

Coking coals of Mongolia

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Abstract

The coal deposits of Mongolia tend to become younger from west to east and can be subdivided into two provinces, twelve basins, and three areas. Main controlling factor of coal rank is the age of coal bearing sequences. Western Mongolian coal-bearing province contains mostly high rank bituminous coal in strata from Late Carboniferous. The basins in southern Mongolia and the western part of central Mongolia have low rank bituminous coal in strata from the Permian. The northern and central Mongolian basins contain mainly Jurassic subbituminous coal, whereas the Eastern Mongolian province has Lower Cretaceous lignite. Mongolian known coking coal reserves are located in western, southern and northern Mongolia and related to Carboniferous, Permian and Jurassic sequences, respectively.

Mongolian coal-bearing basins

Mongolian coal deposits are classified into two coal-bearing provinces (Western and Eastern Mongolian), twelve basins, and three areas (Fig. 1). A total of 400 coal occurrences and deposits are known, of which 100 have been explored (Bat-Erdene, 2012).

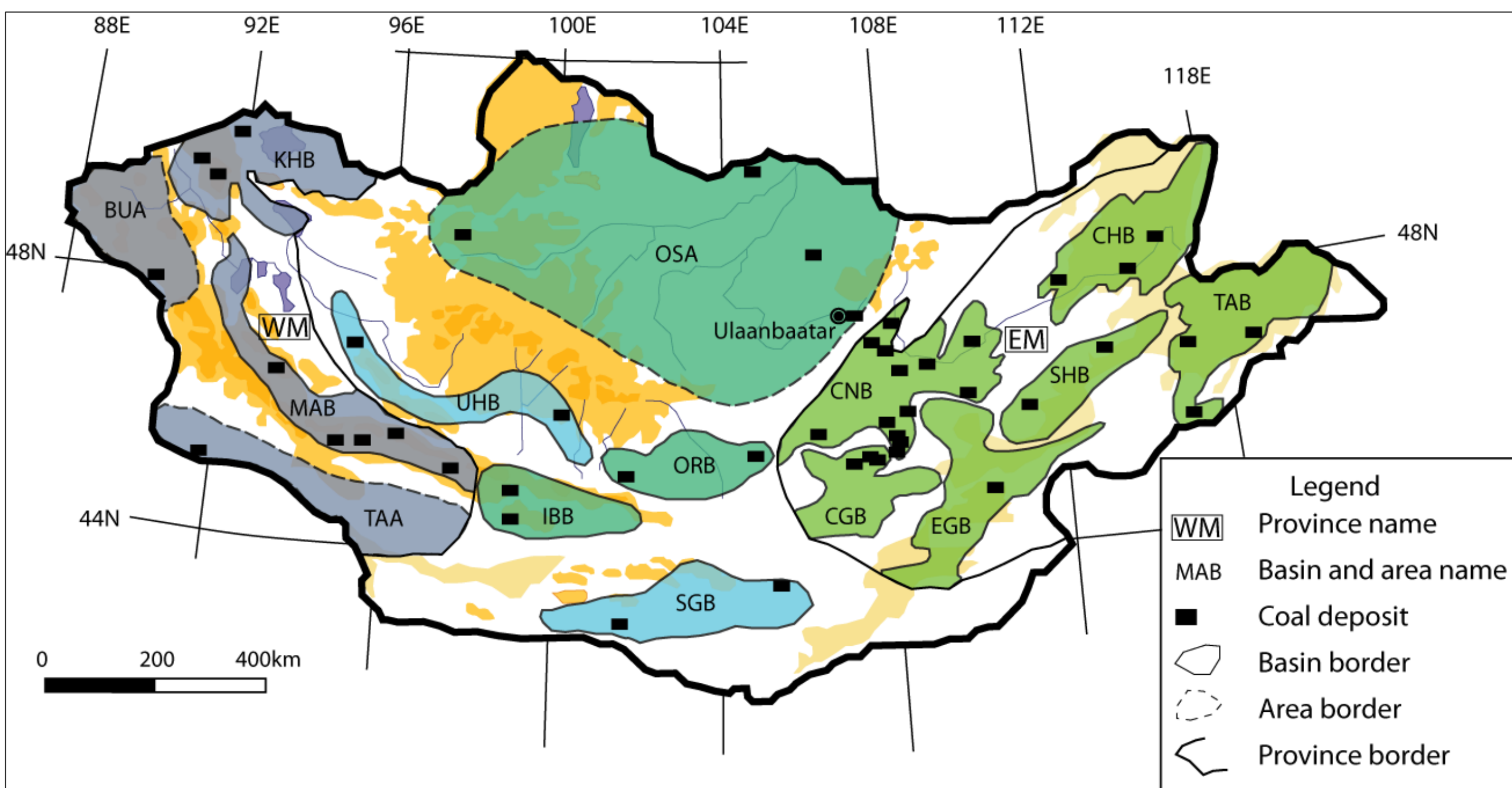


Fig. 1. A location map of Mongolian coal-bearing provinces, basins and deposits (Modified after Bat-Erdene, 1992)

Province: WM - Western Mongolian; EM - Eastern Mongolian;
Basins: KHB - Kharkhiraa; MAB - Mongol-Altai; SGB - South Gobi; UHB - South Khangai; IBB - Ikh Bogd; ORB - Ongi river; CNB - Choir-Nyalga; CHB - Choibalsan; TAB - Tamsag;
SHB - Sukhbaatar; EGB - East Gobi; CGB - Central Gobi; Areas: BUA - Bayan-Ulgii; TAA - Trans-Altai; OSA - Orkhon-Selenge;

Western Mongolian province includes two basins and two areas (Fig. 1, 2). The Pennsylvanian sequence is the most prolific coal-bearing unit (Erdenetsogt et al., 2009).

Eastern Mongolian province is the largest coal and oil shale-bearing province (Erdenetsogt et al., 2009) and comprises six coal and oil shale-bearing basins. The coal presence mainly associated with Lower Cretaceous sequences.

Other basins and area

Main coal resource in *South Gobi basin* is hosted in Upper Permian sedimentary rocks. The basin contains predominant portion of coking coal reserves of Mongolia. Coal seams of *Southern Khangai*, *Ikh Bogd*, and *Ongi river basins* are hosted in Upper Permian, Lower-Middle Jurassic, and Lower Cretaceous sedimentary sequences.

Orkhon-Selenge area is composed of 20 scattered small graben are filled with coal-bearing Jurassic and Lower Cretaceous sedimentary rocks.

