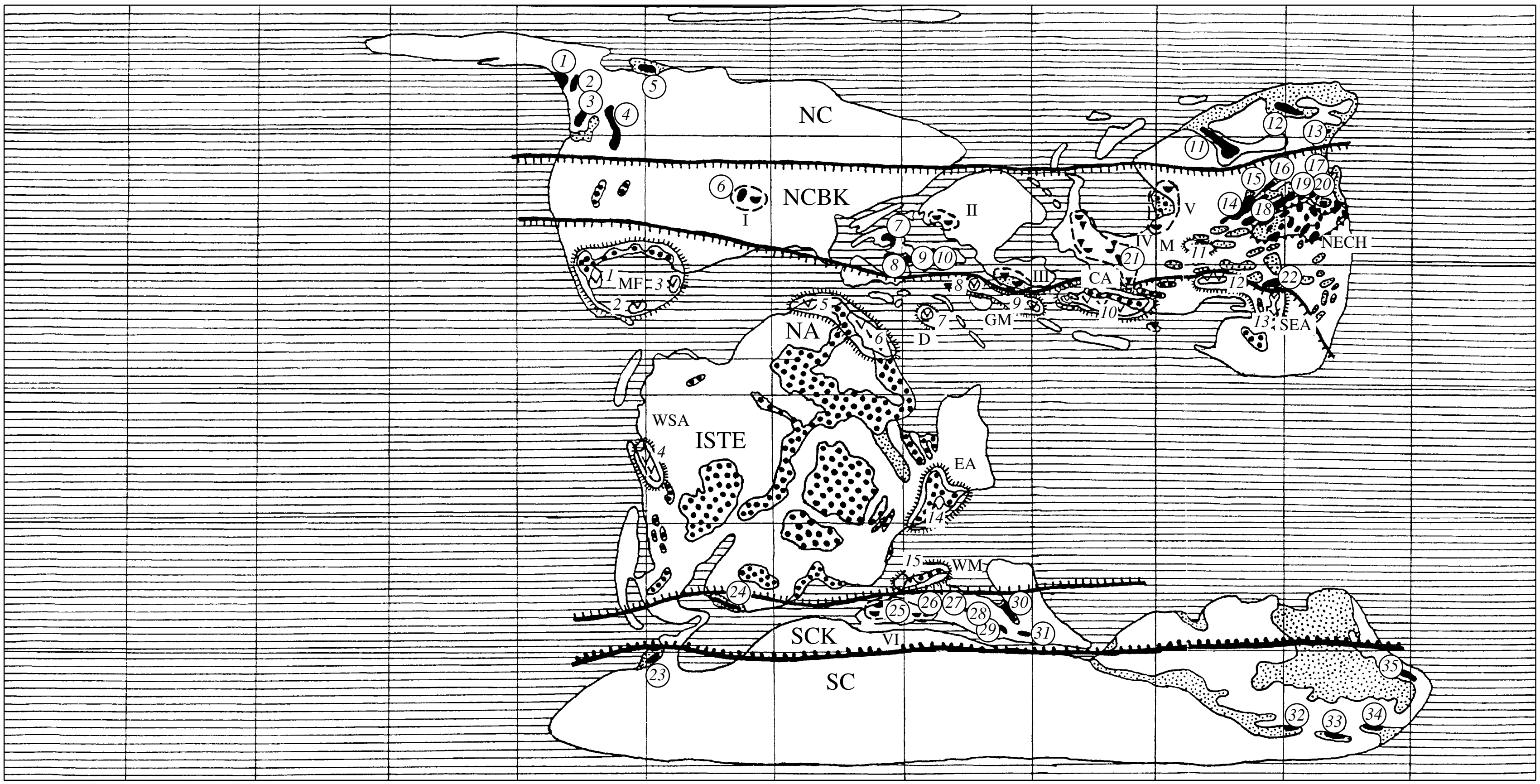
NC
NCBK
I
II
III
IV
V
VI
MF
NA
D
GM
CA
M
NECH
SEA
WSA
ISTE
EA
WM
SCK
SC

Fig. 6.

