Geosyncline

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Geosyncline theory is an obsolete concept involving vertical crustal movement that has been replaced by plate tectonics to explain crustal movement and geologic features. **Geosyncline** is a term still occasionally used for a subsiding linear trough that was caused by the accumulation of sedimentary rock strata deposited in a basin and subsequently compressed, deformed, and uplifted into a mountain range, with attendant volcanism and plutonism. The filling of a geosyncline with tons of sediment is accompanied in the late stages of deposition by folding, crumpling, and faulting of the deposits. Intrusion of crystalline igneous rock and regional uplift along the axis of the trough generally complete the history of a particular geosyncline. It is then transformed into a belt of folded mountains. Thick volcanic sequences, together with graywackes (sandstones rich in rock fragments with a muddy matrix), cherts, and various sediments reflecting deepwater deposition or processes, are deposited in *eugeosynclines*, the outer deepwater segment of geosynclines.

Geosynclines are divided into *miogeosynclines* and *eugeosynclines*, depending on the types of discernible rock strata of the mountain system. A miogeosyncline develops along a continental margin on continental crust and is composed of sediments with limestones, sandstones and shales. The occurrences of limestones and well-sorted quartzose sandstones indicate a shallow-water formation, and such rocks form in the inner segment of a geosyncline. The eugeosynclines consist of different sequences of lithologies more typical of deep marine environments. Eugeosynclinal rocks include thick sequences of greywackes, cherts, slates, tuffs and submarine lavas. The eugeosynclinal deposits are typically more deformed, metamorphosed, and intruded by small to large igneous plutons. The eugeosynclines often contain exotic flysch and mélange sediments.

An *orthogeosyncline* is a linear geosynclinal belt lying between continental and oceanic terranes, and having internal volcanic belts (eugeosynclinal) and external nonvolcanic belts (miogeosynclinal). Also known as geosynclinal couple or primary geosyncline. A miogeosyncline is the nonvolcanic portion of an orthogeosyncline, located adjacent a craton. A zeugogeosyncline is a geosyncline in a craton or stable area within which is also an uplifted area, receiving clastic sediments, also known as yoked basin. A parageosyncline is an epeirogenic geosynclinal basin located within a craton area. A exogeosyncline is a parageosyncline that lies along the cratonal border and obtains its clastic sediments from erosion of the adjacent orthogeosynclinal belt outside the craton. Also known as delta geosyncline; foredeep; or transverse basin.

Several types of "mobile" geosynclinal zones have also been recognized and named. Among the more common of these are the taphrogeosyncline, a depressed block of the Earth's crust that is bounded by one or more high-angle faults and that serves as a site of sediment accumulation; and the paraliageosyncline, a deep geosyncline that passes into coastal plains along continental margins.

Contents

History of the concept

The geosyncline concept was first developed by the American geologists James Hall and James Dwight Dana in the mid 1800s during the classic studies of the Appalachian Mountains. Dana was first to use the term *geosynclinal* in reference to a gradually deepening and filling basin resulting

from his concept of crustal contraction due to a cooling and *contracting* Earth. The geosynclinal theory was further developed in the late 19th and early 20th centuries and at that time was widely accepted as an explanation for the origin of most mountain ranges until its replacement by the subduction zone and continental collision orogenies of plate tectonics in the 1960s. Although the usage varied over the following 100 years, a geosyncline is still basically a large linear deepening basin along a continental margin which becomes deformed and then uplifted in parts as a mountainous region.

References

- King, Philip B. (1977) *The Evolution of North America*, Revised edition, Princeton University Press, pp 54-58
- Kay, Marshall (1951) *North American Geosyncline: Geol. Soc. America Mem. 48*, 143pp.

See also

- Émile Haug, French geologist

External links

- Story of Geosynclines