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Truthfulness of the Existence of the Pelusium Megashear Fault System, East of Cairo, Egypt

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Author(s)

Mohamed A. Gamal

ABSTRACT

The so-called Pelusium Megashear System (PMS), consists of echelon left-lateral megashears crossing Africa from the Nile-Delta since the Precambrian times. Although this system is questioned by some scientists, its existence is sup- ported by others. This research work provides evidences for the existence of the PMS near Egypt's capital (Cairo city). Evidence is interpreted from gravity, magnetic, and seismological data, which proves that it has been in existence since 2800 BC [1]. To support the existence of this fault zone system, all available tectonic data are reviewed; new magnetic tilt derivative TDR map and recent fault plane solution map are introduced. Moreover available earthquake catalogue for historical and recent occurrences in and around the Pelusium zone is compiled. The collected recent and historical seismicity data is supporting the existence of PMS system. The faults excluded from magnetic maps were found to be in a good agreement with tectonic and gravity data introduced by some authors. Available fault plane solutions for old and recent earthquakes gave rise to the hypothesis that the PMS is right lateral shear system. Additionally, the Pelusium zone is evaluated for the rate of seismic activity. The hazards of these zones are studied by calculating the earthquake recurrence rates using Richter-Gutenberg formula (LogN = a – bM). A statistical method is applied to exclude the effect of lack of data due to little seismograph station in the early records, or lack of population density. The Pelusium Megashear fault system proved to be active at least in Egypt, however, it plays a role only over big time window, may be thousands of years to dissipate stresses accumulated within the west of Sinai Peninsula in the African Eurasian-Arabian plates. Finally integrated tectonic model including the effect of PMS is introduced to solve the complexity of intraplate tectonics in Northern Egypt.

KEYWORDS

Pelusium; Megashear; Fault; Hazard; Recurrence; Cairo; Egypt

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