Pacific ocean to its continental margins, we should note that a complex segmented system of volcanic island arcs evolved during the Neocomian along the western coasts of Laurasia (Csejtev *et al.*, 1982; Monger *et al.*, 1982; Shervais and Kimbrough, 1985; Bogdanov and Dobretsov, 1987; Frazier and Schwimmer, 1987; Pindell *et al.*, 1988; Wallace *et al.*, 1989; Miller and Hudson, 1991; Samson *et al.*, 1991; Tardy *et al.*, 1991; Underschulz and Erdmer, 1991; Wilson *et al.*, 1991; Currie and Parrish, 1993). Deep-sea trenches that accompanied these volcanic arcs were locally situated on both the oceanic and the continental sides of island arcs (Wallace *et al.*, 1989). Chains of the Early Cretaceous island arcs along the western coast of Laurasia appeared as early as in the Jurassic time. In the Late Jurassic, some of their segments experienced collision and were integrated into more extended systems (Harper and Wright, 1984; Wallace *et al.*, 1989). In addition to active volcanic island arcs, an underwater chain of the superterrane Talkeetna consisting of dead volcanic arcs of the Paleozoic and Early Mesozoic age existed in the Early Cretaceous along the northeastern periphery of the Mesozoic Pacific Ocean (Jones *et al.*, 1986; Wallace *et al.*, 1989). The Berriasian–Barremian time was marked by the gradual convergence of segments of volcanic island arcs with the Laurasian margin, which continued until the Aptian, when they were amalgamated to the continent (Lanphere *et al.*, 1978; Csejtev *et al.*, 1982; Armstrong *et al.*, 1986; Vaughan, 1995; Zharkov *et al.*, 1995; Filatova, 1996). In the southeastern peripheral part of the ocean, a complex system of island-arc and marginal continental volcanic belts evolved during that time (Figs. 1–4). The northern segment of this system (10°–15° S) included the volcanic island arc situated near the northwestern margin of Gondwana (Colombia, Ecuador, Peru), when volcanoes erupted boninitic and tholeitic lavas (Megard, 1987; Wallrabe-Adams, 1990; Van Thournout *et al.*, 1992). Southward, the Chile–Argentine margin of Gondwana was an area of mountainous landscape. A volcanic belt with thick calc-alkaline volcanic sequences existed there (Coira *et al.*, 1982; Lomize, 1983). A trough with tholeitic and alkalic basalts appeared in the rear of the belt (Dalziel *et al.*, 1974; Suarez, 1979; Grier *et al.*, 1991). This belt continued farther to the south into the Patagonia–Antarctic segment. However, the back-arc depression of this structure represented a marginal sea basin, which accumulated turbidites and MORB-type basalts.

Along the New Zealand–Australia margin of Gondwana in the southwestern periphery of the Mesozoic Pacific ocean, the active volcanic island arc of that time (Lundbrook, 1978; Howell, 1980; Swarko *et al.*, 1983) was conjugated with the deep-sea trench (Figs. 1–4) and surrounded by narrow zones of turbidite sedimentation. The continental margin was occupied here by a shelf sea.

In the northwestern Pacific, the narrow South Anyui sea gulf separating the system of Chukchi continental blocks from the Kolyma–Omolon part of Laurasia existed during the Berriasian–Barremian period. This sea gulf, which gradually narrowed by the mid-Cretaceous time (Filatova, 1988, 1995; Bogdanov and Til'man, 1992; Parfenov *et al.*, 1993), hosted a winding chain of island arcs, which joined the island arcs of the Koryak and Far East regions of the northwestern circum-Pacific margins (Bogdanov, 1988; Faure *et al.*, 1988; Kojima, 1989; Zonenshain *et al.*, 1990; Natal'in and Faure, 1991; Sokolov, 1992).

The Chinese–Korean margin of Laurasia represented in the Neocomian time a land of ragged topography with an extended chain of land volcanoes (Wang and Lin, 1986; Wu and Pei, 1988; Filatova, 1990, 1991). Its rear parts were occupied by depressions with red-bed, evaporite, and, often, coal-bearing deposits. The seaward part of the volcanic belt was fringed by the fore-arc basin and deep-sea trench.

The southern margin of Laurasia in western and eastern Tethys had a similar evolutionary trend during the Neocomian time (Knipper, 1985; Zonenshain *et al.*, 1987; Bogdanov *et al.*, 1994). Spacious areas of this margin were occupied by the epicontinental sea with calcareous sedimentation. The edge of the continent was fringed by the Pont–Transcaucasus ensialic volcanic island arc with turbidites accumulated in the fore-

