

The First U–Pb SHRIMP Dating of Zircons from Capitanian (Middle Permian) Deposits of the Omolon Massif (Northeast Russia)

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Abstract—The U–Pb dating of zircons from two samples taken in the stratotype sections of the Middle Permian Gizhiga Formation in the Omolon Massif has been carried out for the first time. Weighted average ages of 266 ± 2 and 265 ± 3 Ma taking the error into account are consistent with the Capitanian age calculated previously by paleontological determination. The observed detrital zircon population has made it possible to identify a few source areas in the Omolon Basin. Pre-Permian zircons are related to erosion of basement deposits of the Omolon Massif and the Middle Paleozoic volcanic rocks of the Kedon Group, while the Permian zircon population is due to the tuff supply from the Okhotsk-Taigonos volcanic arc.

Keywords: Regional Stratigraphic Scale, Permian, U–Pb SHRIMP dating of zircons, Omolon Massif, Northeast Russia

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INTRODUCTION

Correlation of the Permian deposits of the Northeast Russia with the International Stratigraphic Scale (ISS) and, moreover, with the General Stratigraphic Scale (GSS) used in Russia has always been a challenging problem [4, 11]. In particular, this is the case of the Middle Permian top and the entire Upper Permian, which are completely devoid of the orthostratigraphic fauna groups such as fusulinids and conodonts that the ISS is based on. Recently, advanced precision U–Pb zircon dating methods such as SHRIMP and IDTIMS have come into use in the studied region to date the Permian rocks [5–7, 10]

However, all these works related to zircon dating were carried out outside the stratotype area of the Regional Stratigraphic Scale (RSS). Therefore, the dating of zircons from tuffaceous rocks, synchronous to sedimentation, in the stratotype area is a very important and urgent object in terms of regional stratigraphic units. This paper reports the first SHRIMP dating results for zircons from two reference sections of the Gizhiga Formation and the cognominal regional horizon of the Omolon Massif: it is stratotype in the Vodopadnyi Creek and parastratotype in the Russkaya–Omolonskaya River. These sections were fully studied by traditional biostratigraphy and lithology methods at the end of the last century [9].

THE STRATIGRAPHY OF THE GIZHIGA FORMATION IN THE VODOPADNYI CREEK AND RUSSKAYA–OMOLONSKAYA RIVER SECTIONS AND THE POSITIONS OF THE SAMPLES

The Gizhiga Formation has a similar structure in the Vodopadnyi Creek and Russkaya–Omolonskaya River sections (Fig. 1). Its characteristic features include abundant pyroclastics and foreign scattered gravel–pebble–boulder material. All these features are less evident in the Russkaya–Omolonskaya River section than in the even-aged Vodopadnyi deposits [9].

In the Russkaya–Omolonskaya River section, the Formation (Fig. 2a) is 55-m thick, the contact with the underlying the Omolon Formation is sharp, with negligible erosion traces [9], whereas the contact with the Khivach Formation is gradual. The Gizhiga Formation rocks are composed of the following deposits from bottom to top [9]:

(1) Green tuffites are silty in dimension, massive, with platy cleavage, chloritized, and rubbly. Rare gravel–pebble-size inclusions occur as felsic, and more rarely, intermediate and basic effusive rocks. Faunistic remains include brachiopods *Rhynchopora lobjaensis* (Tolmatchew), *Canocrinelloides obrutschewi* (Licharew), and *Neospirifer invisus* Zavodovsky; bivalves *Maitaia* cf. *bella* Biakov, *Merismopteria* ex gr.