Abstracts

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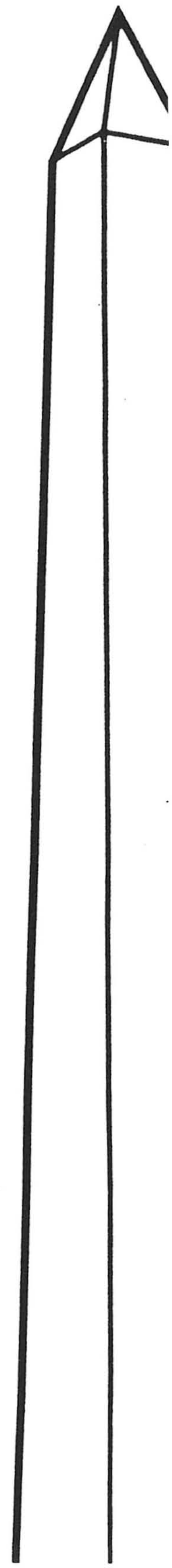

inputs coming from higher ground beyond the Latrobe Valley edges. As a result, the peat swamps became stabilized for long periods of time and have produced thick brown coal seams containing under 5% ash. Nutrients were brought into the coal swamps via lateral diffusion from the lakes and by rising groundwater from the underlying aquifer systems of the Traralgon Formation.

Towards the central parts of the Latrobe Valley, thin brackish-marine silts are recognized within the terrestrial sequence of the Morwell and Yallourn Formations, and these grade laterally eastwards into the marine deposits of the Seaspray Group. The marine equivalents of the Traralgon Formation lie further east beyond the Latrobe Valley limits, beneath Bass Strait.

In late Tertiary times, the brown coal-bearing strata in the Latrobe Valleys, were folded, planated by erosion, and covered by a "sheet" of Pliocene–Pleistocene fluvial gravels, sands, and clays. The major folds are monoclines.

The Latrobe Valley coals can be classified as soft brown coal. Their high moisture content (range 48% to 70%) and therefore low specific energy (net wet specific energy range 5.8 to 11.5 MJ/kg) makes the coal a low-grade fuel. There is a wide relative change in physical and chemical properties both laterally and vertically across the Latrobe Valley. The ash levels in brown coals throughout the valley are generally less than 5% dry basis.

The total brown resource in the on-shore Gippsland Basin is estimated as 394,000 million tonnes; approximately one-third of this coal is classified as demonstrated and the remainder as inferred. The latest published reserve estimates for the Gippsland Basin are 98,000 million tonnes total, with some 33,000 million tonnes excluded for town reserves, etc., giving a balance of 65,000 million tonnes of available brown coal. The general reserve criteria are an overburden/coal ration of less than 2:1 with a minimum seam thickness of 3 m and a 300 m depth cut-off limit. Economic reserves with a minimum seam thickness of 15 m and a 90 m depth cut-off have been defined at approximately 44,000 million tonnes.

Brown Coal production by the SECV, from all Latrobe Valley Open Cuts between 1923 and June 1988, amounts to approximately 1000 million tonnes.

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Isotopic studies and Tectonic Setting of Late Proterozoic Granites of South Brazil

The Dom Feliciano Belt (DFB) is the major geological feature in the Precambrian areas of South Brazil and Uruguay. In the State of Santa Catarin, it shows a northeast-southwest trend with clear vergence toward the northwest. Two paired internal domains can be recognized: the northwestern schist belt and the southeastern granitic belt, which are separated by the Major Gercino Shear Zone that thrusts the granitic belt over the schist domain.

The granitogenesis in the schist belt is related to the major metamorphic event and was emplaced later on to the second deformational phase. Three granitic suites can be identified: (1) Valsungana Suite (V), coarse biotite-microcline monzo to sienogranite; (2) Nova Trento Suite (NT), medium-sized biotite (muscovite) grey granite; (3) Sao Joao Batista Suite (SJB), medium-sized muscovite-feldspar leucogranite, with biotite, garnet, and tourmaline subordinate.

All the granites in the schist belt are slightly deformed to isotropic and show an important metamorphic aureole contact. Their ages are close to 650 ± 50 Ma (U-Pb in zircons, Rb-Sr and K-Ar). $Nd_{(DM)}$ isotopic studies in the Valsungana granite and on two mica schists show 2000 Ma age.

In the granite belt, three major granitic suites can also be recognized: (1) Santo Amaro da Imperatriz Suite (SAI), highly deformed quartz monzonite; (2) Sao Pedro de Alcantara Suite (SPA), slightly deformed quartz diorite to monzogranite; (3) Pedras Grandes Suite (PG), an isotropic pink alcali granite.

Ages ranging from 650 to 500 Ma on Rb-Sr, U-Pb in zircons, and K-Ar methods were obtained. The model $Nd_{(DM)}$ ages in whole rock composites for SPA, SAI, and PG suites fall in the 1700–1200 Ma interval. In addition, a 2500 Ma $Nd_{(DM)}$ age, was obtained on a small PG granite.