Fig. 6. Belts and provinces of arid and humid sedimentation in the Valanginian Age of the Early Cretaceous (symbols as in Fig. 5) *Evaporite basins: 1*, Sabinas; *2*, Yucatan; *3*, South Floridan; *4*, Altiplano (Chicamos, Hunin, and others); *5*, Moroccan; *6*, Algerian–Tunisian; *7*, Dinarids; *8*, Moesian; *9*, Georgian; *10*, Central Asian; *11*, Dzabhan; *12*, Weihe; *13*, Lanpang-Simao; *14*, Mandera; *15*, Murundava, Mazhunga. *Evaporite provinces:* MF, Mexico–Floridan; WSA, Western South American; NA, North African; D, Dinarids; GM, Georgian–Moesian; EA, East African; CA, Central Asian; SEA, Southeast Asian; WM, Western Madagascar. *Coal-bearing basins: 1*, Saint Elias; *2*, White Horse; *3*, Bowser, Sastus, Skeena, and others; *4*, Foothills and Front Ranges of Rocky Mountains; *5*, Eastern Mackenzie; *6*, Moose River; *7*, Celtic; *8*, Bristol, Wild, Channel; *9*, Parisian; *10*, Western Netherlands, Lower Saxonian, Altmark–Branderburg; *11*, Lena; *12*, Zyryanka; *13*, Northern Okhotsk; *14*, West Transbaikalian; *15*, Olekma–Vitim; *16*, Southern Yakutia; *17*, Udsk; *18*, East Transbaikalian; *19*, Amur–Zeya; *20*, Bureya; *21*, Karakamys; *22*, Weihe; *23*, Alexander; *24*, Algoa; *25*, Sakoa; *26*, Palar and others; *27*, Eluri, Ongole, and others; *28*, Wardha, Nagpur, and others; *29*, Talcher; *30*, Narmada (Satpura and others); *31*, Damodor and others; *32*, Otway; *33*, Bass; *34*, Gippsland, Strzelecki; *35*, Maryborough and Miscellaneous; (NECH) Northeastern Chinese coal-bearing province. *Provinces of kaolinite and kaolinite–bauxite formation*: I, Moose River; II, Western Baltic; III, Northern Black Sea; IV, Central Asian–Western Siberian; V, Eastern Siberian; VI, Southern Madagascar–Southern Hindustan. *Climatic belts*: NC, northern coal-bearing of the circumpolar humid zone; NCBK, northern coal–bauxite–kaolinite belts of the humid zone in middle latitudes; ISTE, intersubtropical evaporite belts of the arid zone; SCK, southern coal–kaolinite belts of the humid zone in middle latitudes; SC, southern coal-bearing belts of the humid zone.

