Stratigraphical and Sedimentological Studies Of The Sedimentary Succession At Mitla Pass And Its Environs, East Of Sues City, Egypt

Adel Mady Afify Mohammed

The present thesis is concerned with the studying of the stratigraphy,petrography, diagenesis and sedimentology of the stratigraphic successionexposed at Mitla Pass and its environs at west Central Sinai.Lithostratigraphically, the exposed stratigraphic succession could besubdivided into; Masajid Formation of Oxfordian age at the base that isfollowed upward by Risan Aneiza (?Aptian- Albian), Galala Formation(Cenomanian), Abu Qada Formation (Late Cenomanian- Early Turonian),Buttum Formation (early Middle Turonian), Wata Formation (late Middle-LateTuronian), Themed Formation (Coniacian- Santonian), Sudr Chalk (LateCampanian- Middle Maastrichtian), Mitla Formation (Late MaastrichtianearliestEarly Eocene), Thebes Formation (Early Yepresian) and MiniaFormation (Late Yepresian).Biostratigraphically, this sequence is relatively rich in macrofossilassemblages especially bivalves, gastropods, ammonites and echinoids. Basedon the FAD and LAD of the index species of the prementioned macrofossilgroups, an integrated biostratigraphic framework has been constructed for theUpper Cretaceous succession of the area studied where five ammonite zoneswere recognized from the Cenomanian- Turonian succession. Based on someselected macroinvertebrates other than ammonites, twelve biozones wereproposed. The integration among the proposed biozones as well as local andinter-regional correlation of the biozones has been discussed.The petrographic study of limestone, dolostone and sandstone rocksrevealed, eighteen limestone, four dolostone and four sandstone microfacieswere recorded, besides shale, sandy shale, clay and marl facies. The molluscanshell fragments, foraminiferal tests (planktonic, benthonic, and largerforaminifers), echinoids, corals and coralline sponges are the main skeletalIIcomponents of the different lithofacies, whereas, micrite and sparite as well asdolomite rhombs constitute the main orthochems.Cementation, micritization, recrystallization, dolomitization andsilicification are the diagenetic processes that affected on the different studiedcarbonate rocks. Three texturally different forms of cement were recognized;drusy calcite, granular and blocky cement. The aggrading neomorphism(recrystallization) of lime mud as well as the calcitization of aragonitic andhigh magnesium calcitic shell fragments were recorded. Micritization processis more common due to the action of borer organisms especially on theechinoid plates and foraminiferal tests. Also, three main types of dolomiterhombs were recognized;

ferroan zoned and unzoned type, clear (limpid) typeand sandy dolostone type. The origin of the different types of dolomite rhombswas discussed either by the effect of contamination of meteoric water withmarine water or clay derived mechanism or hypersaline mechanism. Thesilicification process occurred in different forms of bedded chert, lenticularchert, silicified skeletal particles, detrital mega quartz, chalcedony quartz,spherulitic quartz and micron quartz. The origin of chert has been discussed.Also, silica cementation, calcite cementation, dolomite replacement andhematite cementation and pigmentation are the main digenetic processes thataffected on sandstone lithofacies.The stratigraphic and petrographic studies carried out on thestratigraphic succession from Late Jurassic to Early Eocene show gradationalfacies changes from shallow to relatively deep marine environments along thesouthwest-northeast direction of the area. The recognized facies and theirrelated paleoenvironments document lateral and common vertical transitionfrom inner, middle to outer ramp setting. These facies could be subdivided intoeight associations; peritidal flat/beach clastics, peritidal flat carbonates,lagoonal clastics, lagoonal carbonates, high energy shoal of ooids and patchIIIreefs (oolitic shoal), intertidal- subtidal open marine, storm influenced subtidalopen marine (mid-ramp) and hemipelagic (outer ramp) facies.Generally, the area under investigation was controlled by a long termtransgressive phase and several higher order sea level fluctuations from LateJurassic to Early Tertiary. The main events recorded are; the regressive phaseat the contact between Masajid and Risan Aneiza Formations, Middle Turonianregressive phase (Buttum Formation), the deeper conditions of UpperMaastrichtian- Lower Eocene sediments in the eastern part of the area (MitlaFormation). The main factors controlling the ramp deposition and the describedevents are; structure control (Syrian Arc Deformation), eustatic sea levelfluctuations (combined with environmental influences such as autochthonouscarbonate productivity and siliciclastic supply) and paleorelief conditions.