

Seismic “Incident” of 1185 in the Northern Sea of Azov: Contemporary Analysis of the Earthquake in an Active Seismogenic Zone

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Abstract—The earthquake and tsunami that occurred in 1185 in the North Azov region is considered here using the multidisciplinary approach for the first time in professional literature, based on indications from the Old Russian written source, *The Tale of Igor’s Campaign*. Problems such as the relationship between earthquake and tsunami, shaking intensity, geographic position, and other location conditions are addressed. The epicenter area is established to be the northeastern shore of the Sea of Azov. Information is given about earthquakes in the region for 200 years and their confinement to the sublatitudinally extending northeastern shore of the sea is found. The revealed seismogenic zone is correlated with the North-Azov fault, a large tectonic structure of the same orientation. Finally, based on archeoseismic data, which have not been previously employed in a seismic hazard assessment in the framework of making General Seismic Zoning maps, the question is raised of assessing the seismic potential of the zone.

Keywords: earthquake, tsunami, year 1185, seismogenic zone, archeoseismology, source parameters, northern shore of the Sea of Azov, North Azov Fault, South Crimean coast, Gothia, Vrancea zone of deep-focus earthquakes

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INTRODUCTION

It should be emphasized that the word “incident” has been intentionally used in the title with respect to a seismic event. The unusual character of the earthquake, the erroneous interpretation of it as a strong one, and, finally, the respective history of more than 30 years, taken together, comprise an “incident” by themselves. It is also an “incident” in that the author managed to correct his own error both before the inclusion of the event in the catalogs and in order to include it in the catalogs.

The words “earth throbbed” in the famous Old East Slavic epic poem, *Slovo o plūku Igorevĕ* (*The Tale of Igor’s Campaign*, hereinafter, *The Tale*) were first noticed by N.V. Shebalin and, as an experienced seismologist, he professionally interpreted them when compiling the first, basic edition of (*Novyi...*, 1977; hereinafter, the *New Catalog*), but this fragment was published much later in (Drumya and Shebalin, 1985), and reproduced verbatim after Shebalin’s death (Shebalin, 1997). The episode was given as follows: “The centennial records help us... We can be almost completely sure that it (Shaking in 1185. *A.N.*) can be referred to the Carpathian–Balkan source (Vrancea zone. *A.N.*), because there are not any other known sources of strong seismic waves affecting the central European part of USSR... And here is the immediate

conclusion: most likely, this was an echo of the Carpathian earthquake... At a distance of about 700 kilometers from the source, such shaking could be caused by an earthquake with magnitude $6\frac{3}{4}$ –7” (Shebalin, 1997, p. 256).

It is now known that strong earthquakes occurring in the Vrancea zone had been repeatedly felt in West Crimea, for example, in 1790 and 1802, however, the facts of the further eastward extent of their shaking had not yet been reported. Shebalin could not support his theory about the 1185 earthquake in the Vrancea source zone for a simple reason: the earthquakes were repeatedly mentioned in Old Russian chronicles (however, it was not mentioned in the European sources) beginning from the 11th century, however, no earthquake was mentioned in any chronicle record of that year (Nikonov, 1990).

A number of questions naturally arise, namely, (1) why the shaking in the lower Don River area should be considered as a manifestation of some distant earthquake and (2) how can they be a priori rejected as a possible occurrence of a local weak event. Note that local weak earthquakes were not comprehensively studied in the second half of the 20th century, while strong tectonic events were recorded with certain errors and gaps—and this fact was also noted by Shebalin himself. The important point here is that

Table 1. Indications of the earthquake on land and sea in two editions of The Tale

<i>(Heroic Song..., 1800)</i>	<i>(Pletneva, 1985)</i>
On land	
“the earth throbbed”	“the earth moaned”
“the grass rustled”	“the grass rustled”
“the Polovsk tents began to stir”	“the Polovtsians’ tents began to move”
In the sea	
“the sea spurted at midnight”	“the sea rolled one the shore at midnight”
“the waterspouts pass like mists”	“the eddies go like mists”

the earthquakes that occurred from 1814 along the northern coast of the Sea of Azov, up to Taganrog and Rostov-on-Don, have remained unnoticed, and therefore have not been included in the basic New Catalog (*Novyi...*, 1977), despite the fact that the data were published even in foreign catalogs, e.g., in (R. Mallet and J. Mallet, 1858). As a result, the zone of North Azov seismogenerating fault was not distinguished at that time and even much later (*Noveishaya...*, 2006).