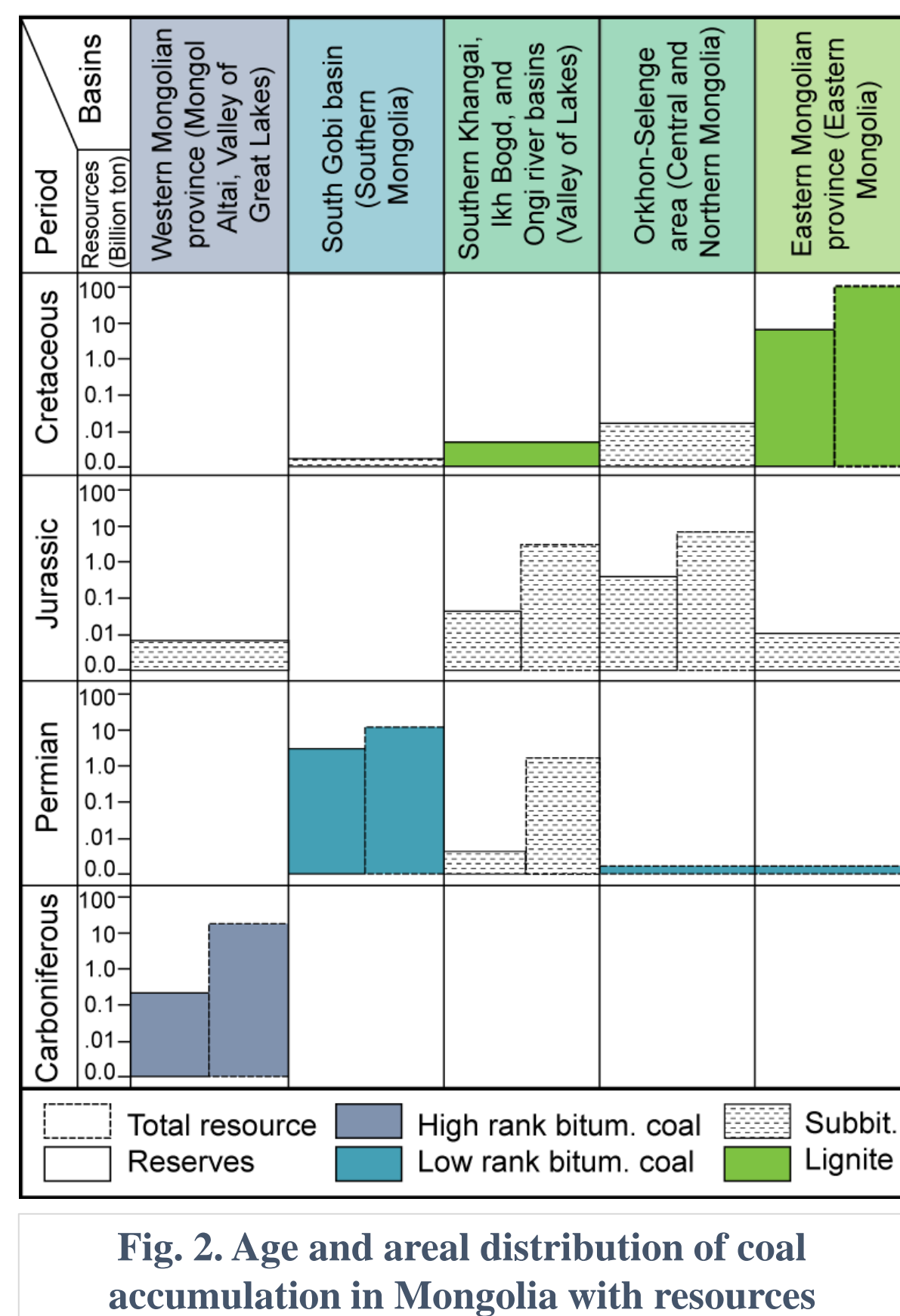


Fig. 2. Age and areal distribution of coal accumulation in Mongolia with resources

Some of the biggest coking coal deposits of Mongolia

Four coking coal deposits such as Pennsylvanian Nuurstkhotgor, Upper Permian Khurengol and Tavantolgoi, and Lower-Middle Jurassic Ovoot are selected to present here.

Pennsylvanian Nuurstkhotgor coal deposit is located in northwestern Mongolia (in Western Mongolian coal-bearing province). In total, 13 seams with the thicknesses ranging from 0.7 m to 205 m were intersected (Fig 3). Coal reserve is estimated to be 1.0 billion ton, of which half is coking coal (Bat-Erdene, B., 2014).

