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ORIGINAL ARTICLE

Using Of the Morphologic Science to Determination of Relationships between Characteristics of Alluvial Fan And Watershed

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ABSTRACT
Analysis of drainage basins and Fans relationship using of the morphologic science is essential. The study of fan morphometry is the measurement of alluvial fan and the use of external form to identify form process associated relationships. In the study morphometric analysis of relationships between characteristics of basins and alluvial fans investigate in the Fars province, Iran. Morphometric parameters can be used to describe, analyze and compare basins and alluvial fans in different sizes. In this study, we analyzed 5 morphometric parameters between 7 alluvial fans and basin in Fars province, Iran. Also we used Digital Elevation Model (DEM) for extracting the characteristics of alluvial fans. In this study, In order to extract longitudinal profiles of 7 Fans can be used DEM to display how topography varies along strike.
Keywords: *Alluvial Fan, Morphometric Parameters, longitudinal profiles.*

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Introduction

Alluvial fans develop at the base of drainages where feeder channels release their solid load [4, 9, 6]. A classic fan-shape forms where there is a well-defined topographic apex. Multiple feeder channels, however, often blur the fan-shape resulting in a merged bajada. Alluvial fans can be found in almost all terrestrial settings. These include alpine [2], humid tropical [8, 12], humid mid-latitude [3, 11], Mediterranean [13, 5], per glacial [10], and different paraglacial settings [1]. Many studies have related the characteristics of alluvial fans (size and gradient, sedimentary structure) to those of the basin (size, sediment yield, plant cover, type of sediment transfer) [7], confirming the complex relationships between geomorphic and hydrological processes on the hill slopes, sediment transfer and fan occurrence.

This paper analyses the factors that are related to the presence or absence of alluvial fans in a playa and pediment area: the Fars province, Iran. The factors analyzed were physical, including distinct morphological (drainage basin area, fans apex, basin relief, fans area, fans length, fans slop, fans concavity). Also, the correlation between morphometric parameters of alluvial fans and drainage basins to be determined. The fans, the main sites of deposition, are therefore an intrinsic part of an erosional-depositional system in which mountains tend slowly to wear away and basins to fill with sediment through geologic time (Figure1).

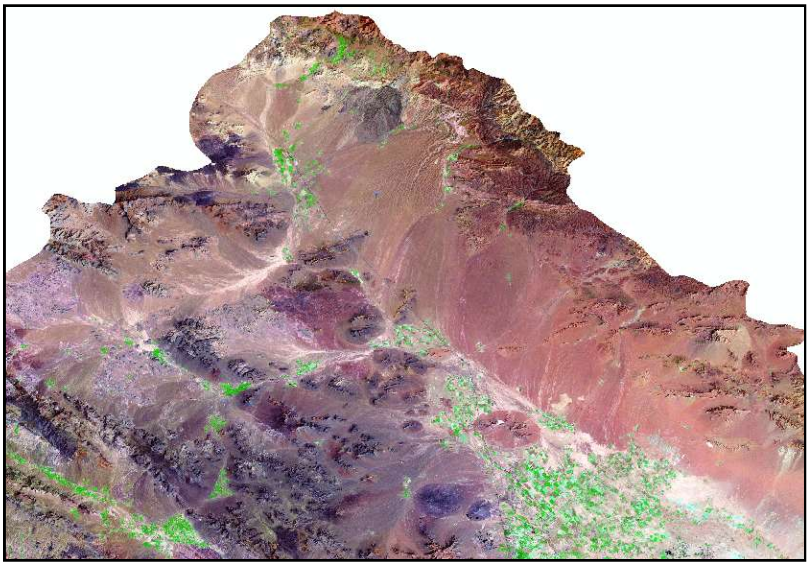

Figure 1. Position of a number of the alluvial fan in the catchment area

Study area

The study area is a salt playa in the north east of Fars province, Iran. This area is located in 31º 11′ to 33º 41′- N and 50º 01′ to 53º 23′ E with an area of 41547 Km² (Figure 2).The highest and lowest elevation in this area are 1414 and 3939 meters.