The publication “The earth throbbed: Another tale about The Tale” was published in the popular science magazine (Nikonov, 1997) more than 20 years ago, where the author considered signs of the 1185 earthquake documented in *The Tale of Igor’s Campaign*. The author at the time was unaware of Shebalin’s opinion about the same event. After publication, the article drew the attention of Academician D.S. Likhachev, who invited the author to present a report at a seminar in the Pushkin House (Institute of Russian Literature, Russian Academy of Sciences), St. Petersburg.

Due to the extremely decorative character of data in The Tale, the singularity of the source, and certain ambiguity about the environment, the author did not aim to make the event a focus of scientific research and has never mentioned it in either professional publications or compiled catalogs (Nikonov, 2002a, 2002b, 2003; Gabsatarova et al., 2017). Nevertheless, the author has since 1993 been collecting factual data on the North Azov fault and associated local earthquakes (Nikonov, 2002b, 2003), two of which occurred on the fault in the early 21st century and were considered in collective publications (Nikonov and Gabsatarova, 2012; Gabsatarova et al., 2017). However, the 1185 earthquake has not been considered in scientific literature up to now. It has become topical because of the published full-scale scientific review of historical earthquakes in Crimea (Moiseev et al., 2018); this recent publication has surprisingly employed the earlier famous publication by the author, as well as its ideas (along with the others) regarding the 1185 earthquake in particular. All this on aggregate gave grounds to consider the initial source again and, employing the seismic information for the last 200 years in North Azov region, address the problem of understanding and assessing

the 1185 earthquake, moreover, the area affected by it includes the territory of Russian Federation.

ANALYSIS OF THE TALE FROM SEISMOTECTONIC POINT OF VIEW *Indications of a Seismic Event in the Text of The Tale*

In the earlier, more popular take and interpretation of scarce data of The Tale on the 1185 earthquake, it was important to confirm and substantiate the decision made about whether or not it constituted an earthquake. It was almost impossible at that time to assess its main parameters (source location, intensity, etc.). We can now attempt to discuss it in detail. For better completeness and reliability of interpretation, direct quotes from two editions of The Tale (*Heroic Song...*, 1800; Pletneva, 1985) are used (Table 1).

The fact that the incident under discussion was an earthquake was never questioned by the author. The only issue is whether there is some relationship between the waving sea (“the sea spurted”), mentioned in the beginning of the quoted episode (Igor’s escape), followed by the events on land (“the earth throbbed”), in time and origin. Midnight is implied in the first case, while the narrator in the second one refers to the time when dusk ended. It seems illogical to believe that water waving was preceded the throbbed earth only because of the order of mentioning in The Tale, because the escapees should have waited for the complete darkness that logically follows dusk (also, they waited for the guards to get drunk on Friday, as reported in the Ipatiev Chronicle). Most likely, the reported phenomena on the sea and land were simultaneous, but the information about them was told by different people. The genetic relationship between such phenomena on land and sea in the cases of earthquakes occurring in coastal areas is normal. On the one hand, the indication of mist (“the waterspouts pass like mists”) suggests that wind effect should be excluded as a possible cause of sea waving. On the other hand, the occurrence of mist (vapors, evaporation) above the sea or, sometimes, land surface has been repeatedly observed before and during earthquakes (Tronin, 2011)—of course, such earthquakes should have a relatively high magnitude.

