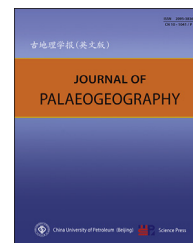




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Lithofacies palaeogeography and sedimentology

# Lacustrine basin evolution and coal accumulation of the Middle Jurassic in the Saishiteng coalfield, northern Qaidam Basin, China



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**Abstract** Based on an extensive borehole survey of the Middle Jurassic coal-bearing sequences in the Saishiteng coalfield, northern Qaidam Basin (NQB), a total of 20 rock types and 5 sedimentary facies were identified, including braided river, meandering river, braided delta, meandering river delta, and lacustrine facies. The distribution of rock types and sedimentary facies contributed to the reconstruction of three periods' sedimentary facies maps of the Middle Jurassic in the Saishiteng coalfield, namely, the Dameigou age, the early Shimengou age and the late Shimengou age. That also provided the basis for the development of a three-stage depositional model of the Middle Jurassic in the NQB, indicating the lacustrine basin of the NQB in the Dameigou age and early Shimengou age were corresponding to an overfill basin, and that in the late Shimengou age was related to a balanced-fill basin. The analysis of the stability and structure of coal seams based on sedimentary facies maps showed that the preferred coal-forming facies in the Saishiteng coalfield were inter-delta bay and interdistributary bay of lower delta plain in the Dameigou age. In particular, the swamps that developed on the subaqueous palaeohigh favored the development of thick coal seams. Thus, minable coal seams may also be found along the Pingtai palaeohigh in the western part of the Saishiteng coalfield.

**Keywords** Sedimentary facies, Middle Jurassic, Northern Qaidam Basin, Lacustrine basin evolution, Coal accumulation

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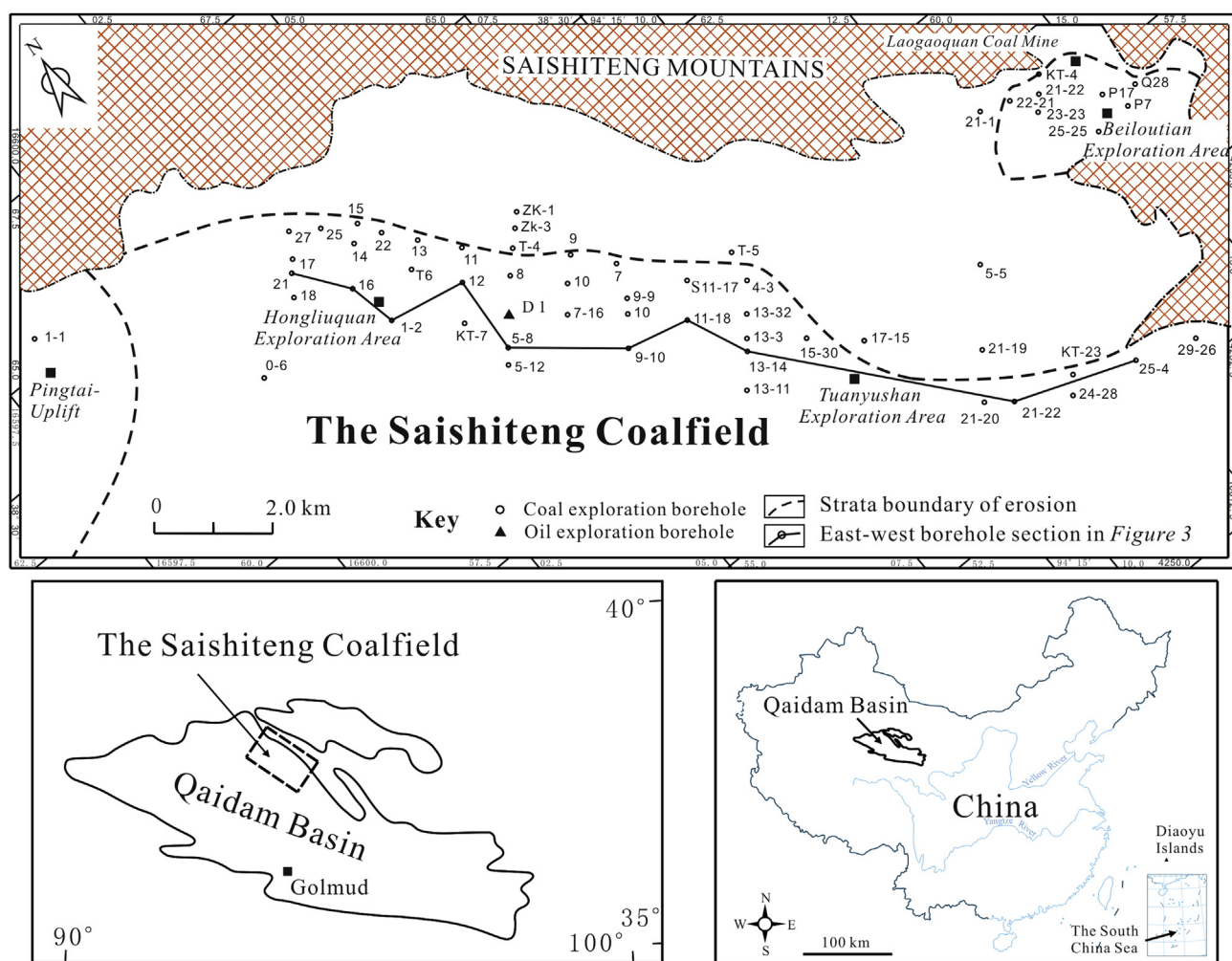
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## 1. Introduction

A classification of lacustrine basin types, including overfilled, balanced-filled, and underfilled, was proposed by Carroll and Bohacs (1999, 2001), which allowed us to differentiate continental basins according to their tectonic and palaeoclimatic settings (Diessel, 2007; Li et al., 2014b; Nichols and Fisher, 2007; Türkmen et al., 2007; Wadsworth et al., 2010). However, the tectonic environment, lacustrine basin evolution, and energy resources associated with different sedimentary facies in continental coal-bearing basins are not yet fully understood.

The Jurassic non-marine basin in the northern Qaidam Basin (NQB), northwestern China, was formed on top of the pre-Jurassic basement and is geologically significant because of its abundant oil, gas, and coal

resources (Li et al., 2014a; Liu et al., 2013; Yang et al., 2000; Zhao et al., 2000). The Saishiteng coalfield which is located in the western part of the northern Qaidam Basin, represents a new coal exploration area with high-quality coal resources beared in the Middle Jurassic. In the Saishiteng coalfield, a large number of coal and oil boreholes were drilled (Fig. 1) in recent years, facilitating a more detailed analysis of rock types, sedimentary facies, palaeogeography, palaeo-currents, provenance, subsidence and coal accumulation. These detailed original data and subsequent in-depth analyses allow us to address the sedimentary facies distribution, basin evolution and coal-forming characteristics of the continental lacustrine basin, thus a three-stage depositional model was proposed and the lacustrine basin evolution and coal accumulation during the Middle Jurassic in the Saishiteng coalfield were discussed.



Modified after the State Bureau of Surveying and Mapping, 2008 (GS(2008) 1990)

Fig. 1 Location of the Saishiteng coalfield, northern Qaidam Basin. The location of borehole data used in Figs. 3–6 are shown in the upper part.

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