Introduction

Seismic hazard assessment is largely based on the historical earthquake catalogs. The most complete set of the parameters given in them is necessary for calculations; these parameters are earthquake date, epicenter coordinates, hypocenter depth, magnitude, and intensity in the epicenter, and all the parameters are accompanied by accuracy codes. However, it is left beyond the scope of a specialist in the field of seismic hazard assessment what data were the bases for the parametric solution presented in the catalog. It is believed that all the uncertainties about parameterization reliability can be fully set using accuracy codes or indicating error limits. But the system of error codes cannot always be applied to the quality of the data, on whose basis the catalogs of historical earthquakes are compiled. For example, description may be very complete and detailed, and earthquake parameters can be easily and unambiguously defined from it. Formally, error limits would be small and, from this viewpoint, the solution should be considered accurate. But the information source proper may be very unreliable. It is clear that in such a situation whatever big error limits are set, they will not eliminate the doubts that an earthquake really occurred.

Historical seismology has elaborated certain recommendations to assess the reliability of macroseismic information. These recommendations are quite general and have proven their efficiency in many cases. But they should be very carefully applied, because the formal approach used in them is not always reasonable. Based on the analysis of sources relevant to the 1542 earthquake in the north of Russia, it is shown that though the distribution of priorities for sources relying on how close they are to the event works well, it can not be considered a universal rule. Many other details, such as characteristic of the person compiling the document, one’s interests, how free one could access the non-public archives, and the goal of writing the document, have to be taken into account.

Preliminary Study

In the seismological literature, the earthquake of 1542 has been mentioned for the first time in the paper by G.D. Panasenko (1977) with the reference to (Minkin, 1976) and (Letopisets solovetskii..., 1883), where the following text was cited:

“In the year 7050 (1542), at three pogosts—Keret’, Kovda, and Kandalaksha—and 300 versts from them, at Umba, a great earth shaking was felt at 1 hour noon.”

G.D. Panasenko has not parameterized this earthquake and it was not included into the (Novyi katalog..., 1977), because it had been unknown at the moment of catalog compilation. Parameters for this event were suggested much later by A.A. Nikonov (2004). This author gives a bit more detailed description, adding that “mountains and forests were shaking,” providing the reference to Solovetskii letopisets of the late 16th century (no accurate reference). The epicenter coordinates are not given and accuracy of location is not assessed; only the note is provided: “The epicentral zone falls within the axial part of the western half of Kandalaksha Bay.” The epicentral intensity is \( I_0 = 7 \pm 0.5 \), depth is 12 km, and magnitude is \( M = 5.2 \ (\pm 0.5) \). In support of this solution, the map of localities and intensity values is given, where inten-
sity 5, 5–6, and ≥4–5 are assigned to the mentioned settlements. This is a strange point because the initial description mentions the settlements one by one and any differentiation of shaking intensity between them cannot be derived. Another strange point are speculations on the absence of data from Kola fort. It was founded in 1548 (i.e., 6 years after the earthquake), and no permanent settlement had been there. But in this case we are not interested in problems regarding parameterization of this earthquake in (Nikonov, 2004), but rather in analysis of source documents mentioning the earthquake.

INFORMATION SOURCES AND THEIR CHARACTERISTICS

There are many versions of Solovetskii letopisets (Letopisets Solovetskogo monastyry...; hereinafter Letopisets...), presented in different publications. Additionally, its publications are known from the late 18th and in the 19th centuries, many handwritten chronicles by the Solovetskii chronicler are available as well as their published versions. A series of other documents and works refer to the Solovetsky monastery’s archive. Below, the list of publications with the respective comments is presented.

(1) The earliest publication of Letopisets... was prepared by G. Borozdin in 1790 (Fig. 1). The full title is (in Old Russian) Letopisets Solovetskago monastyrya, v koem povestvuetся o nachale postroeniya ego, o byvshih v nem nachal’nikakh, o znamenitykh prishhestviyakh vo onoi blazhennoi pamyati Gosudarya Imperatora Petra Velikago, i o drugikh mnogikh proizshestviyakh po 1760 god. Izhdiveniem G. Borozdina. Moskva, v Universitetskoi tipografii, u V. Okorokova, 1790 (The chronicle of Solovetsky monastery, telling about the start of monastery building, about the monastery heads, about notable events in the blessed memory of Throne-Sitting Emperor Peter the Great, and about other many events until 1760. Publication funded by G. Borozdin. Moscow, University typography of V. Okorokov, 1790).

The work starts with a “Foreword from the publisher”:

“Issuing the present Letopisets, I think it is necessary to mention that this collection of records was given to me by my friend, Petr Petrovich Fedotov; it was given to him directly from the Solovetsky monastery in 1778 from his father, who took a rank there: this is why I have no doubts that the chronicle was incorrect. The reason why I decided to publish this Letopisets is nothing but an opportunity for my own nationals, interested in ancient times, to get to know about the history of this monastery.”

This publication does not contain the information about the earthquake in 1542.

(2) In 2010, another version of Letopisets... was published (digital document on the web-site of the National Library of Republic of Karelia (NL RK)).

The library cautions that this publication is not intended to be of scientific completeness, but to familiarize the non-specialist readers with rare and poorly investigated historical sources. The original of this chronicle is stored in the NL RK.

It is mentioned in the comments that the published literary monument, known as Solovetskii letopisets, has been traditionally dated by the specialist at the first quarter of the 18th century. On the basis of the paleographic study of the manuscript, it is claimed that Letopisets... already existed in the second half of the 17th century. The published work is a manuscript written with one hand using the ornate cursive writing of the 18th century. The manuscript is dated back to the second half of the 1790s (i.e., this publication is nearly coeval to Borozdin’s extensive edition book). The comparison between the texts of this manuscript and