There are no other locations with reported shaking, and it is no use to expect them to be revealed at a later point, because the event occurred in the lands of nomad tribes. In this respect, we have no option but to use the data from the only area (with no well located point) of Don steppes. First, we emphasize that earth did not either “move” or “waved” or “trembled” in the night—it “throbbed,” i.e., there was a strike, indicating a hard radiation of seismic energy that is usually observed near the source.

The date of Igor’s escape has remained unknown for a long time. Academician B.A. Rybakov proposed that it happened a month after the battle, i.e., in June–July 1185. Historian L. Makhnovich later calculated the exact date of Igor’s escape: June 21, 1185. Assuming it is the right date, the time of the earthquake is also determined.

On the Intensity of the 1185 Earthquake

The indications of an earthquake, mentioned in The Tale, are absent in macroseismic scales, however, with the background of interpreting similar indications in equally “vague” descriptions of seismic events in different regions of the world, including steppes and seas, it is quite possible to at least approximately assess earthquake intensity.

The words “the earth throbbed” is a clear indication of a quake observed at shaking of at least $I = V$. The same intensity can be inferred from the line “the grass rustled.” There is nothing but grass to make such a noise in the steppe, however, it is not to be expected at an earthquake with $I = III-IV$, so a higher intensity (a quake) is necessary. The third, more interesting indication is that “the Polovsk tents began to stir” (“wabble”): this could be caused by a quake of $I = V$ and more. Judging by the data presented in the Ipatiev Chronicle, Igor lived in an ordinary felted tent of nomads, with the entrance removable by hand. A tent was installed on a carcass made of wooden poles. The line “вежи половецкий подвизашася” (*Heroic Song...*, 1800, p. 40) can be literally translated as “tents of Polovtsians moved.” In his explanatory dictionary, V.I. Dal’ (1882, p. 164) indicates that the verb *подвизашася* means “to move, to move to and fro.” The fact that the tents not only “shook,” but were moved and displaced, moreover, seen from a distance, could be observed, most likely, in the case of shaking intensity of $V-VI$.

The line “море прыснуло” can be understood as “the sea waved, rushed on the shore; the wave hit the base of the coastal cliff”—these are typical indications of tsunamis which have been identified to occur in the Sea of Azov (Nikonov et al., 2018). Thus, in the first approximation, I_0 of the earthquake could be $I = V-VI \pm 0.5$, with the epicenter being located near the northern coast of the sea. The subsection below is to determine the exact location of the earthquake epicenter.

On the Position of the Epicentral Zone

Where could the headquarters of the Konchak khan be located in summer 1185, when captured Igor was there? As early as 1997, the author (Nikonov, 1997) indicated that “the headquarters was located on the coast of this sea (Sea of Azov. *A.N.*)” However, there were not sufficient data available at that time to determine the epicentral location more precisely. In her detailed work, S.A. Pletneva (1985), a specialist on the Polovtsians history and culture, argued that the main area where Polovtsians camped beginning from the 11th century were steppes along the valley of the Seversky Donets River with its tributaries, and the areas to the south of there, i.e., steppes of the northern Azov region. By the 12th century, the routes of seasonal movements and locations of camps became constant and confined, with the summer season (before the midsummer) being spent in the areas near the coast. Pletneva also reconstructed the area controlled by the Konchak khan. His domain to the southeast reached the Gulf of Taganrog, and the Sea of Azov, ending in the area of the lower stream of the Don River, near the Old Belaya Vezha. In 1185, “the edge of Polovtsians field” was located in this “corner” of Konchak lands, not far from the sea coast. Pletneva placed the headquarters of Konchak khan on the Tor River, the right tributary of Seversky Donets, from where, she believed, Igor escaped. But this version contradicts the concluded above (by Pletneva herself) regarding the seaward movement, and ignores the sea mentioned in The Tale: “from the Great Don to small Donets.” The fact that Igor swam across the river in the very beginning of his escape should not be considered an indication that it was a right tributary of the Seversky Donets, as Pletneva assumed. The headquarters of the Konchak khan was located near the coast, because the captured people could hear that sea “spurred,” but, at the same time, it should be near some freshwater source, i.e., on the bank of some small river running to the sea.

