Cretaceous system of South America

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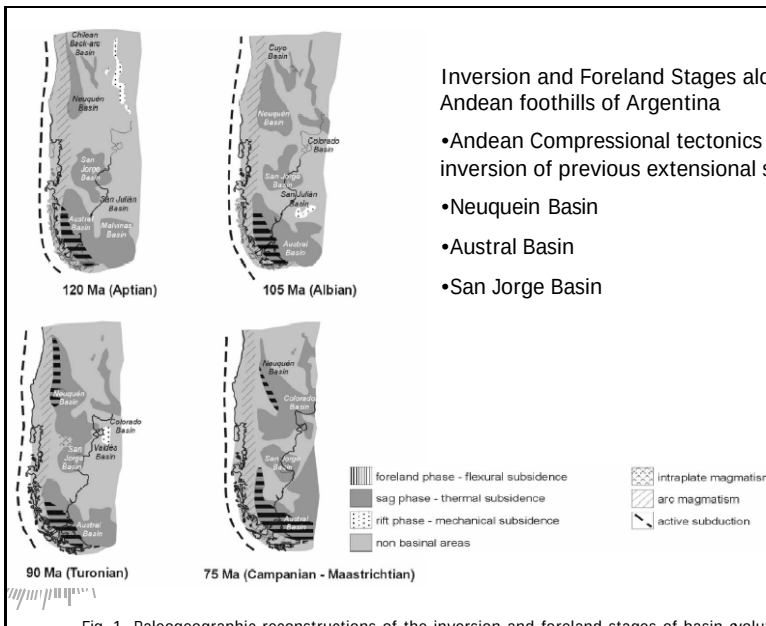
2-11-04

Five Diastrophic Phases

- Between Late Jurassic and the Late Cretaceous
  - The Araucanian Phase
    - General uplift in central-west Argentina
  - The Catan Lil Phase
    - Unconformity, related to eustatic fall of Sea level
  - The Avile Phase
    - Conspicuous sandstone levels within the Agrio fm of The Neuquen Basin
  - The Mirano Phase
    - Andean uplift
    - Ended marine sediment, initiated continental sedimentation
  - The Laramic or Early Magallenian Phase
    - Angular unconformity on the Upper Cretaceous and the lower Tertiary volcanic sedimentary units



Inversion and Foreland Stages along the Andean foothills of Argentina

•Andean Compressional tectonics caused inversion of previous extensional structures.

•Neuquein Basin

•Austral Basin

•San Jorge Basin

Fig. 1. Paleogeographic reconstructions of the inversion and foreland stages of basin evolution.

Paleogeography of the Cretaceous

- Berriasian-Hauterivian (122-144Ma)
- Berremian-Cenomanian(93.5-127 Ma)
- Turonian-Campanian (71.3-93.5 Ma)
- Maastrichtian (65-71.3 Ma)

BERRIASIAN-HAUTERIVIAN 127-144Ma

- Sedimentary patterns within the Andean Basin were related to Episodic development of two distinctive volcanic arcs with intra-arc subbasins
- Western belt of the Andean Basin, a volcanic pile 5,000-8,000km thick was formed
  - Andesitic flow Breccias (Upper Part)
  - Basalt flows (Lower-middle parts)
- Argenina and Bolivia – tectonism gave rise to a block structure with NW/SE and NE/SW fractures

BARREMIAN-CENOMANIAN 93.5-127Ma

- Magmatic arc of Andean basin
  - Eastward migration
- Initial uplift of the Cordillera Principal of Argentina and Chile
  - Caused complete reversal of regional slope
  - Continental basins were developed on the site of the back-arc basin

TURONIAN-CAMPANIAN
71.3-93.5Ma

- Uplift of the Western areas of Central and Northern Chile
- Thick volcanic sequences were deposited to the west and east of the Abanico Paleovolcanic Range
- Near shore and continental sediments deposited
  - Widespread presence of red beds

MAASTRICHTIAN
65-71.3Ma

- Continental basins of central and northern Chile disappeared due to folding and uplift
- Volcanism was still present in most areas
- Small fore-arc basins were developed along the western margin of the Principal Cordillera
- Cratonic subsidence produced continental sedimentation on a broad stable platform
  - End of Cretaceous General uplift resulted in new erosion cycle