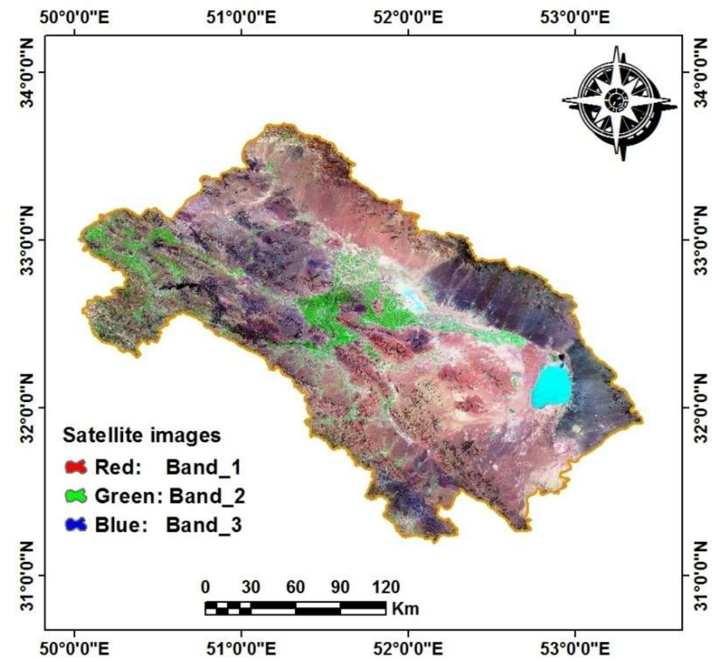

Figure 2. Location of the study area

In geology map, the lithological units cropping out in the catchment area mainly consist of: Shale, Limestone, Sandstone, Granite, Aplite, Conglomerate, Dolomite, Marl, Rhyolitie and etc. (Fig. 3).

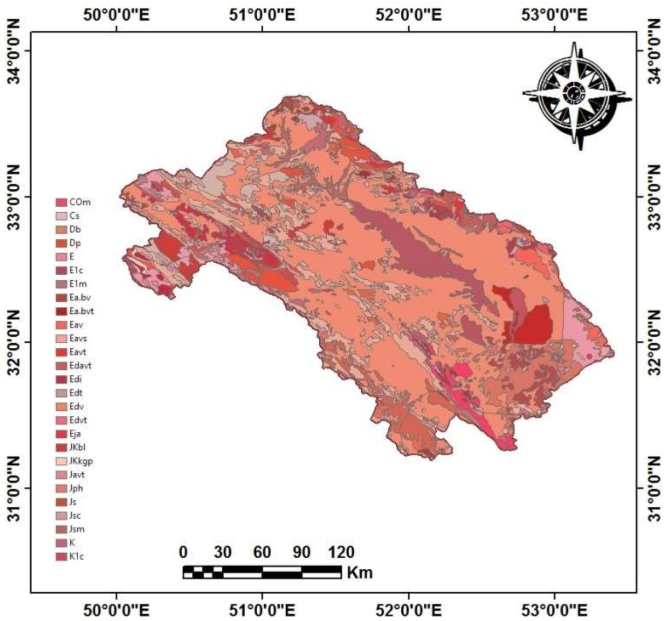

Figure 3. Geology map of the study area

Material and Method

Topographic maps (1:25000 and 1:50000) were used ground reference of the other maps. Then 30 fans were selected available maps. In order to prepare of watershed boundary has used in the software ArcGIS 10.3, ArcHydro, and WMS8.4, DEM. Geometric and morphometric data sources for this study were based on digital topographic maps 1:50000 and 1:25000, Digital Elevation Model (DEM 30) (ASTER DEM 30m). Then fan boundary was extracted DEM. Then different parameters of morphometry such as slope, direction, etc. has prepared (Table 1 and Figure 4). Finally correlation of morphological parameters was evaluated.

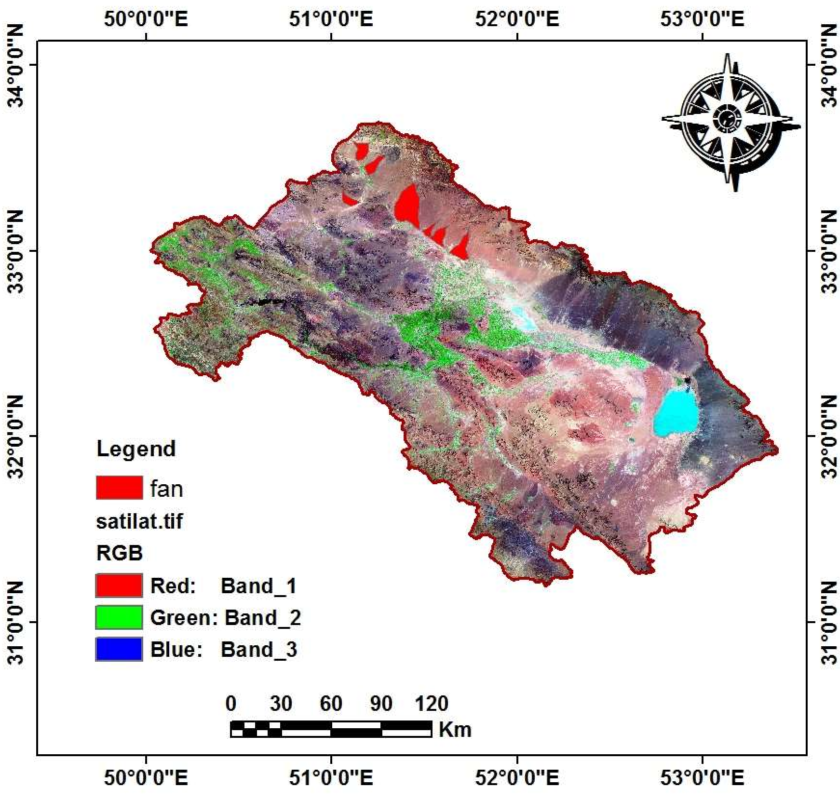

Figure 4. Position investigated alluvial fans in the study area

Table 1. Morphometric parameters for the fans in study area.

