desiccation-expansion "teepee" structures. Caliche clasts are reworked into overlying intertidal-supratidal deposits, indicating that weathering occurred near sea level and contemporaneous with offshore deposition.

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SEDIMENTATION IN NHA TRANG BAY, SOUTH VIETNAM

Nha Trang Bay is an embayment at the mouth of the Cai River on the central coast of South Vietnam. The river is the principal source of sediment to the coastline, but intertidal reefs provide minor amounts of calcareous sand, and the continental shelf supplies some coarse quartz sand. The sediment supply to the coast and its distribution in Nha Trang Bay are closely related to the monsoon climate of the region. Northeast monsoons cause intense rainfall and runoff, combined with a unidirectional wind field causing strong southerly coastal currents. Most of the river sediment enters Nha Trang Bay during monsoons, and the sediment distribution reflects the monsoonal wave and current regime. Approximately one-fourth of the river-supplied sand enters the Nha Trang beach littoral cell, where it is transported south along the coast. Thus, the present configuration and orientation of Nha Trang beach are related also to monsoonal wave conditions. This pattern of sediment dispersion appears to have persisted during the Holocene still-stand of sea level, causing the accretion of an extensive beach-ridge coastal plain south of the river mouth. Similar orientation of the ancient beach ridges suggests that monsoonal waves have been the predominant factor in the development of the coastal plain.

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DIFFERENTIAL CEMENTATION OF PLEISTOCENE CARBONATE FANGLOMERATE, GUADALUPE MOUNTAINS

Pleistocene fanglomerates, extending southeastward from the Guadalupe Mountains, consist of predominantly micritic carbonate particles (limestone and dolostone) eroded from the Permian reef complex. Accessory particles consist of detrital monocrystalline grains of calcispar, quartz, and chert. The fanglomerate is firmly cemented by low-magnesium calcite. The fanglomerate was cemented in the vadose zone. Predominantly micritic particles are coated by bilaminar films, consisting of inner calcimicrite laminae and outer rims of drusy, dogtooth spar. Bilaminar films do not completely occlude porosity in large neighboring interstices. Monocrystalline carbonate grains are concentrated in the sand-size fraction and are enveloped by thin, discontinuous micrite films and thick overgrowth aureoles which expand outward to occlude porosity in adjacent interstices.

The following lines of evidence suggest that overgrowth aureoles on monocrystalline grains were precipitated at much greater rates than outer drusy rims of bilaminar film-coated grains: (1) both monocrystalline grains and bilaminar film-coated grains are enveloped by thin inner micrite films, suggesting that outer drusy rims are homologous with overgrowth halos; (2) overgrowth rims on monocrystalline grains are 3-10 times thicker than outer rims of dogtooth spar on similar-sized, bilaminar film-coated particles; (3) where overgrowth halos expand outward and engulf neighboring grains, outer drusy rims are missing or poorly developed.

Bilaminar films, especially outer drusy rims, thicken downward from lower grain boundaries into interstices in response to a gravitational effect (downward thickening of water films).

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THERMAL ENVIRONMENTS AS MODELS OF PRECAMBRIAN ENVIRONMENTS

Thermal ecosystems are biologically simple. These systems contain a few species of unicellular organisms and may resemble ecosystems that existed on the ancient earth during the early stages of biological evolution. The analysis of fatty acids from some bacteria-algal mats in streams draining hot springs in Yellowstone National Park show distributions resembling those of fatty acids isolated from ancient cherts. A layered silica deposit, "stromatolite," taken from the perimeter of an alkaline hot spring was used as a modern analog of bedded chert deposits. The distributions of fatty acids from the surface, crust, and interior regions of the stromatolite indicate that the acids are syngenetic with the silica deposition, and that acid distributions have not changed significantly during the time of formation of the "stromatolite" (10^2–10^3 years).

Comparisons were made of fatty acids and hydrocarbons from natural ecosystems and laboratory cultures of thermophiles. Marked differences were observed between the distributions of the fatty acids and alkanes in the specific samples and of the fatty acids from different ecosystems.

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SUBSEA CEMENTATION OF SHALLOW BRITISH HONDURAS REEFS

Contemporary subsea cementation is restricted to specific zones in shallow British Honduras barrier and atoll reefs. On the southern half of the barrier reef and on Glovers Atoll, cementation occurs only on the seaward margins of the reefs, the reef flat, and spur and groove structure.

On the reef flat, coral rubble and skeletal sand are cemented to a hard pavement 10-100 m wide. Coral fronds from the pavement have a radiocarbon age of about 450 years B.P. The cores of projecting spurs, a growth frame of coral and *Millepora*, locally are bound with a mortar of cemented skeletal sand, forming marble-hard limestone. Coral fronds lying loose on groove floors between spurs contain well-cemented geopetals, indicating lithification of internal sediment in place.

Carbonate cement is present (1) in intraskeletal voids of reef-building organisms, (2) between skeletal sand grains that form the rubble mortar and that partly fill the growth frame, and (3) within fine skeletal sand and carbonate mud geopetals of mollusk and sponge borings.

The localization of subsea cementation on the reef flat and seaward faces of the British Honduras marginal reefs significantly enhances their wave resistance. A similar localization of early cementation by magnesium-calcite in ancient reef complexes would have reduced porosity and permeability and increased the amount of magnesium locally available for dolomitization. This facies-specific diagenesis would have directed subsequent subaerial and late diagenesis, which in turn determines the quality of reef reservoirs.

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ERTS AND REMOTE SENSING'S NICHE IN GEOSCIENCE

Remote sensing, defined here as "all methods of recording and measuring energy which is reflected or emitted from selected segments of the electromagnetic spectrum," has been used in natural sciences and earth resources fields for several decades. Data collection systems are highly developed, as are instruments designed to automate the analysis, enhancement, information extraction, and/or change-detection of the acquired data. When used with ancillary data (ground observa-