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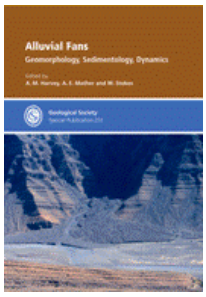
Alluvial Fans: Geomorphology, Sedimentology, Dynamics, edited by A.M. Harvey, A.E. Mather & M. Stokes, 2005. Geological Society of London Special Publication 251. The Geological Society Publishing House, Unit 7, Brassmill Enterprise Centre, Brassmill Lane, Bath BA1 3JN, UK. Hardbound, 248 pages. Price GBP 75.00. ISBN 1-86239-189-0.



This book is a result of a conference with the same title that took place in June 2003 in Sorbas, Spain. As the editors write in the lead paper, all contributions represent three problematic topics: (1) processes on fans, (2) dynamics and morphology of Quaternary alluvial fans, and (3) interpretation of the sedimentary successions of fans. These three topics are, however, not truly well recognizable as such in this book. It would therefore, in my opinion, have been better to focus on two essential groups of fans: megafans (which receive much attention) and other (small-scale) fans (i.e. true fans). This view is based on the nature of the various contributions that are summarized in the following.

Mather & Hartley analyse the sedimentology of a hyper-arid alluvial fan in the Atacama Desert, Chile. The study brings the authors to the conclusion that the wet interval at the transition from the Late Pleistocene to the Holocene is responsible for the dominance of fan sedimentation at the time; aggradation by antidune-characterized sheetfloods was typical. In contrast, recent fan development is characterized by a three-stage dynamic cycle of large floods. Initially, stream erosion takes place, which is followed by mass-flow deposition. The cycle is finished by channelized flow redeposition. It must be stressed, however, that this cycle is represented only by a relatively poor sedimentary record.

Wilford and co-authors analyse environments of mountain fans in British Columbia (Canada). The numerous colour photos are very attractive, but I did, unfortunately, not find any substantial geomorphological or sedimentological conclusions in this contribution.

Arzani does much better in his description of a megafan from an arid climate. Is hydrology is dominated by flashfloods. As opposed to standard megafans, this one is characterized by ephemeral flows, which are most commonly of a sheetflow type. In fact, it is a terminal fan ending in a playa. Arzani distinguishes one facies in the proximal fan (gravels of shallow channels and sheetflows) and three in the middle and distal fan (channel gravels and sands; interchannel silts; gypsiferous marls, travertines and aeolian sands at the transition into the playa).

Gabris & Nagy reconstruct fluvial environments from the last glacial and the Holocene for a megafan of the Hungarian Plain. On the basis of a geomorphological analysis, they distinguish three phases of braided rivers alternating with three phases of meandering rivers. These fluvial accumulation phases were separated from one another by intervals during which erosion prevailed. Such a study provides a great opportunity to compare the Hungarian fluvial history in detail to the Dutch, German and Polish models. Unfortunately, this chance was not taken by the authors.

Colombo describes fans formed at the confluence of mountain streams (so-called telescopic fans), i.e. tributary alluvial fans. These fans are composed of several segments, viz.

alluvial and lacustrine terraces. The segments result from successive cycles of fan progradation. Damming of mountain rivers resulted in lake formation and related sedimentary phases, whereas drainage events caused erosion. This contribution is interesting because it contains detailed geomorphological characteristics of fans, but the sedimentological description of the fans is superficial.

Al-Farray & Harvey present a geomorphological analysis of arid mountain fans in the United Arab Emirates and Oman. This contribution brings not too many interesting conclusions.

Hartley c.s. studied the dynamics and lithology of fans in a hyper-arid part of Chile. Their contribution is a professional sedimentological analysis of coastal fans. They distinguish debris-flow, hyperconcentrated-flow, and sheetflood facies. Some geomorphological differences between massflow-dominated and sheetflow-dominated fans are presented. The coastal fans are well developed and their dynamic activity took place during almost the entire Pleistocene and Holocene. in contrast, the fans of the Central Depression, which are separated from the ocean by mountains, are smaller forms and do currently not show any depositional activity. The authors prove that the fan-forming processes are fundamentally related to air-mass circulation, i.e. different climatic conditions. In my opinion, this contribution is the best study of the book.

Harvey decribes the mountain-front fans influenced by previous high lake levels, and their subsequent evolution when the lake gradually disappeared. The author concludes that fluctuations in lake level play an important role in fan development under the conditions of (1) considerable submergence (at least of the distal fan zone), and (2) a steep slope of the fan surface. Telescopic fans are formed due to a falling lake level. The author also stresses that a fan's origin depends mainly on the climate (as it is responsible for sediment supply), whereas changes in base level (i.e. accomodation space) are the secondary factor.

Pope & Wilkinson reconstruct the evolution of mountain fans in Greece during the two last glacials and Holocene. A model of aggradational/degradational processes in the Quaternary climatic cycle results from this investigation. Accumulation took place during glacials while erosion and progradation of the fans occurred during interglacials. Sedimentary hiatuses and soil development took place during interstadials. This is quite an interesting study: I encourage to read it.

Robinson and co-authors present a contribution on the dating of fan deposits. This contribution is not truly within the scope of the book.

Weissmann c.s. describe Californian megafans in the context of variations in accomodation space during glacial/interglacial climatic cycles. The fans were studied with respect to changes in subsidence rate, the relationship between sediment supply and discharge, and base-level fluctuations. Although this study represents a “fashionable” method of basin analysis, the final conclusions are not really surprising.

Nichols presents an excellent sedimentological contribution on the Paleogene-Neogene development of Spanish fans. A well-done lithofacies analysis forms the basis for the interpretation of the depositional styles of fans, their sizes, the climate in which they develop, and the base-level conditions.

Wagreich & Strauss studied two fans formed close to a half-graben fault. Tyhe deposition on both fans was dominated by mass flows, and the lithology of the resulting debrites appears to be controlled by the parent-rock petrology: gneisses and amphibolites in the case of one of the fans, and schists and marbles in the case of the second fan. This work brings, unfortunately, no remarkable results.

The contribution by Leleu c.s. provides a superficial sedimentological analysis of Cretaceous-Paleocene alluvial fans in SE France. The fan deposits form two types of successions: several smaller-scale cycles (50-60 m thick) together form larger-scale cycles. All successions are topped by paleosol horizons. The large size of the study area and the long stratigraphic interval during which the fans were formed, cause that this contribution cannot be regarded as a true fan analysis, but rather as a paleogeographic description of of the development of the margin of a tectonic basin.

The title of the book already indicates that the studies on alluvial fans presented in it are more geomorphology-oriented than sedimentological in nature. The various contributions have, in

my opinion, fairly different scientific levels. In my opinion, none of the contributions can be regarded as innovative, or revolutionary in a sense that they open new scientific perspectives. On the contrary, the contents of this book might easily bring readers to the conclusion that all methods of fan research have been exhausted. It can only be hoped that a next conference on alluvial fans will result in a book that will be more useful for researchers of fans, particularly since these geomorphological features still pose so many sedimentological problems that need to be solved.

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