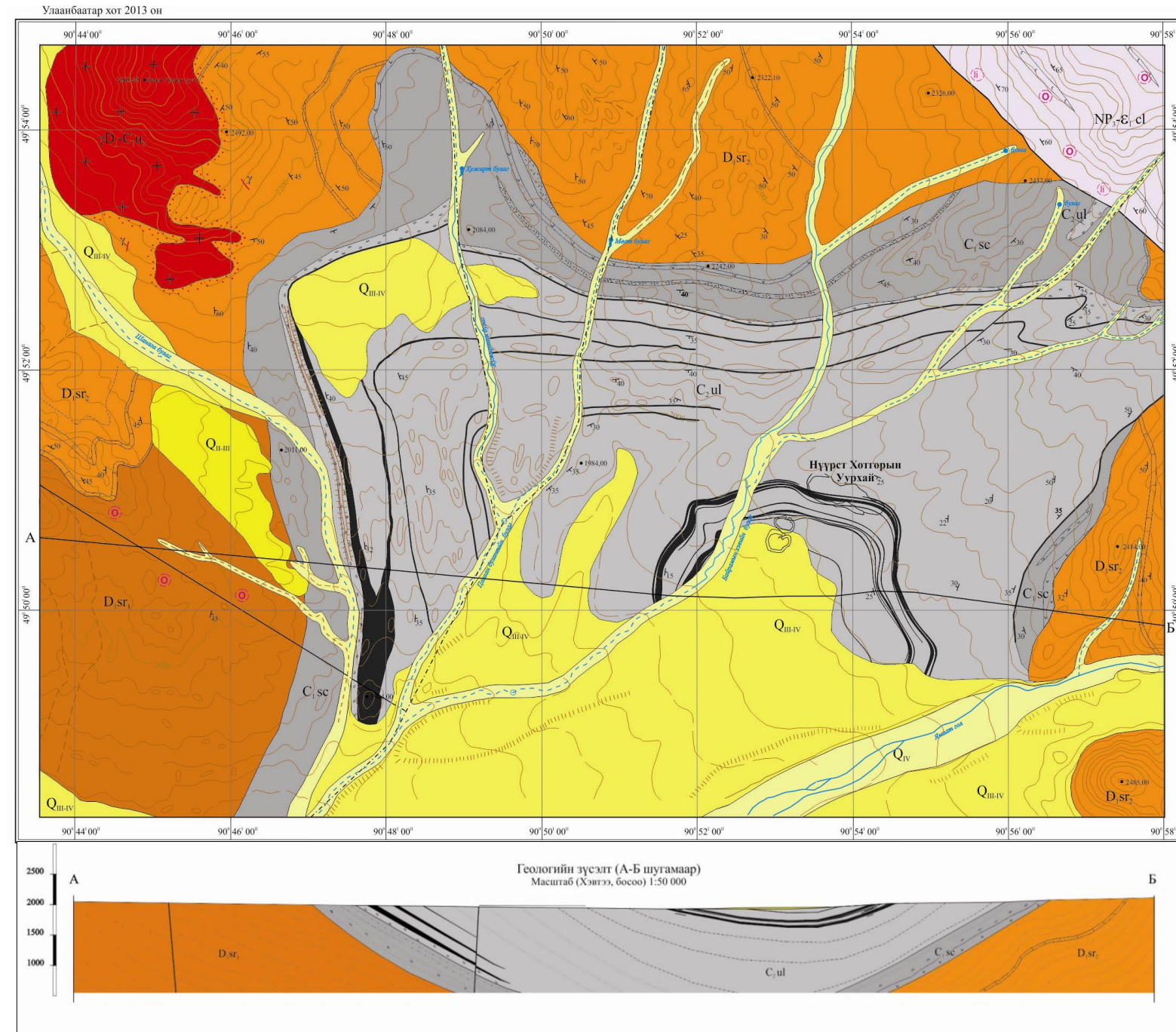
