

XIFENG CIRCULAR BASIN: ANOTHER FAILED POTENTIAL CRATER IN CHINA. Jun Huang¹, Long Xiao¹ and Kun Wang², ¹Faculty of Earth Sciences, China University of Geosciences, Wuhan 430074 China [longxiao@cug.edu.cn], ²Laboratory for Astrochemistry and Planetary Sciences, Lunar and Planetary Science Center, Purple Mountain Observatory, Nanjing 210008 China [wangkun@pmo.ac.cn].

Introduction: Until now, there has been no substantiated impact crater located in China, although several potential ones were reported [1]. In 2006, a further possible crater was discovered by a paragliding enthusiast in Xifeng County, Guizhou Province, China (27° 3'41.00"N, 106°42'2.19"E) (See Fig.1). This first report of Xifeng "crater" inspires several geologists to investigate its origin. In September 2007, after preparatory analysis of a geological map of this region, we visited the Xifeng area. Here we report that the Xifeng "crater" is actually an altered syncline (specifically pericline or branchsyncline) which rejects the possibility of impact causes.



Fig.1 Google Earth Satellite Image of Xifeng "Crater".

Morphology: The shape of Xifeng circular basin suggests that it is possibly an impact crater. The Xifeng circular basin is very similar to complex-type craters in platform. It is comprised of a 3000m-diameter inner ring, with a peak in the southwest (See Fig.2 Sample 2 location) and several concentric outer halos. The diameters of outer halos extend to ~20km and they are discontinuous in the southwest and northeast. The heights of inner and outer rings range from 80 to 400m. Thus, the depth to diameter ratio is 1/250 to 1/50 which is significantly smaller than those reported for the complex-type craters (about 1:10 to 1:20 [2]). The Xifeng circular basin is therefore too shallow to be a crater.

Stratigraphy: With the help of the existing geological map [3], augmented by measurements taken during our field trip, the cross section of Xifeng circular basin is illustrated in Fig.2. From the center to the rim, the strata are intact and continuously vary between Jurassic and Permian (although there are some faults nearby, the normal sequence of strata is largely untouched). In addition, nearly all the strata are dipping with dip directions toward the center. These features demonstrate that the Xifeng circular basin is simply a syncline. In contrast, in a true crater, the inner strata are always disturbed or partially lost, whilst the outer strata may remain horizontal and will be straightly intersected by the crater floor. As a result, the stratigraphy of the Xifeng circular basin is entirely different from an impact crater.

Impact Metamorphism: Three representative samples were collected during our field trip. Sample One is from the central flat area. Sample Two comes from the highest point of inner ring which was thought to be a central peak and Sample Three is from the dyke in the outer rings (See Fig.2). Sample One and Two are reddish feldspar-quartz sandstones which contain 75% fine-grained quartz, 20% feldspar and 5% accessory minerals. Sample Three is a gray amygdaloidal-structure basalt with 65% plagioclase phenocrysts and 35% matrix. It is also slightly altered by sericitization (See Fig.3). After careful observation with an optical microscope, no impact-shocked minerals were identified. The Planar Deformation Features (PDFs), one of the most principle forms of evidence can not be found in the quartz and feldspar.

Conclusions: Although the Xifeng circular basin has similarities to a typical complex crater, the closer analysis of the morphology, stratigraphy and impact metamorphism do not reveal any impact-related characteristics. It is not a meteorite or comet impact crater but a reformed syncline derived from the tectonic movements of our Earth.

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References: [1] Ming Chen (2008) *Chinese Science Bulletin*, 53, 392-395. [2] O. R. Norton (2002) *the Cambridge Encyclopedia of Meteorites*, Cambridge University Press. [3] Guizhou Regional Geological Survey Team (1980) *1:200000 Xifeng Regional Geological Survey Report*.