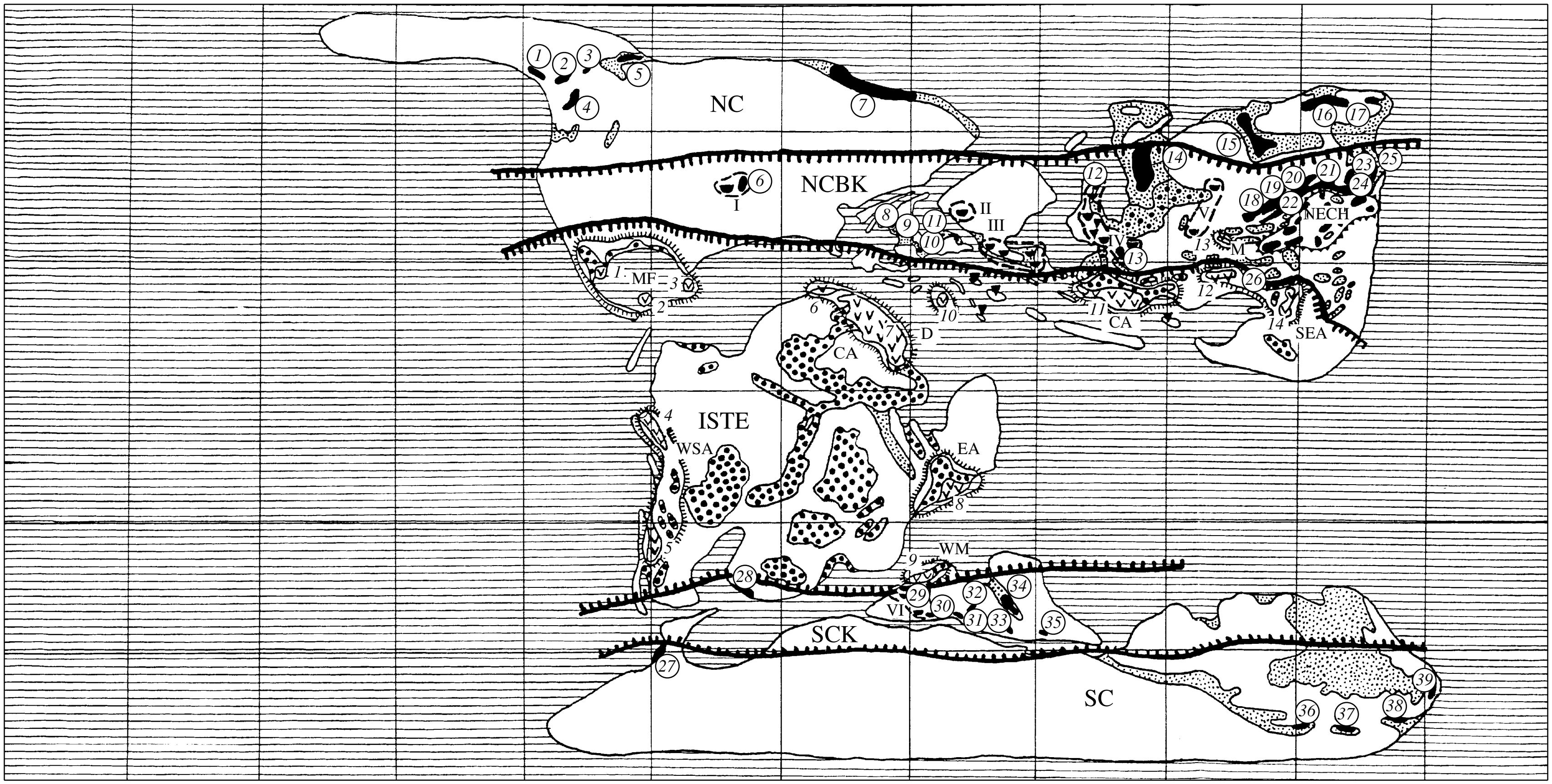

Fig. 7.

arc basin of its seaside part. The deep-sea trench, whose outer oceanic slope was in contact with hemipelagic and calcareous–clayey deposits of the Tethys, occupied the most frontal position. The incipient Black Sea and South Caspian marginal basins, which appeared as early as in the Late Jurassic, existed in the rear of the Pont–Transcaucasus volcanic arc (Zonenshain *et al.,* 1987; Kaz'min *et al.,* 1987; Dercourt *et al.,* 1993).

Further eastward, in the Tibetan region, the Pontids–Transcaucasus ensialic belt marged into the volcanic island arc of the peripheral zone of the ocean in front of the southern edge of Laurasia, which was bounded by zones of turbidite accumulation (Tapponnier *et al.,* 1981; Bard, 1983; Dietrich *et al.,* 1983; Allegre *et al.,* 1984; Coulon *et al.,* 1986). Even further to the east, the Laurasian margin within the Indochina region of Southeast Asia represented a differentiated mountain land with a chain of volcanoes adjoining the fore-arc trough with turbidite sedimentation and the deep-sea trench (Otsuki, 1985; Wang and Lin, 1986; Poltser and Tapponnier, 1988).

The peculiar feature of landscapes in southern Laurasia and the adjacent peripheral oceanic zone consisted of the presence of undersea rises with carbonate and terrigenous–carbonate sedimentation in the latter zone (Figs. 1–4). These rises are usually considered to represent fragments detached from the African–Arabian plate. The raised blocks (Central Afghanistan, Pamirian, South Tibetan) gradually neared the edge of the Laurasian continent from the Berriasian through the Barremian and collided with the latter in the Aptian–Albian (Allegre *et al.,* 1984).

Thus, the spacious Neocomian ensembles of perioceanic ensialic island arcs existed along the deep-sea trenches of the Mesozoic Pacific, for instance, in its northeastern and northwestern sectors including the southern Anyui gulf. In the southeastern sector of the ocean, the situation was more complicated: the island arc located near northwestern Gondwana merged southward into the central Andean–Antarctic volcanic belt of the continental margin, which further extended along the eastern margin of Gondwana into the southwestern sector of the Pacific. Similarly, island arcs of the northwestern Pacific were replaced southward, in the Chinese–Korean region, by marginal continental volcanic belts.

Volcanic belts along the northern periphery of the Tethys also occupied the marginal position in continents, though segments of oceanic ensimatic island arcs were also formed in some of these areas (for instance, in the North Tibetan region). It is interesting that, in the rear regions of volcanic belts, back-arc and marginal basins existed throughout the Neocomian and tectonic extension in continental margins progressed with time. This can be exemplified by the Rocas-Verdes basin in the Patagonia region of South America, where this period of time resulted in formation of the oceanic-type crust.

