In the course of postsedimentary development, the Lower and Middle Jurassic sedimentary complex of the Greater Caucasus underwent various transformations through diagenesis and burial to appreciable depths under the influence of intense lateral loads (stress) and the formation of cleavage. These transformations were accompanied by intense mineralogical and geochemical alterations of rocks. As demonstrated in our previous works (Gavrilov, 2005; Gavrilov and Tsipursky, 1987; Gavrilov et al., 2000, 2001; Bujakaite et al., 2003; Kushcheva et al., 2007; and others), alterations of clayey rocks are primarily manifested in the change of minerals assemblages, crystallinity index of minerals, their polytypism, and other properties. The development of cleavage was accompanied with both dissolution of some primary terrigenous minerals and formation of new ones. These processes caused redistribution of elements or their compounds resulting in change in proportions of the parental (initial) and daughter (secondary) isotopes. Rearrangement of the isotope systems “reset radiological clock,” allowing one to date the postdiagenetic alterations of rocks with a certain precision. Earlier we examined changes in isotope systems of clayey rocks within a large terrigenous complex of the Lower and Middle Jurassic rocks in the central Greater Caucasus. Investigations were carried out along the geological profile across the Terek River valley of the Central Caucasus (Bujakaite et al., 2003; Gavrilov, 2005). It was established that the measured radiological age suggests a significant “rejuvenation” of rocks, relative to their real stratigraphic age. In different parts of the Greater Caucasus, for example, in its western area roughout the profile across the Belaya River (Adygeya) (Kushcheva et al., 2007), such alterations of sedimentary sequences differ in intensity. Since our task was to elucidate the character and dynamics of secondary transformations of the Jurassic terrigenous complex throughout the entire area of its occurrence, it required to carry out the corresponding investigations in Dagestan in the eastern Greater Caucasus (Fig. 1).

OBJECTS AND METHODS

Investigations in the Eastern Caucasus were carried out along the Avar Koisu River valley and its sources along the profile across a major portion of the Lower—Middle Jurassic rock terrane (Figs. 2, 3). Data on stratigraphy of this region are presented in (Gushchin and Panov, 1983). As compared to other profiles studied previously (Bujakaite et al., 2003; Kushcheva et al., 2007), the Dagestan profile is characterized by the presence of distinct zones with similar deformations—monocline zone, flexure and box fold zone, acute upright and inclined fold zone, and Bezhita depression zone with irregular deformations. Rocks of the profile show intense development of cleavage in some areas and its absence in other areas. These areas are separated by transitional zones. We recorded the deformation mode of textures and structures in different parts of the profile. In order to study the lithological, mineralogical, and geochemical composition of rocks along the profile, we took about 100 samples from rock sequences ranging from the upper Pliensba-
The X-ray study of samples was carried out to characterize clay minerals from different parts of the profile (Gavrilov and Tsipursky, 1987; Gavrilov, 2005). Study of the oriented preparations and their powder samples were analyzed with a DRON-2 diffractometer (Cu Kα) to determine the phase composition of the clayey rock fraction <0.001 mm. The results revealed that the samples contain different proportions of micaceous minerals, kaolinite, and chlorite. Diffractograms of the natural oriented preparations show integral or nearly integral series of basal reflections 00l (d(001) ~ 10 Å) that are typical of the micaceous minerals. After the saturation of preparations with glycerin, diffractograms of some samples demonstrate a slight high-angle shift of the first basal reflection 001, suggesting the presence of expandable (2 : 1) layers in the minerals (Drits and Sakharov, 1976). Following the classification of micaceous minerals with different contents of expandable layers (Omel’yanenko et al., 1982), we subdivided the studied micas into two groups: sericites (expandable layers <5%) and hydrolics (expandable layers 5–10%, up to 15% in some samples).

Some samples were examined by the oblique-texture electron diffraction (OTED) method to unravel the possible differences in the polytype modifications of micas and to determine parameters of their unit cells. The chlorite-bearing samples were subjected to preliminary treatment to remove the admixture. The study was carried out with an ER-100 electron diffractometer at 100 kV. Deciphering of the OTED results unraveled the presence of various combinations of the micaceous minerals of polytype modifications 1M and 2M₁ in the samples. Their contents vary in different parts of the profile: modification 1M prevails in some parts; proportions of micas 1M and 2M₁ are approximately equal in other parts; and virtually pure micas 2M₁ prevail in some parts (Gavrilov and Tsipursky, 1987; Gavrilov, 2005).

Analysis of diffractograms of the clayey rocks shows that crystallinity degree of the layer silicates is variable in different parts of the profile. Different types of crystallinity index are used to assess the variation. Although this method has several shortcomings (Frey, 1970; Eberl and Velde, 1989; Drits et al., 1997; and others), sufficiently great number of determinations of this parameter (in our case, Kübler index KI) makes it possible to obtain a statistically reliable pattern that...