FIELD TRIP IN SHANDONG PROVINCE, EASTERN CHINA

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ABSTRACT

This field trip was led by Professors Shi Yangshen and Lu Huafu of Nanjing University following the Fourth International Tectonostratigraphic Terrane Conference in Nanjing. Shandong Province forms a peninsula that separates the North China Sea from the Bohai Sea. We traveled north by train from Nanjing to Xuchou and Taian, and then spent six days driving 600 km across the West Shandong terrane, the Tanlu fault zone, and the East Shandong composite terrane. The trip ended in the city of Yantai, near the tip of the peninsula.

REGIONAL GEOLOGY

The West Shandong terrane and the East Shandong composite terrane cover much of Shandong Province. The West Shandong terrane consists of Archean metavolcanic rocks (2.5 Ga) intruded by granite (2 Ga) and locally overlain by 600-800 m of Sinian (Late Proterozoic) platform sediments. Archean and Sinian rocks are unconformably overlain by 500 m of Cambrian and Lower Ordovician shale, limestone, and dolomite. An unconformity spans Late Ordovician through early Carboniferous time and is overlain by intertongueing marine and nonmarine (coal-series) facies of late Carboniferous and Early Permian age. Upper Permian rocks are nonmarine, predominantly red beds. Jurassic and Tertiary nonmarine rocks unconformably overlie Paleozoic and older strata.

East Shandong terrane includes two Proterozoic island arc terranes, the Jiaobei and the Jianan terranes, that amalgamated prior to the intrusion of a 610-Ma stitching pluton, the Kunyushan-Queshan granite. These terranes contain Early Proterozoic (1.7 Ga) plagioclase amphibolite, gneiss, and granulite; Middle Proterozoic (1.5-1.2 Ga) marble and schist; and Sinian (800-700 Ma) quartzite and limestone. They are overlapped by Jurassic and Lower Cretaceous nonmarine and volcanic rocks.

Three lines of evidence suggest Triassic to Early Jurassic accretion (juxtaposition?) of the East Shandong and West Shandong terranes along the Tanlu fault: (1) Pebbles of Cambrian oolitic limestone and Carboniferous fusulinid limestone derived from the West Shandong terrane were deposited in Upper Jurassic conglomerate of the East Shandong terrane, (2) paleomagnetic measurements on Jurassic strata in both terranes give similar paleolatitudes, and (3) pre-Jurassic strata of both terranes were deformed during the Triassic.

FIELD TRIP STOPS

At a stop in Yunlong Park in the city of Xuchou, before the main geologic field trip, we discussed paleobathymetry indicators at an outcrop of steeply dipping thin-bedded Cambrian limestone. The presence of edgewise conglomerate and graded beds were used by some participants to support a deep-water (continental-slope) model that contrasted with a shallow-water (platform) interpretation based on the fauna and the presence of oolites and stromatolites. No consensus had been reached when we left the outcrop.