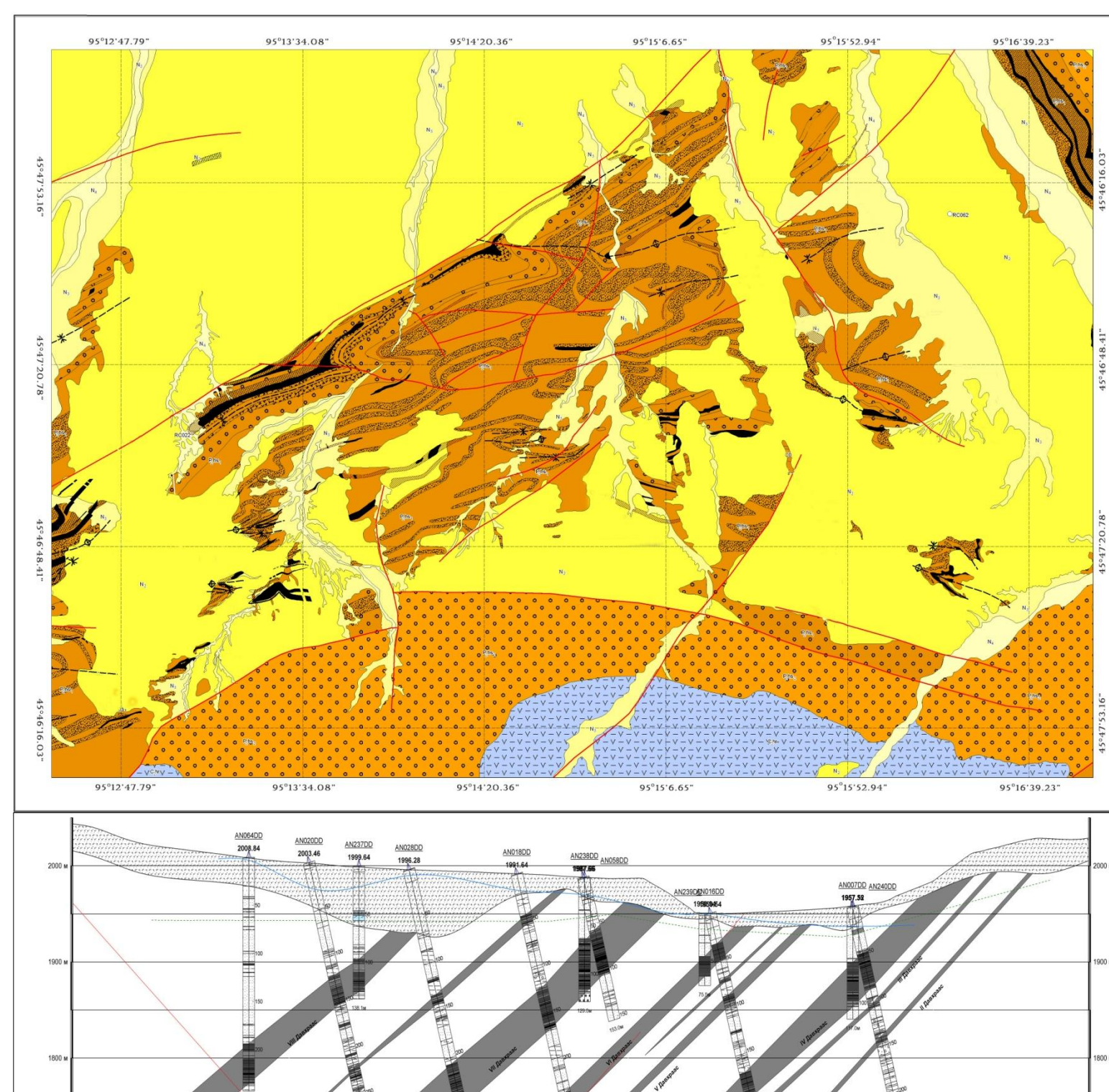


