

Paleomagnetic data vs. geological evidence: a dive into the Baja British Columbia hypothesis

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Abstract

The timing and amount of movement of terranes in the Cordilleran orogen of western North America remain controversial despite over half a century of research. The area known informally as “Baja British Columbia” is at the forefront of the controversy. Baja BC consists of an insular superterrane that includes the Wrangelia and Alexander terranes, an intervening volcanic arc known as the Coast Plutonic Complex, and an intermontane superterrane. Paleomagnetic data from the insular and intermontane superterranes indicate that the rocks in Baja BC were located ~1500 – 4000 km south of their current location relative to the continental craton during the late Cretaceous and early Cenozoic, placing them in a location coinciding with present-day Baja California. The paleomagnetic data have been tested against ages from detrital zircon in sedimentary rocks from the Nanaimo Basin of the insular superterrane and those results suggest that basin sediment was sourced from the Mojave-Sonoran region, which is adjacent to Baja California, supporting the paleomagnetic data. However, geological evidence from faults in the region do not support such large-scale displacements (>1500 km), instead pointing to a more northerly origin for these tectonic entities. Reconstructions to restore displacements within major Late Cretaceous to Cenozoic contractional and extensional belts, as well as restoring displacement along major dextral strike-slip faults of the northern Cordillera, indicate total displacement from ~450 – 1000 km, a large discrepancy compared to the paleomagnetic data. Consensus has not yet been reached, and it is likely that more tectonic modelling and investigations of detrital zircon grains from various basins surrounding the terranes will help to determine the displacement of Baja BC.