

# Geologic reconnaissance of the Pre-Late Jurassic Basement: Patagonian Andes

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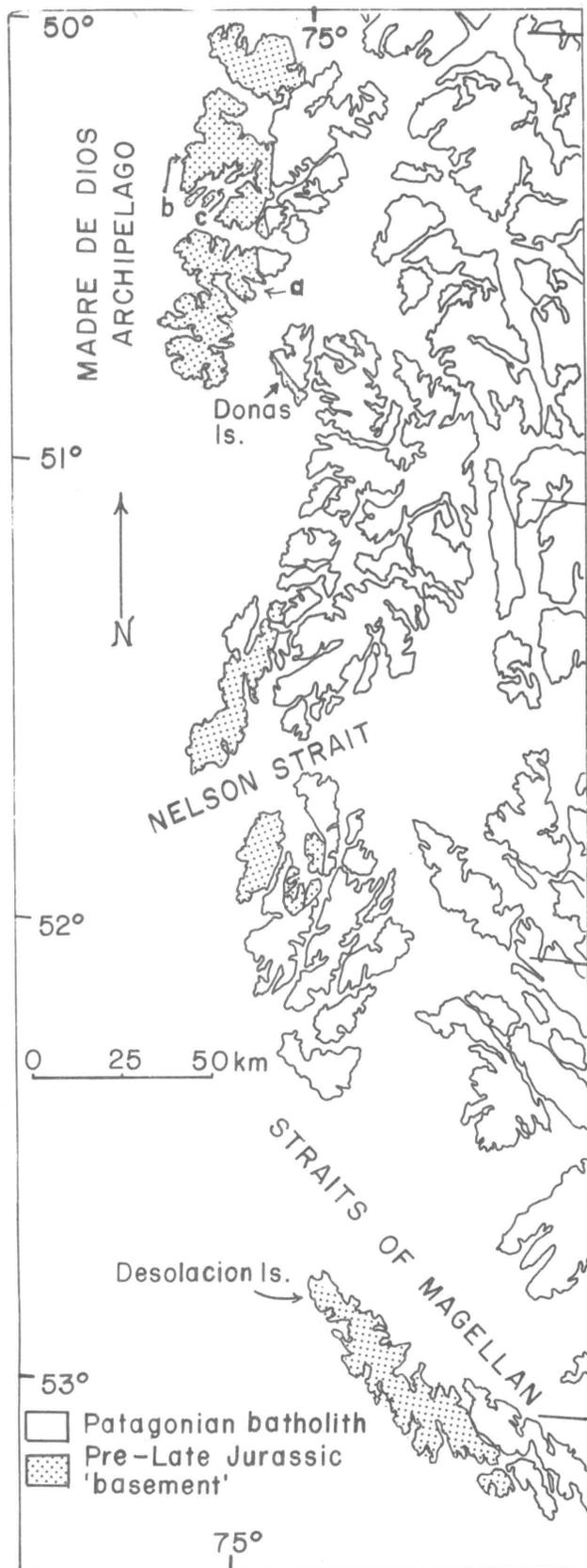
Over 3 months of field work have been done to define the regional geologic framework of the Pre-Late Jurassic basement exposed along the outer perimeter of southernmost Chile. This work has been carried out through the R/V *Hero* cruise 76-5, and more recently through the logistical support of the limestone quarry operated by the Compañia de Acero del Pacifico within the region of concern. These investigations were part of the continuing study of the structural and tectonic history of the Scotia Arc supported by the National Science Foundation. (See, for example, Dalziel *et al.*, 1975; Dalziel, 1975.)

The Pre-Late Jurassic basement forms an almost continuous belt of exposure from 47°S. to 54°S. along the outer belt of islands that comprise the southern Chilean archipelago (see figure). The islands containing basement exposures that have thus far been investigated are Desolacion, Donas, Madre de Dios, and Duque de York.

*Desolacion Island.* Over 90 percent of the basement within this region is composed of a monotonous sequence of alternating conglomerate, sandstone, and shale, all generally immature and containing many graded units of turbidite character. Tectonically emplaced into these clastic sediments are lenticular bodies of red and green rhythmically bedded chert.

Structurally the flyschoid and chert units exhibit an extreme parallelism between bedding and cleavage, usually striking northwest and dipping variably to the southwest. The discontinuous nature of the chert and clastic units together with the cleavage-bedding relationships suggest massive imbrication and thrusting on an inter- and intraformational scale.

*Madre de Dios, Duque de York, and Donas Islands.* As a result of detailed investigations carried out in this region, a geologic



Pacific perimeter of southern Chile between latitudes 50° and 53°. Islands investigated were Duque de York ("a" on map), Desolacion, Doñas, and Madre de Dios ("b" on map). Limestone quarry located at "c."

map for these three islands at a scale of 1:100,000 is close to completion. Many new discoveries have been made to add to the previous work in this region (Oppinger, 1883; Biese, 1945; Mordojovich, 1953; Cecioni, 1956; Douglass and Nestill, 1976; Dalziel, 1975). Probably the most important discovery is the occurrence of over 20 bodies of a basalt/chert/shale/limestone association that are for the most part in thrust contact with the other two dominant lithologies in the region, these two being (1) a massive fusulinid-bearing limestone of Carboniferous to Permian age (Mordojovich, 1953; Douglass and Nestill, 1976) and (2) a monotonous sequence of conglomerate, sandstone, and shale similar to those on Desolacion Island. In 3 of the 20 localities stratigraphic relationships among the basalt/chert/shale/limestone association have been preserved. Massive pillow basalt with interstitial red and purple manganiferous chert is overlain by a sequence of red ribbon chert. The red chert consistently passes upward into a sequence of green ribbon chert. Within both red and green cherts, radiolaria and fine turbiditic structures occasionally are visible. The green chert can be seen in transitional contact with thinly bedded limestones in at least three localities. In one of the three localities, the limestone contains a fusulinid-bearing zone. This suggests a late Paleozoic age for the basalt/sediment association. The sequences of conglomerate, sandstone, and shale commonly contain zones of soft sediment deformation, olistostromes, and cleavage-bedding relationships similar to those observed in Desolacion Island. Conglomeratic horizons contain many clasts of silicic volcanics, occasional clasts of limestone, and many angular sandstone and shale clasts.

Structurally the region is more complicated than the Desolacion area and cannot be adequately synthesized here. Structural domains of both consistent fabric characteristics and consistent orientation are generally relatively small, perhaps less than 25 square kilometers on the average.

*Regional Synthesis.* The presence of (1) pillow basalts overlain in sequence by red chert, green chert, and limestone, (2) immature clastic sequences containing clasts of felsic/silicic volcanics, turbidite intervals, and soft sediment deformation features, (3) tectonic melanges, and (4) zones of small- and large-scale crustal imbrication as well as complicated discontinuous folds, corroborate the hypothesis suggested earlier that this region represents a fore-arc, arc-trench-gap assemblage of late Paleozoic to early Mesozoic age (Barker *et al.*, 1976; Dalziel, 1975; Dalziel, in press; de Wit, 1977; Suárez, 1976).

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