Lithogeochemical and isotopic (high Sr initial ratio and negative End) data suggest that the magmatism of DFB was produced during the Late Proterozoic Brasiliano cycle mainly by melting of previous crust. The granites in the schist belt were derived from either supracrustal mica schist (SJB) or a more deep source (V and NT), but in both cases the precursor material was added to the crust at 2000 Ma ago. In contrast, the magmatism of the granitic belt probably originated from a Middle Proterozoic magmatic arc that was intensively reworked during the Brasiliano orogenesis.

No evidence of a mangle-derived granitoid emplaced during the Late Proterozoic has been found yet. The Brasiliano cycle is interpreted as a period of intensive lithospheric shortening related with an important collision process where the granitogenesis is the most expressive result.

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Volcanism and Tectonics of Venus from Venera 15/16 Results

Volcanism and tectonics are responsible for the majority of landforms observed on Venera 15/16 radar images covering the northern quarter of Venus' surface. Exogenetic resurfacing on Venus has been found negligible. The plains (about 75% of the area) are predominant with numerous features evidencing their formation as a result of basaltic volcanism. Tectonic deformations are mainly concentrated within uplands that occupy about 25% of the area. The most abundant are uplands bearing the cross-secting systems of ridges and grooves ("parquet" or tesserae) that indicate deformations due to horizontally oriented stress or strain. Large dome-like uplifts with plains-like morphology complicated by apical systems of subparallel grooves represent another major type of tectonic landform (Beta Regio etc.). The ridge belts bearing the controversial evidences of their compressional and/or extensional origin and observed on many Venusian plains may be specific surficial manifestations of global spreading on Venus. Average crater retention age of the area surveyed is estimated as 0.5 to 1.0 b.y. Tectonic-volcanic resurfacing on Venus during the dated period of its history was an order of magnitude less than at Earth's oceanic floor.

The information from Venera 15/16 shows that Venus is much more endogenetically dynamic than the Moon, Mercury, or Mars. It confirms the earlier conclusions on the direct dependence of scale and duration of internal activity of a planet on its size. At the same time, if our estimates of crater retention age for the area surveyed by Benera 15/16 (0.5–1 b.y.) are correct, and the other three-quarters of Venus' surface is not significantly younger, Venus, at least in its later period of evolution, is significantly less endogenetically active than Earth. The reasons for this difference, if it exists, are enigmatic as yet. To resolve this enigma and many problems raised but not resolved by Venera 15/16 data, new progress in data coverage and resolution is needed.

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Major Cretaceous–Cenozoic Erosional Events in Northwest Pacific

The distribution of major stratigraphic hiatuses in the sedimentary cover of the northwest Pacific testifies that the last 110–120 m.y. of the region's geological history saw an alternation of periods of relative intensification and ceasing of the erosional processes, which resulted in hiatuses and/or dissolution facies accumulation (Figure 1). In the Cretaceous, two maxima of erosional activity took place. The first one is confined to the Late Cenomanian–Early Turonian (90–95 m.y.), the second to the Late Santonian–Early Campanian (77–82 m.y.). In the Cenozoic, erosional processes showed a particular strength. Periods of their most significant intensification coincide in time with: (1) Paleocene, with maximum in the interval 60–62 m.y.; (2) Paleocene/Eocene boundary (52–54 m.y.); (3) early middle Eocene (48–50 m.y.); (4) Eocene/Oligocene boundary (37–38 m.y.); (5) early late Oligocene (28–30 m.y.); (6) earliest MIocene (20–22 m.y.); (7) late middle Miocene (10–12 m.y.); (8) latest Miocene (6–8 m.y.).

The fluctuations of erosional activity correlate well with sea-level changes and major tectonic, oceanological, and climatic events. Its maxima correspond to low sea-level stands and water temperature drops; minima, on the contrary, correspond to sea-level rises and warmings. At the same time, periods of ceasing erosion coincide with major tectonic events within the Pacific Plate as well as with main orogenic phases, and tectonic reorganizations directly or indirectly resulted in changes in direction and velocity of plate movement, its configuration, and topography.

The influence of tectonic processes on erosional activity was likely realized both through lithosphere blocks motions, which led to changes in ocean configuration and water mass circulation, and through changes, due to spreading and intraplate volcanism, in volume of midoceanic ridges and undersea rises. According to some scientists, these changes caused the global sea-level variations.

The geodynamic and seafloor structure peculiarities and principally different systems of global water mass circulation in the Late Mesozoic and Cenozoic predetermined the differences in mechanism of tectonics influence on erosional activity in the Pacific and its complication through time. In the Late Cretaceous well and evenly warm ocean with low temperature gradients and sluggish haline circulation the tectonic processes could influence erosion directly through the decrease of ocean depth and rise, due to lithosphere heating, of the local seafloor areas into the zone with high hydrodynamics. Proceeding from the presence of neritic foraminifers, corals, molluscs, and traces of redeposition in Cretaceous sediments drilled