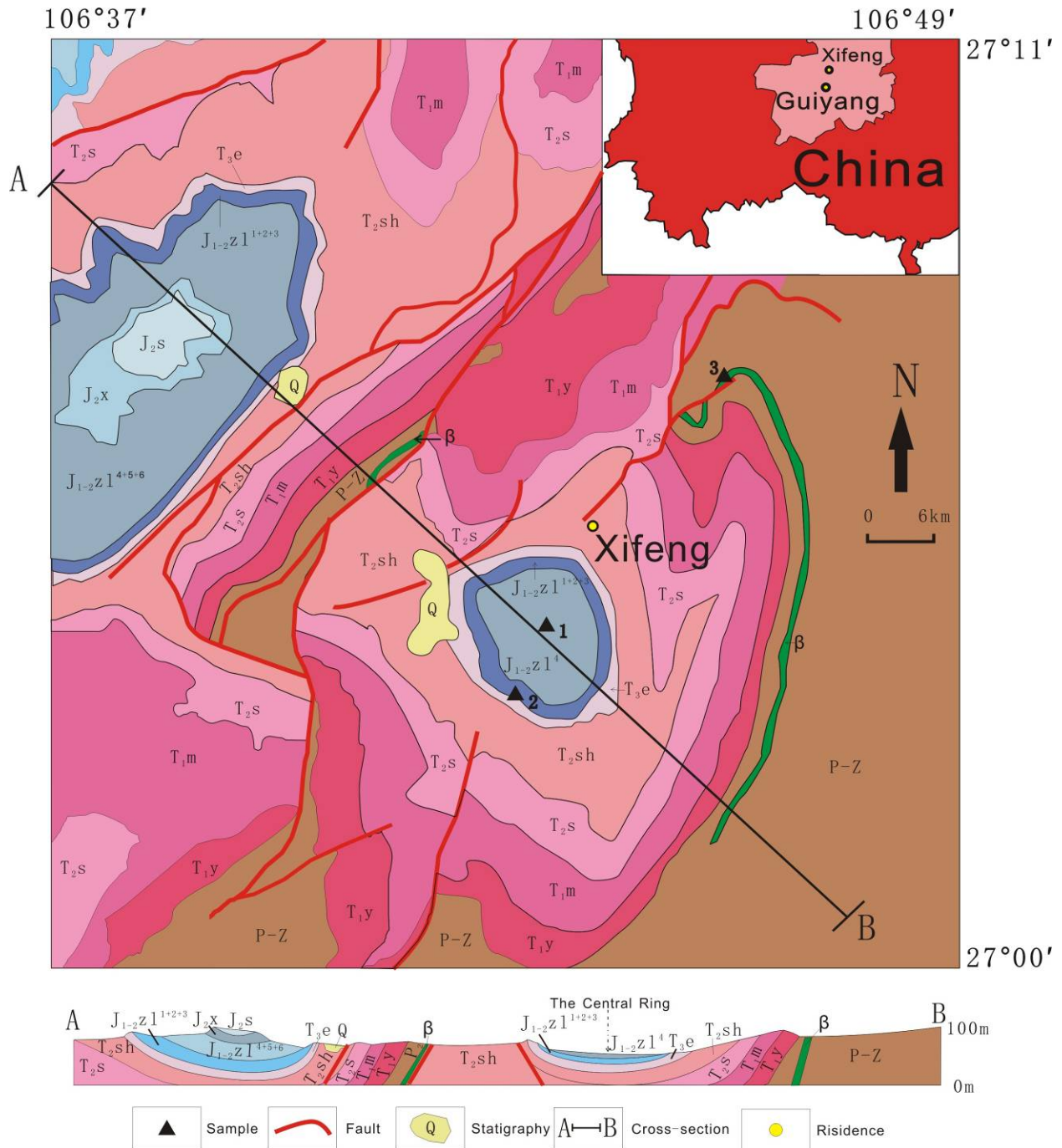


Fig.2 Geological Map [3] and Cross Section of Xifeng "Crater".

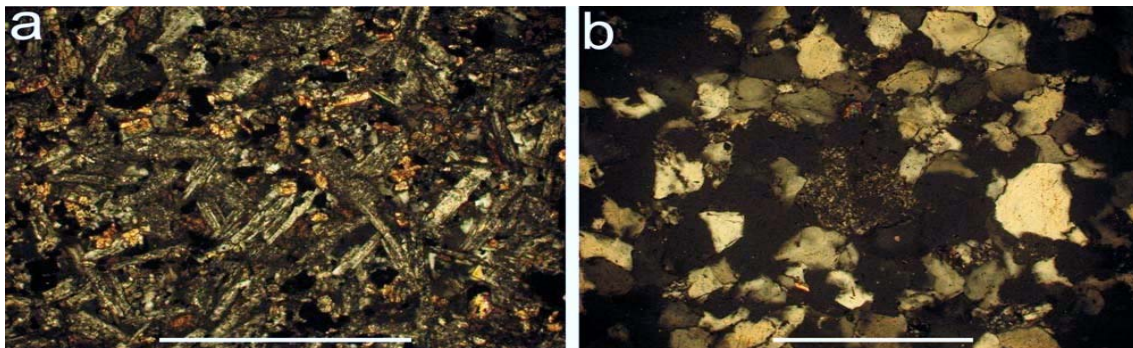


Fig.3 sample 3(a) and sample 1(b) in cross polarization, scale is 0.05mm.