The considered paleogeographic settings existed in active margins of Gondwana and Laurasia until 110–105 Ma, i.e., until the cardinal reorganization of lithosheric plates (Knipper, 1985; Bogdanov, 1988; Larson, 1991; Zonenshain and Kuz'min, 1992; Khain and Balukhovskii, 1993; Zharkov *et al.,* 1995; Filatova, 1996).

PECULIAR FEATURES OF SPATIAL DISTRIBUTION OF ARID AND HUMID SEDIMENTATION AREAS

Schemes illustrating the distribution of coal accumulation areas and basins of red-bed or gray-bed sedimentation in the arid and humid zones also show the sites of kaolinite and bauxite formation. They are based on lithologic–paleogeographic reconstructions and also on an analysis and systematization of published data (Bogolepov, 1961; Butov *et al.,* 1962; Douglas, 1964; Martinis and Visintin, 1966; *Atlas litologo–paleogeograficheskikh*..., 1968; Gol'tbert *et al.,* 1968; Busson, 1972; Blant, 1973; Beltrandi and Pyre, 1973; *Poverkhnosti vyravnivaniya*..., 1974; Gevork'yan, 1976; Traves and King, 1976; Kauffman, 1977; Ludbrook, 1978; De Klasz, 1978; Dingle, 1978; Nairn, 1978; Benson *et al.,* 1978; Saint-Mare, 1978; Yasamanov, 1978; *Kory vyvetrivaniya*..., 1979; Megnien, 1980; Monakhov *et al.,* 1981; Parrish *et al.,* 1982; Ziegler, 1982,

Fig. 7. Belts and provinces of arid and humid sedimentation of the Hauterivian Age of the Early Cretaceous (symbols as in Fig. 5). *Evaporite basins*: *1*, Sabinas; *2*, Yucatan; *3*, South Floridan; *4*, Altiplano (Chicamos, Hunin, and others); *5*, Neuken; *6*, Moroccan; *7*, Algerian–Tunisian; *8*, Mandera; *9*, Murundava; *10*, Dinarids; *11*, Central Asian; *12*, Qaidam; *13*, Dzabhan; *14*, Lanpang-Simao. *Evaporite provinces:* MF, Mexico–Floridan; WSA, Western South American; NA, North African; EA, East African; WM, Western Madagascar; D, Dinarids; CA, Central Asian; M, Mongolian; SEA, Southeast Asian; *Coal-bearing basins*: *1*, Saint Elias; *2*, White Horse; *3*, Peel; *4*, Laberge, Bowser, Sastus, and others; *5*, Eastern Mackenzie; *6*, Moose River; *7*, Sverdrup; *8*, Celtic; *9*, Bristol, Wild, Channel; *10*, Parisian; *11*, Western Netherlands, Lower Saxonian, Altmark–Branderburg; *12*, North Uralian; *13*, Karakamys; *14*, Enisei–Taz; *15*, Lena; *16*, Zyryanka; *17*, Anui; *18*, West Transbaikalian; *19*, Olekma–Vitim; *20*, Southern Yakutia; *21*, Amur–Zeya; *22*, East Transbaikalian; *23*, Udsk; *24*, Bureya; *25*, Partizansk, Razdol'naya; *26*, Central Qinling; *27*, Alexander; *28*, Algoa; *29*, Sakoa; *30*, Palar; *31*, Eluri, Ongole; *32*, Wardha, Nagpur; *33*, Talcher; *34*, Narmada (Satpura and others); *35*, Damodor and others; *36*, Otway; *37*, Bass; *38*, Gippsland, Strzelecki; *39*, Clarence, Moreton, and Miscellaneous; (NECH) Northeastern Chinese coal-bearing province. *Provinces of kaolinite and kaolinite–bauxite formation*: I, Moose River; II, Western Baltic; III, Northern Black Sea–Donets; IV, Uralian–Western Siberian; V, Eastern Siberian; VI, Southern Madagascar–Southern Hindustan. *Climatic belts*: NC, northern coal-bearing belt of the circumpolar humid zone; NCBK, northern coal–bauxite–kaolinite belt of the humid zone in middle latitudes; ISTE, intersubtropical evaporite belt of the arid zone; SCK, southern coal–kaolinite belt of the humid zone in middle latitudes; SC, southern coal-bearing belt of the humid zone.