

## **Preliminary construction and application of a database of igneous rocks**

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A new scientific research paradigm driven by both data and models has emerged as a significant trend in the scientific community. Here, we present a database of igneous rocks developed within the framework of the Deep-time Digital Earth (DDE), an International Big Science Program. This database integrates the knowledge system of petrology with the concept of “data + mapping + research,” encompassing a backend service (Cloud), a user-friendly website (Web), and a dedicated scientific research work platform (Desktop). The primary data sources include published literature. The database contains detailed information on rock types, occurrences, spatial distribution, geological background, geochronology, geochemistry, isotopic compositions. It covers major Phanerozoic orogens and cratons. The data are accessible via both the website and the research platform.

The database offers several key advantages. (1) It is designed around the integrated concept of “data-mapping-research,” providing a platform for data analysis. (2) The inclusion of 22 thematic databases attracts a wide range of experts, creating strength in specific regions and fields. (3) The core datasets are enriched with chronological information and precise geographic coordinates (longitude and latitude), allowing for seamless integration with geographic map polygons. (4) The data analysis platform enables advanced research based on core data (geochronology, isotopes, etc.).

Leveraging this database, significant progress has been made in addressing major geoscientific issues, such as the complex processes of continental assembly, crustal growth, and the compositional architecture and evolution of the deep Earth.