



## Three-dimensional sedimentary architecture of Quaternary deposits; a case study of environmental sedimentology (Bam, Iran)

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**Detailed 3-D analysis of the sedimentary structure and stratigraphy of these deposits allows for an accurate understand of sedimentary model of basin. This paper presents a case study in Bam (SE Iran) reconstructing the 3-D distribution of fluvial sediments based on a high resolution, process-orientated sedimentary facies classification and lithostratigraphy. We investigated the mean grain size with vertical and horizontal change of it, clay mineralogy, sediment texture, sedimentary structures, petrology and petrography and determination of paleo-environments and finally, we prepared two cross sections in S-N and W-E directions and a 3D block diagram for the situation of changes in subsurface sediments and compare them with the destruction rate map of earthquake in Bam city. Quaternary alluvial sediments are characterized by lithofacies deposited by braided river channels, debris flows and hyperconcentrated flows. The channel flow deposits constitute relatively well sorted, well imbricated and clast-supported gravels with coarse to medium sand matrix. Mostly poorly sorted, weakly imbricated to disorganized matrix supported pebble to boulder gravels with silty sand represent debris flow deposits. Hyperconcentrated flow deposits consist of clast-supported, poorly developed sorted polymodal gravel facies with poorly developed imbricated fabric, and generally occupy the lower parts of the terrace and fan sequences. The alternation from hyperconcentrated flow to channel flow deposits is predominant in the sequence, and is possibly the response to different climate modes. The high discharge and supply of sediments as well as the dispersal and deposition of these materials in the trunk stream is attributed to climatic perturbations during the Quaternary. These models allow quantifying the thickness and volume distribution of sandy gravel and clay deposits. We correlate these sedimentary units on the basis of lithofacies similarities, stratigraphic position. These relationships suggest that deformation had occurred upward into the basin during time. According to our observations, a great number of recently constructed buildings were also damaged in city areas far from the faulted zones. These are areas where silty and clayey soils dominate, exhibiting very low electric resistivity and low wave velocity, together with high thickness, plasticity and compressibility. Rock samples are from volcanism stages in Eocene magmatism. The clay minerals have resulted from weathering of continental environments in upstream.**

Key Words: Bam, Sediment, facies, 3D sedimentary model, Earthquake.