The small-amplitude anomalies of the Bouguer gravity field in the central part of the Verkhoyansk–Chersky orogen (Eastern Yakutia)

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The gravity survey was made within a large area of the Verkhoyansk-Chersky orogen/collisional orogenic belt, which is the western part of the Verkhoyansk-Kolyma Mesozoides. The area is situated approximately between 62°–72° N and 132°–146° E. It covers the larger part of the fold-and-thrust belt determined as an outer orogenic zone. It also includes a sequence of orogen internal zones; numerous intrusive massifs, known mainly as units of the Principal batholith belt, occur within these internal zones.

Gravity values in different reductions were obtained. But for geological interpretation the Bouguer gravity map with intermediate layer rocks density of 2670 $kg.m^{-3}$ is used due to strong relationship of this field with some exposing formations mainly comprising various magmatic bodies. These gravity values fulfil a need the no-errors conditions provided by the topographic landforms.

The gravity data analysis produced by previous investigations included an identification of regional and local source of anomalies.

The regional gravity field similar roughly to both the Bouguer reduction and air-free data consists of close to isometric or lenticular low and high anomalies which have no likeness with fundamental orogen elements. There is no common point of view on their origin. Regional gravity anomalies were investigated in connection with anticipated dip depth variations of terrigenous complex basement, concealing granite-gneiss domes, lower lithosphere and/or asthenosphere composition and structure change, etc.

The local anomalies showing amplitude values fluctuations between 2 and 15 mGal often reflect the igneous rock series. Great amount of intrusive massifs was supposed to exist in this area on the basis of the analogous geophysical features. Inferred massifs form the linear NNW- and EEN trending zones corresponding to Bouguer gravity negative anomalies. The largest zone 150 km wide and 600 km long coincides with the Principal batholith belt. Moreover, the three parallel arc negative zones occur in the northern part of the studied area. Shape of these zones may have resulted from lateral pressure propagated from collisioning plate.

Sedimentary grabens of Neogene age evidently correspond to local gravity negative anomalies, too. However, the Bouguer gravity grid displays anomalies characterized by smaller amplitudes ranging between 0.8 and 2 mGal also. Minimum value of these amplitudes is equal to root mean square of Bouguer anomaly determination. The small-amplitude gravity anomalies form complex patterns reflecting roughly some tectonic elements of the studied area. A first-order feature of these patterns is the narrow chain 5 km wide and over 600 km long consisting of the positive small-amplitude anomalies.

This gravity feature corresponds to the thrust and strike-slip fault zone known as the Adycha-Tarynsky fault; it is recognized as the boundary between the external and internal parts of the orogen. The disposition of these small-amplitude anomalies shows the numerous revisions in the described structure of this geologic unit including its offsets, braiding and continuation to the northward. This anomalous zone is of metallotect significance because it is associated with gold deposits. To the west, a few zones of small-amplitude anomalies appeared as resembling with a gravity pattern within the Adycha-Tarynsky fault. It is assumed as result of near-fault rock compaction process reflected by gravity field.

The aim of this review is to indicate some gravity data features of the region and proposed approach to its interpretation. Gravity anomaly grid detailed analysis could introduce many corrections in the complicated and vaguely understood stages of the Verkhoyansk-Chersky orogen/collisional orogenic belt geologic history and ore control.