Geophysical Research Abstracts,
Vol. 10, EGU2008-A-05192, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-05192
EGU General Assembly 2008

Calibration of Upper Cretaceous sea level transgression peaks and unconformity level by method of vertical-motionless reference points (East European platform).

B. Malkin
("Aerogeophysica", Russia, malkin@aerogeo.ru)

Cretaceous sedimentary cover of epeiric seas of East European platform (EEP) is convenient for calibration of absolute levels of Upper Cretaceous transgression peaks by method of vertical-motionless reference point. The calibration is based on: a) the amplitudes of relative sea level fluctuations during Cretaceous time established before, b) the selection and substantiation of tectonic stability of key section points, and c) some representations about Cretaceous development of the East Europe platform topography, allowing to use hypsometric levels of regional stratigraphic unconformity for an estimation of transgression peaks altitude. Ideal reference point for the decision of a calibration task is detection of a paleocoastal line of the sea transgression within the limits of stable area. Such territory should settle down in internal parts of craton (epeiric sea). Sedimentary basins of external shelves are more subject to isostatic compensation movements and sensitively react by deformations to changes of tectonic stress.

It is obvious, that conservation of the paleocoastal lines of transgression after tens millions years of subaerial history is rather improbable. For the stable intracraton areas the simple method of an estimation of absolute sea level can be offered. It is possible to receive the minimal and maximal estimations. The hypsometric mark of a layer plus depth of the sea determined by lithofacial criteria defines a sea level of a sedimentary episode. The received estimation generally less real one as it is authentically not known, what part of a layer was destroyed by the subsequent erosion. On the

contrary, if to hypsographic mark of unconformity level (basis of a layer) we plus a relative amplitude of sea level rise established from complete stratigragraphic records for this sedimentation episode, the received estimation will be higher real one as the residual relief of unconformity surface is unknown. Clearly, that for vertical motionless areas (blocks) the calculated minimal transgression level should be less maximal one: - their difference will indirectly characterize a residual relief and reliability of an estimation: - the less this difference, the better key section is suitable as a reference point. It is possible to classify the deformations caused by tectonic stress as localized, poor-localized and non-localized. Post-Turonian localized tectonic deformations, especially of the Miocene age, are rather widely represented within the EEP. Areas of such deformations are characterized by the non-horizontal position of Upper Cretaceous layers, and they can be easily excluded from consideration. Poor-localized deformations are expressed by insignificant deviations from horizontal over large areas and are characteristic for peripheral zones of Paleogene areas of weak lowering. In this case, rock bedding are weak monoclinal, and the initial hypsometric bedding level can be restored. Such regions with certain restrictions can be used for estimating sea level by means of a motionless reference point. The role of non localized deformation in sea level calibration is estimated in first tens meters.

As a result of the calibrations of a curve of fluctuations of a sea level within the limits of the EEP for Albian-Campanian time it is possible to draw the following conclusions: 1. Within the limits of the EEP there are areas (blocks) which answer to geophysical, structural, stratigraphic and paleogeographic criteria of tectonic stability during the last 100 million years. These areas can be counted motionless in sense of vertical tectonic movements and to use as a reference point for calibration of fluctuations of a sea level recorded in deposits of epeiric seas. The most probable estimation maximal trangression peak of the beginning of Turonian is about **280** meters above contemporary level and the same estimation was received for several reference areas. 2. The chosen reference points placed in the central part of EEP are rather far one from another and belong to different structural elements of EEP. Results of calibration the maximal sea level based on different fragments of Albian-Campanian stratigraphic section, including unconformities, have shown almost identical values. Thus maximal (based on unconformities) and minimal (based on lithofacial analysis) estimations also are very close, that testifies weak difference between hypsometric level of unconformities and a sea level in regressive minima during the Cenomanian–Campanian history of EEP. 3. In the Middle Cenomanian EEP central area looked like low polygenetic planation surface. It was generated with significant participation of processes of marine denudation. During the period from the Turonian up to Late Santonian the sea has several times flooded the peneplain, and the sea level fell again, approximately, down to Middle Senomanian level with fast exgumation of this surface and its further

exogenous transformation. The initial height of this peneplain concerning a nowadays sea level is + **220-250** meters. The most probable estimation of a sea level of Middle Cenomanian regression episode is + **220** meters.