Fan name	Fan apex	Fan area	Fan concavity	Fan length	Fan slop
1	2082.00	2.49	1.60	5.10	0.029
2	2180	5.98	1.30	3.20	0.054
3	2027	2.44	1.20	4.50	0.032
4	2178	2.86	1.10	3.10	0.031
5	2108	2.94	1.10	3.40	0.018
6	2121	2.98	1.00	4.10	0.031
7	2321	0.8	1.00	3.50	0.038

RESULTS

In order to extract longitudinal profiles of 7 Fans can be used DEM to display how topography varies along strike. They are shown in Figure 5.

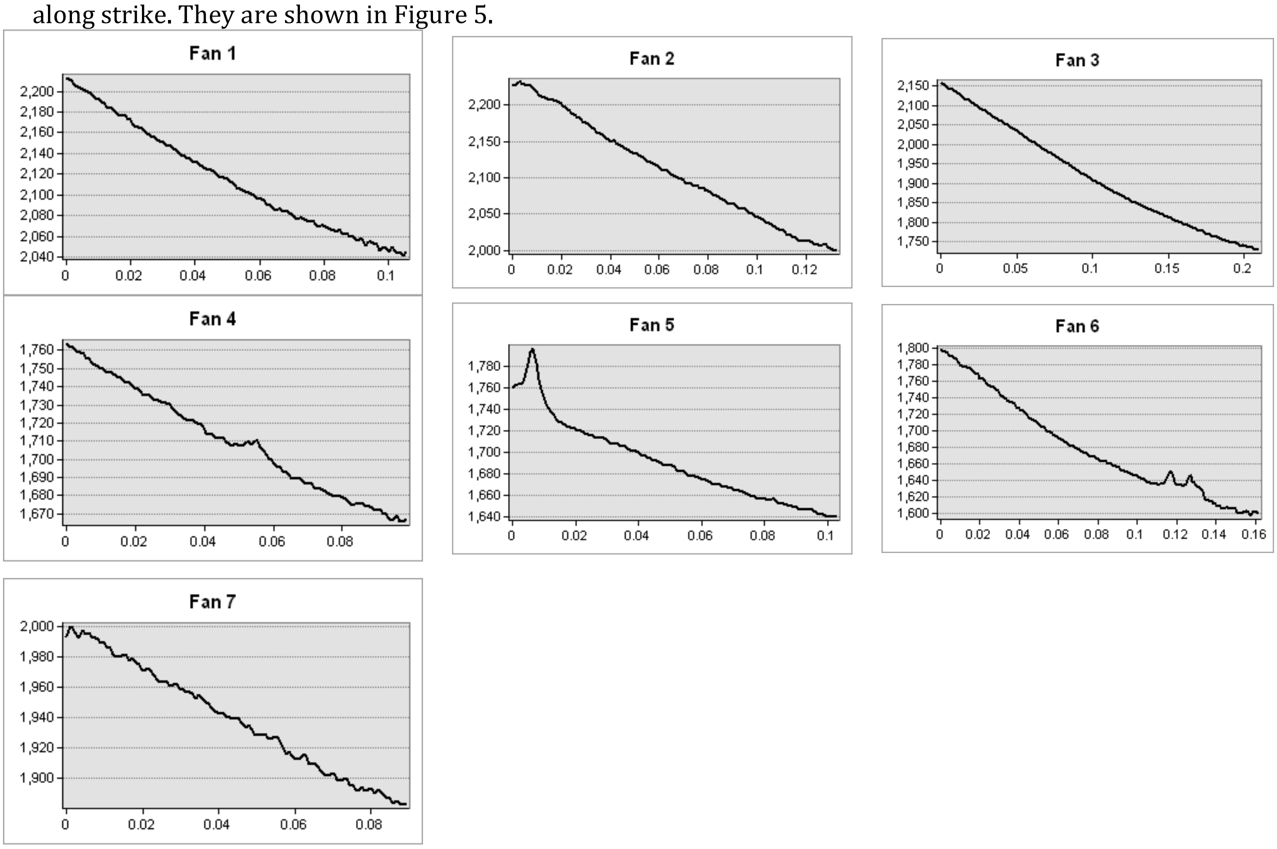

Figure 5 Cross sections of 7 fans in study area

CONCLUSIONS

A complex application of digital elevation model (DEM) derivatives is presented for morphometry of Fans in Fars province, Iran. Using DEM can be extracted many information. Therefore the statistical DEM properties such as (1), elevation (2) slope (3) length and etc. Also using DEM calculation of morphometry is easy and found that there are the highest correlation between catchment area and Fans Area. So that in a large catchment area has also larger alluvial fans.

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