

A Candidate for the Global Stratotype Section and Point at the Base of the Serpukhovian in the South Urals, Russia¹

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Abstract—The Verkhnyaya Kardailovka section is one of the best candidates for the GSSP (Global Stratotype Section and Point) at the base of the Stage (Mississippian). For boundary definition, the first appearance of the conodont *Lochriea ziegleri* Nemirovskaya, Perret et Meischner, 1994 in the lineage *Lochriea nodosa* (Bischoff, 1957)—*L. ziegleri* is used. *L. ziegleri* appears in the Venevian Substage somewhat below the base of the Serpukhovian in the Moscow Basin. The position of the FAD of *L. ziegleri* within the *Hypergoniatites–Ferganoceras* Genozone is confirmed and lies between 19.53 and 19.63 m above the section's base. Before 2010, deep-water stylonodular limestone containing the boundary in unnamed formation C at Kardailovka was well exposed but only 3 m of Viséan strata cropped out immediately below. Recent trenching exposed another 10 m of underlying Viséan carbonates in formation C and older Viséan siliciclastics and volcanics in unnamed formation B. The contact between formation B and underlying crinoidal limestones in unnamed formation A representing the middle Viséan Zhukovian (Tulian) regional Substage was excavated. The boundary succession, situated in the Magnitogorsk tectonic zone above the Devonian Magnitogorsk arc and Mississippian magmatic and sedimentary rift succession, was deposited west of the Kazakhstanian continent during closure of the Ural Ocean. In the lower part of the section, Viséan tuffaceous siliciclastics and volcanics of formation B record rapid deepening after deposition of neritic middle Viséan crinoid lime grainstone of formation A and subsequent subaerial exposure. The overlying condensed upper Viséan to Serpukhovian succession in formation C comprises deep-water limestone deposited in a sediment-starved basin recording minor turbidite influx and carbonate-mound development. The $\delta^{13}\text{C}_{\text{carb}}$ plot shows a positive shift of 1‰ V-PDB (from +2 to +3‰) between 17.0 and 17.75 m (3.05 and 1.97 m below FAD *L. ziegleri*). The $\delta^{18}\text{O}_{\text{apatite}}$ graph displays a prominent upward shift from 19.9 to 21.1‰ V-SMOW (at 19.15 to 19.51 m) in the *nodosa* Zone below FAD of *Lochriea ziegleri*.

Keywords: Viséan, Serpukhovian, South Urals, conodonts, foraminifers, ammonoids, *Lochriea ziegleri*, GSSP

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INTRODUCTION

The Serpukhovian Stage, proposed by Nikitin (1890), was re-established in the Russian stratigraphic scheme in 1974 by the Interdepartmental Stratigraphic Committee of the USSR and has become internationally recognized as the upper stage of the Mississippian Subsystem (Heckel and Clayton, 2006; Davydov et al., 2012). The base of the Serpukhovian has not been

defined by a Global Stratotype Section and Point (GSSP) and it is one of the priorities of the Subcommittee on Carboniferous Stratigraphy (SCCS) of the International Commission of Stratigraphy (ICS) to locate a suitable index for defining that boundary and establish a GSSP close to the existing Viséan–Serpukhovian boundary. In order to fulfill these goals, the Verkhnyaya Kardailovka section on the eastern slope of the South Urals (Baimak District, Bashkortostan, Russian Federation, (base section at 52°17'11.7" N; 58°55'29.0" E) and fossils within it are being inten-

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