

## Research and application of detection methods for urban underground space in Yan'an area

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**Abstract:** This paper considers that the methods of aerial photogrammetry and three-dimensional basic geology mapping are suitable for detecting the lateral mountain space while the technique methods of engineering geological drilling, monitoring while drilling and geophysical well logging of multi-parameters can be used in detection of vertical underground in loess hilly and gully region like Yan'an, among which the detection effect of engineering geological drilling and geophysical well logging of multi-parameters is much better. The detection result shows that the rock and soil of underground in Yan'an center areas can be divided into 8 soil mass mapping units and 5 rock mass mapping units, and the quartz sandstone strata of Baotashan Member in Middle Jurassic Yan'an Formation is favorable for underground space exploitation. It concludes four types of underground geological structure in Yan'an City, i.e. the loess gully region and slope zone of lateral mountain space geological structures, and the valley terrace area and the excavation and filling area of human engineering activities in vertical underground geological structure. The research result can provide controlled and accurate data for the establishment of a three-dimensional geological structure models in the area.

**Key words:** loess hills; Yan'an; underground space; detection method

• 成果快讯 •

## 无人机技术在长三角水网平原区生态环境地质调查中的应用示范

2019年12月1日,中共中央、国务院印发了《长江三角洲区域一体化发展规划纲要》,长三角区域一体化上升为国家战略。中国地质调查局南京地质调查中心紧扣“一体化”和“高质量”两个关键词,聚焦水环境和水生态等突出问题,以水为脉,积极探索长三角水网平原区无人机调查、采样和监测在生态环境地质调查的技术应用示范。

(1)形成无人机水域污染源快速筛查技术,利用无人机搭载热红外相机,可在1小时内完成10 km<sup>2</sup>的工业排污口监测,极大地提高了工业园区污染源调查和监测效率,为圈定污染源和水体精准采样提供技术支撑。

(2)形成无人机水域高效安全采样技术,破解湖泊中心水样采集难题,通过无人机搭载自主研发采水器进行水样采集,大幅提高工作效率和野外安全,16小时完成了26个湖泊中心区水样采集工作,可为涉水地区生态环境调查与监测提供技术支撑。

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