The Spatial Distribution and Geometrical Characteristics of Dyke Swarms in Hami, Xinjiang, NW China

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The studies of dyke swarms on tectonic setting, emplacement pattern, formation mechanism, lithofacies, geochemistry, isotope geochronology, geometry and comparative planetary studies have making much progress in recent decades. A large number of basic dyke swarms have been exposed in the Hami area of Xinjiang. A series of researches have been conducted on the dyke swarms in this area, but few researches have been done on the spatial distribution characteristics of the dyke swarms. In this study, high-resolution remote sensing images were used to extract the geometric parameters and spatial distribution characteristics of dyke swarms in this area. In-depth research provides important information, most of the dykes are mainly related to the extensional tectonic setting. They are formed by the magmatic emplacement event resulting in the formation of a fracture system in the overlying crust and subsequent influx of magma. The emplacement modes of dyke swarms are mainly vertical and lateral, and may also be the result of the interaction of the two modes. The dyke swarms are diverse in lithology but mainly ultrabasic-basic rocks, indicating that they are closely related to the deep magmatism. The geochemical study of the dyke swarms can reveal the tectonic setting of the magmatic events, the magmatic evolution and the characteristics of the source area. A total of 201 rock dyke swarms were extracted from remote sensing images, of which two distinct extension directions ($80°$-$90°$ and $90°$-$105°$) obviously exist. The length of individual dykes in the study area varies from 37 m to 3.77 km with an average length of about 0.54 km. The average thickness of the dyke swarms is about 16.7m. The distribution of dyke swarms length approaches the power law distribution, while the dyke swarms thickness distribution follows the law of logarithm normal distribution. According to the extracted data, the crustal extension rate of this area is extracted and calculated in the direction of two cross-sections along the dyke swarms, and the crustal extension rates are 19.34% and 15.71% respectively.