Fig. 3. Geological schema of Nuurstkhotgor deposit with section

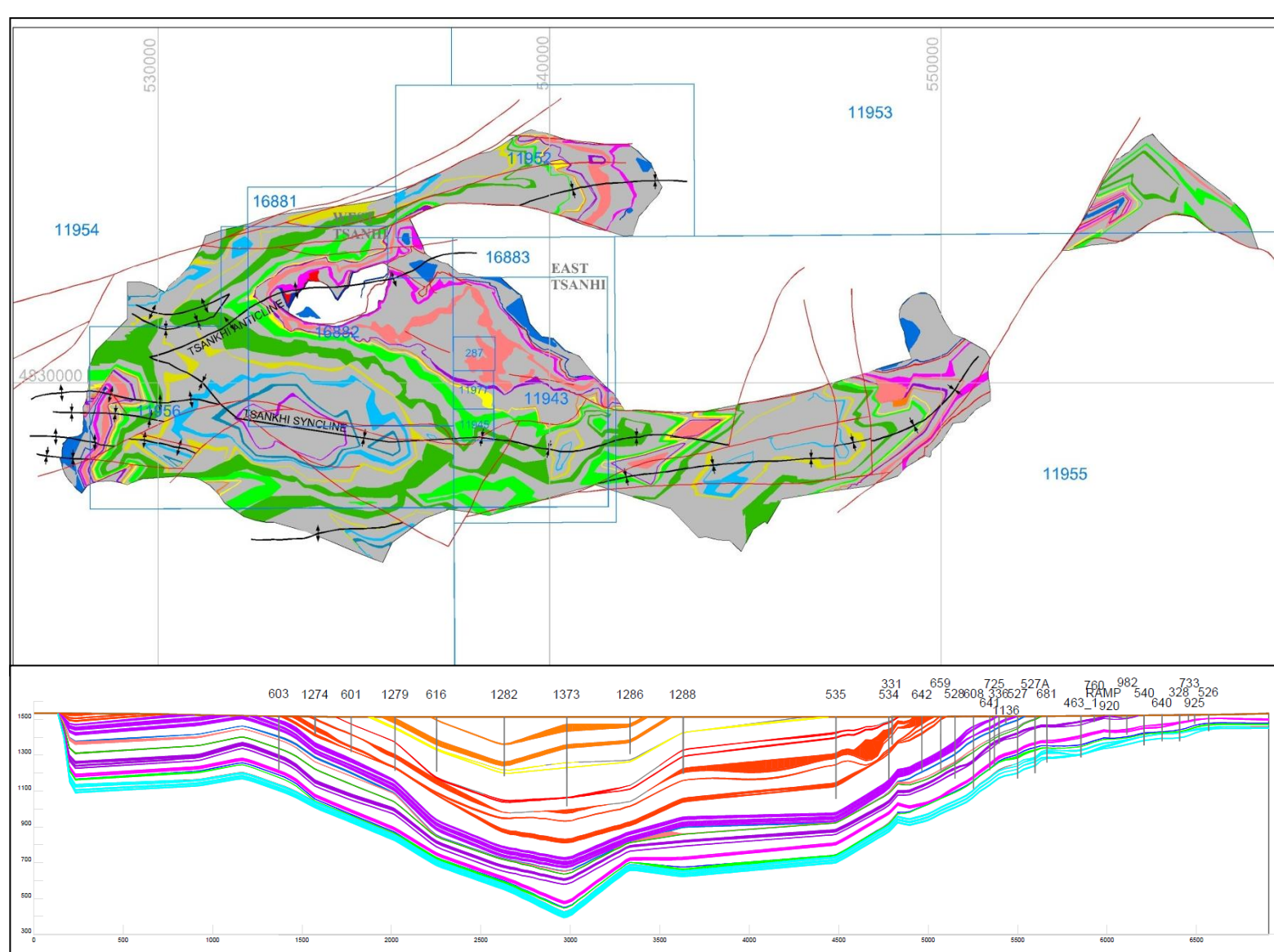


Upper Permian Khurengol deposit is situated in western Mongolia (in Western Mongolian coal-bearing province). The deposit has 8 seams with the thicknesses ranging from 8 m to 35 m (Fig 4). Coking coal reserve of the deposit is estimated to be 227 million ton (Bat-Erdene, B., 2015).

Fig. 4. Geological schema of Khurengol deposit with section

Upper Permian Tavantolgoi, the largest coking coal deposit, lies in southern Mongolia (in South Gobi coal-bearing basin). In Tsankh mine border, 11 seams with the thicknesses ranging from 2 m to 30 m (Fig 5). Coal reserve is estimated to be 6.0 billion ton, of which 2 billion ton is accounted as coking coal (Erdenetsogt et al., 2014).

Fig. 5. Coal seam schema of Tavantolgoi deposit with section



Coal quality

Nuurstkhotgor coals have 1-7.5 crucible swelling number (CSN) and 0-86 G-index. Vitrinite reflectance value (R_{\max} in oil) varies from 0.7% to 1.2% and sulfur content is low, ranging from 0.3% to 0.6% with an average of 0.4%.

