BRADY, MICHAEL J., and RICHARD B. KOEPNICK, Dept. Geology, Univ. Kansas, Lawrence, Kans.

TRANSITION FROM SHELF TO BASINAL CARBONATES IN MIDDLE CAMBRIAN MARJUM FORMATION OF HOUSE RANGE, WESTERN UTAH—PALEOENVIRONMENTAL ANALYSIS

Lithofacies of the Marjum Formation in the House Range of west-central Utah indicate that a rather abrupt transition from shallow-shelf to basinal depositional environments persisted in this locality during much of the Middle Cambrian. The beginning of Marjum deposition was marked by the accumulation of deep-water limestones and shales throughout the area, but this pattern soon was disrupted by shoaling and development of shelf conditions in the vicinity of the central and northern House Range. Supratidal to shallow subtidal carbonates formed on the shelf as deposition of slope and basinal sediments continued a few miles south for the remainder of Marjum time.

Algal-laminated and pelletal dolomitic mudstones accumulated in the extensive supratidal and intertidal areas that existed on the shelf. Some stromatolitic units are evenly laminated, whereas others have laminae that are irregular and discontinuous. The pelletal mudstones exhibit fenestral fabrics and contain intraformational conglomerate lenses, commonly including clasts reworked from the stromatolitic units. Wave ripples and desiccation features associated with these lithologies are further evidence of their shoal-water origin and periodic exposure.

Pelleted, intraclastic wackestones and packstones characterize the shallow subtidal environments of the shelf and shelf-slope. Interspersed with the slope sediments are units containing both algal-coated and uncoated intraclasts. The coated grains are on the upper part of the slope and were derived from the shelf edge, whereas the uncoated clasts were largely reworked from slope deposits. In addition, the coated grains have undergone little transport, but the uncoated clasts are well sorted and rounded, and are commonly graded.

Fossiliferous wackestones and laminated mudstones with interbedded shales represent the deeper water toe-of-slope and basinal sediments. The fossiliferous units have been moderately bioturbated, but the finely laminated mudstones, which were deposited well below wave base, are essentially undisturbed. The presence of sponge spicules and presence of small-scale cross laminations and microscopic cut-and-fill structures are typical of these dark, thin-bedded limestones. Depositional slopes in this part of the basin are indicated by penecontemporaneous slump structures and debris lenses deposited by submarine slides.

BRENNINKMEYER, BENNO M., S. J., Dept. Geology, Boston College, Boston, Mass.

SYNOPTIC SURF-ZONE SEDIMENTATION PATTERNS

A new device, the almometer, has been constructed which instantaneously measures the changing elevation of the bottom and distribution of bedload and suspended load in a water column. Three almometers were placed normal to shore in the surf zone at Point Mugu, California. Data for 20 tidal cycles show that mean grain size in the mid-swash zone is coarser on the ebb than on the flood. Except when the tidal inequality is small, skewness of the sand becomes negative on the ebb and positive on the flood. There are 6 episodes of profile change which increase seaward in magnitude per tidal cycle. Erosion increases from 6% of breaker height on the beachface to 14% on the shoreface. The frequency of motion of sand in the inner and outer surf zones is virtually independent of the deep-water wave period, but the relation improves somewhat in the breaker, transition, and swash zones. Outside the breaker zone, sand moves primarily as bedload, in pulses coincident with the prevailing swell period. Inside the breaker zone, sand moves more rapidly, with frequencies equal to both seas and swell. Bottom elevation changes of more than 6 cm/wave are not uncommon. Sand seldom is thrown into suspension. In the outer surf zone, sand movement is rare, but in the inner surf zone sand suspension increases in frequency, elevation, and duration. At the still-water level, sand motion by suspension becomes dominant. In the swash zone, sand motion reverts to bedload. At Point Mugu, the amount of sand thrown into suspension 6 in. above the bottom per tidal cycle per foot of beach length is from 200 to 400 cu yd.

BRUCE, C. H., Mobil Oil Corp., Houston, Tex.

PRESSURED SHALE AND RELATED SEDIMENT DEFORMATION—MECHANISM FOR DEVELOPMENT OF REGIONAL CONTEMPORANEOUS FAULTS

Regional contemporaneous faults of the Texas coastal area are formed on the seaward flanks of deeply buried linear shale masses characterized by low bulk density and high fluid pressure. From seismic data these masses, commonly tens of miles in length, have been observed to range in size up to 25 mi in width and 10,000 ft vertically. These features, aligned subparallel with the coast, represent residual masses of undercompacted sediment between sand-shale depoaxes in which greater compaction has occurred. Most regional contemporaneous fault systems in the Texas coastal area were formed during times of shoreline regression, when periods of fault development were relatively short, and where comparatively simple down-to-the-basin fault patterns were formed. In cross-sectional view, faults in these systems flatten and converge at depth to planes related to fluid pressure, and form the seaward flanks of underlying shale masses. Data indicate that faults formed during shoreline regression were developed primarily through differential compaction of adjacent sedimentary masses. These faults die out at depth near the depoaxes of the sand-shale section.

Where subsidence exceeded the rate of deposition, gravitational faults developed where basinward sea-floor inclination was established in the immediate area of deposition. Some of these faults became bedding-plane type, when the inclination of basinward dipping beds equaled the critical slope angle for gravitational slide. Fault patterns developed in this manner are comparatively complex and consist of many antithetic faults and related rotational blocks.

Conclusions derived from these observations support the concept of regional contemporaneous fault development through sedimentary processes, where thick masses of shale are present and where deep-seated tectonic effects are minimal.

BUCHER, SIEGFRIED, Phoenix Ventures Ltd., Calgary, Alta.

MINI-CREWS FOR SEISMIC OPERATIONS

It is common practice to use large crews and heavy equipment for seismic operations in remote and almost inaccessible country. The required camps are commonly very large and equipped with the most modern appliances providing for living habits expected in more civilized areas. Considerable supplies, fuel, and spare parts are required to operate the crew and maintain vehicles and machinery. This creates immense logistics problems, which in turn affect the economy of the seismic survey adversely.

Phoenix Ventures Ltd., a Calgary-based company, has introduced the MINI-CREW, a new concept in seismic operations. This crew was designed and built by Phoenix and used successfully to record 200 mi of seismic reflection data in the ice-covered waters of the Canadian Arctic Islands during the spring of 1972. This compact, lightweight, and highly mobile crew minimized operational and logistic problems, resulting in considerable cost savings over conventional methods used in the same areas.