade blocks were dispersed by extensional faults. g = glaucophane, jd = jadeitic pyroxene, law = lawsonite. Approximate ages of sediment in different parts of the complex are shown in millions of years before the present in order to illustrate the pattern of material circulation. Note that the present-day erosion level is 10–20 km below the original upper surface of the prism.

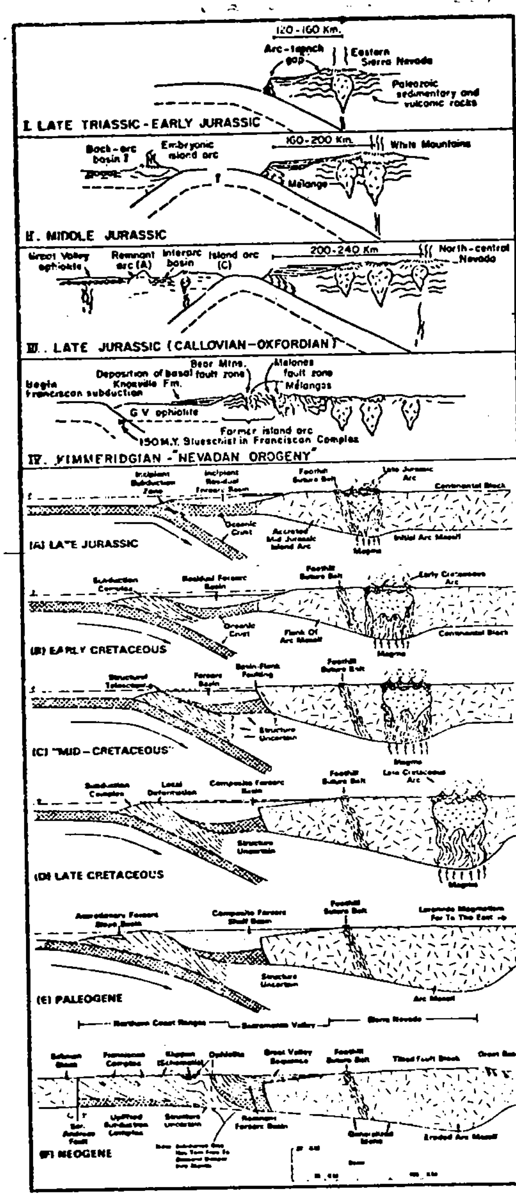


Figure 3. Schematic cross sections of northern California during Mesozoic and Cenozoic from formation of Coast Range ophiolite behind an east-facing intraoceanic arc (III) to termination of Great Valley forearc by conversion to transform margin (F). A-F are true-scale drawings, whereas I-IV are more schematic. Also, notice that reference point shifts from IV to A. Structural telescoping is depicted here arbitrarily as a discrete mid-Cretaceous event, but doubtless occurred over some finite span of Cretaceous time. Plus and minus symbols indicate motion on San Andreas fault zone (F). See text for discussion. (From Dickinson and Seely, 1979 (A-F); and Schweickert and Cowan, 1975 (I-IV).)

Ingersoll & Dickinson (1981)