The Logos La Plata and Fontana Thrust Belt

- Thermal subsidence was suddenly interrupted by orogenic uplift in the middle cretaceous
- 130-120 Ma- the volcanic front migrated to the foreland for the first time since the breakup of Gondwana
- 120 ma- The southern Atlantic ocean opened triggering the westward drift of the Patagonian block
- The Cordillera Patagonica

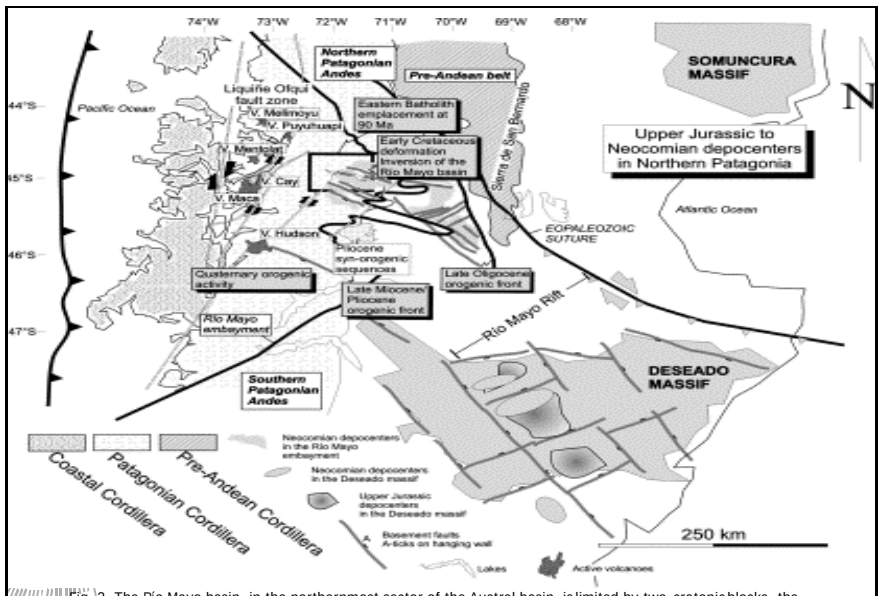


Fig. 2. The Río Mayo basin, in the northernmost sector of the Austral basin, is limited by two cratonic blocks, the Somuncura and Deseado Massifs. Its western half is filled by marine sediments, its eastern half by continental to littoral deposits. The main pulses of orogenic growth are labeled on the basis of synorogenic deposits and fission-track data. The trend of Neocomian depocenters follows the proposed early Paleozoic suture between the two cratons

RIO Mayo Embayment

- The westernmost part of the Patagonian Batholith correlates with the opening of the RIO Mayo embayment 140-125Ma
- Extentional topography mostly filled by nonmarine volcaniclastic and cratonic-derived sediments
- Neocomian Depocenters connected by major W-NW trending horsts and grabens segmented by NE trending Normal faults