Khurengol coals have CSN and G-index of 8-9 and 54-99, respectively. Vitrinite reflectance value ranges from 1.1 to 1.7% (average 1.4%) and sulfur content varies between 0.2 and 0.6% (average 0.4%).

Tavantolgoi coals have CSN of 1 to 7.5 and R_{\max} of 0.7% to 1.2%. Sulfur content is low, ranging from 0.5% to 0.9%.

Average CSN and G-index of Ovoot coal are 9 and 88, respectively. Vitrinite reflectance value ranges from 1.1% to 1.3% (average 1.2%) and sulfur content varies from 0.8% to 1.4% (average 1.0%).

Deposit	Seam	Average thickness, m	M, d, %	Ash, ad, %	VM, ad, %	St, ad, %	Q, daf, MJ/kg	FSI	G index
Nuurstkhotgor	Seam II	25	5 ^b	19	25	0.3	30.5	7.5	85
	Seam I	53	5 ^b	18	27	0.4	30.4	6.5	70
Khurengol ^{1,a}	-	-	1	8	27	0.6	33.2 ^b	9	75
Tavantolgoi (Tsankhi)	Seam IV	17	1	21 ^d	24 ^d	0.7	33.7	7.5	80
	Seam III	12	1	20 ^d	24 ^d	0.7	34.4	7	-
Ovoot ¹	-	-	1	21	28	1	24.4 ^b	9	88

Note: ¹deposit average; ^awashed coal; ^bair dry basis

Resources

Deposit	Total reserves, Mt	Coking coal reserves, Mt	Thermal coal reserves, Mt
Nuurstkhotgor	1032	500	532
Khurengol	227	227	-
Tavantolgoi (Tsankhi)	6008	2050	3958
Ovoot	281	281	-

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