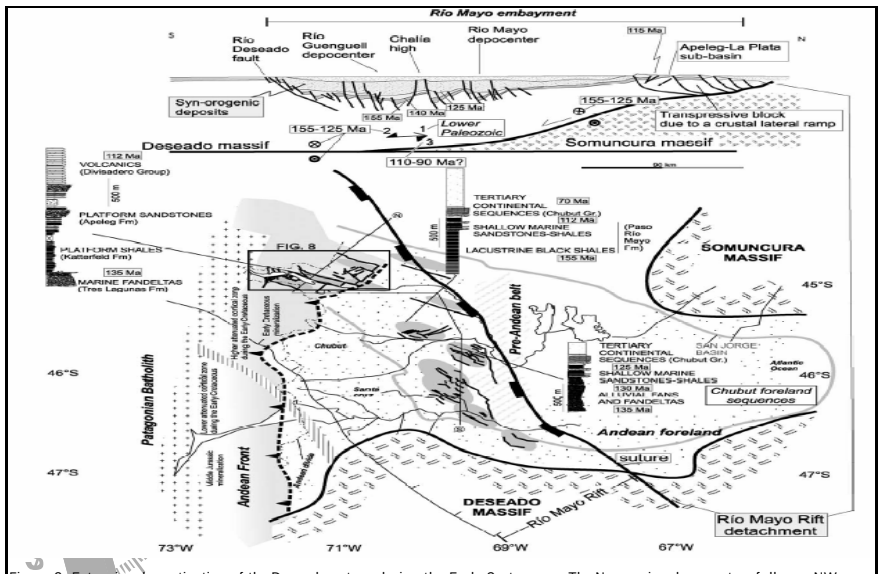
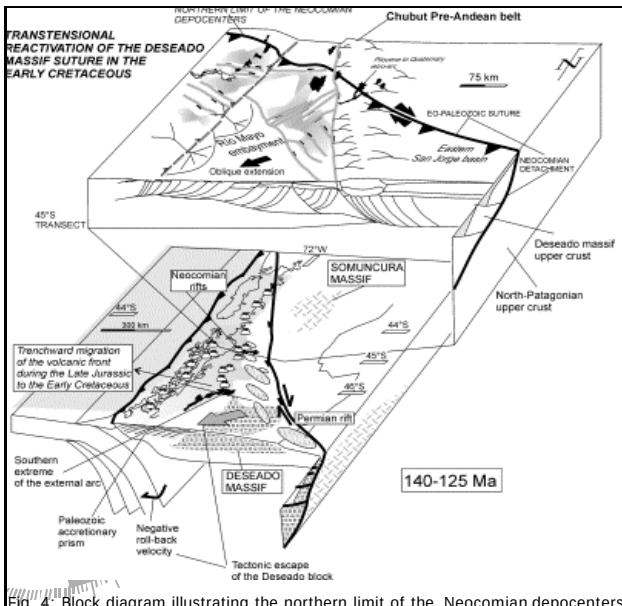
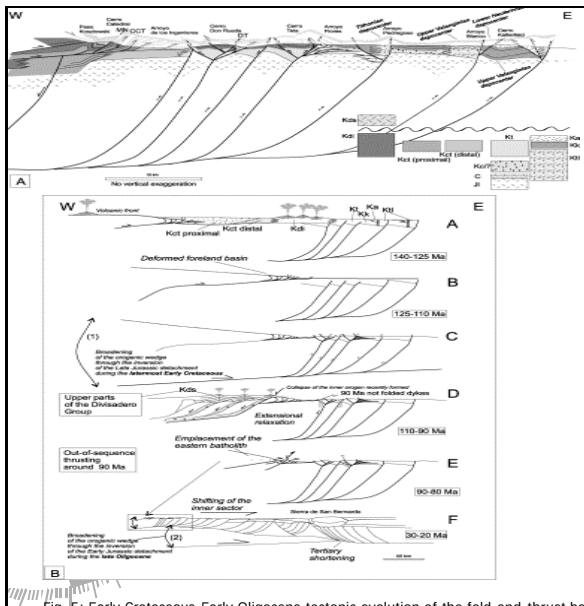


Figure 3: Extensional reactivation of the Deseado suture during the Early Cretaceous. The Neocomian depocenters follow a NW–NNW trend. A series of small depocenters crops out in the Apeleg-La Plata area west of the region at the Andean front. The eastern depocenters are deeply buried beneath Barremian–Albian and Paleogene sedimentary sequences. During the Cretaceous, these depocenters were inverted as a regional lateral ramp. The profiles of the western depocenters were taken from Strelkovet al. (1994). The profile and mapping of the eastern depocenters were modified from Figari et al. (1996).



- Reactivation of the Deseado Massif suture in the Early Cretaceous
- Necomia Depocenters
- Necomian Rifts
- Trenchward Migration of the volcanic front

Fig. 4: Block diagram illustrating the northern limit of the Neocomian depocenters and their relation to the Late Jurassic–Early Cretaceous rift controlled by an Eo-Paleozoic suture at the northern edge of the Deseado Massif

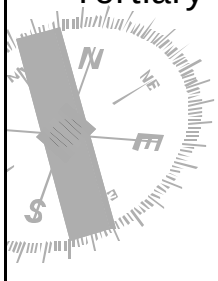


- 125-110 Ma - Deformed Foreland basin
  - Broadening of the oregenic wedge
- 110-90 Ma – Collapse of inner orogen
  - Extensional relaxation
- 90-80 Ma emplacement of eastern batholith
  - Out of sequence thrusting ~ 90Ma

Fig. 5: Early Cretaceous-Early Oligocene tectonic evolution of the fold-and-thrust belt at 45°S in the form of an unbalanced structural section at the southern margin of the Lagos La Plata and Fontana Formations.

Conclusions

- Thrusting that began in the end of the cretaceous strengthened into the Cenozoic
- The Andean Orogeny continued into the Tertiary where it reached its present altitude



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