The Tale itself contains several additional indications about the place. The sea which is repeatedly mentioned, is the Sea of Azov, its northern coast, clearly not the one to the south of the Don River mouth. The next direct quote reads: “Игорь мысленно измеряет поля от Великого Дона до Малого Донца” (“Igor in his mind measures the plains from the mighty Don to the little Donets”; *Heroic Song...*, 1800, p. 40), and then “босым волком побежал к лугу Донецкому” (“like a swift-footed wolf he fled to the meadow of the Donets”). It is important here that, first, in the latter sentence Igor did not run *down* the meadow but to the meadow of the Donets, and, second it was the Donets, not the Don, according to the interpretation of old names of the rivers from The Tale (although, formally, adjective “Донецкий” in modern Russian may indicate something pertaining to both the Don and Donets rivers). The headquarters

Table 2. Parameters of the 1185 earthquake in the Northern Azov region

Date	Time	Coordinates	h , km	M	I_0	Trend
June 21, 1185	22:00 ± 2 h	47.2° ± 0.1° N, 39.2° ± 0.4° E	(10) 8–15	4.5 ± 0.3	V–VI ± 0.5	80°

was therefore located on the sea shore, near the Don River, to the west of its mouth. This part of the coast, approximately between the present-day cities of Rostov-on-Don and Taganrog, is where the shore is steep and cliffy. Thus, we have the more or less exact location of the headquarters of the Konchak khan, from where Igor escaped.

*On the Earlier Thoughts of the Author
Regarding the Epicenter and Magnitude
of the 1185 Earthquake*

In his popular article of 1997, the author made a “preliminary scientific conclusion,” assuming that it was possible to introduce (of course, with certain reservations), the data on the strong earthquake in Gothia, on the southern coast of Crimea, whose waves had reached the Northeastern Azov region in 1185, to paleoseismological science (Nikonov, 1997). The Gothian lands on the southern coast of Crimea in the Middle Ages have been studied in many publications. Remarkably, The Tale also mentions them: “Раздаются песни *готфских* красных девиц по берегам моря синего” (“the fair maidens of the *Goths* sang on the shore of the blue sea”), suggesting that Ruthenians were familiar with people from Crimean Gothia. But nevertheless, this earthquake was not considered by specialists as one worth attention, because it soon became clear that the possibility of a strong 1185 earthquake in Crimean Gothia is erroneous. Hypothesizing about the strong earthquake of 1185 near the southern coast of Crimea, the author has not considered at least two points. First, there were two areas of Gothian (Germanic) people in the Middle Ages: Eastern Gothia in Crimea and Western Gothia, the more ancient one, in the Baltic region. It was much more likely that such a remarkable event would appear in some European chronicle, with the reference to the Western Gothia as place; Eastern Gothia, inhabited by steppe nomads, was far from chroniclers (moreover, regular connection with Europe was absent). Indeed, it was revealed that the earthquake occurred in Western Gothia in 1185: in the area of Yset (today Lower Languedoc, France). However, P. Alexandre (1990) specified the remarkable dates of the holy church and included this event in his catalog as the one occurred on March 23, 1186. The error became more than obvious but the author did not have an occasion to state this in a professional publication. However, this event was not included in the catalog of strong Crimean earthquakes (Nikonov, 2000) and the later work by the author (Nikonov, 2016). In this respect, it seems strange that qualified

specialists (Moiseev et al., 2018) referred to a popular science article making a preliminary conclusion (Nikonov, 1997) as grounds for interpreting data on Southwest Crimea.

Second, in the course of writing the first manuscript on the 1185 earthquake, the author did not notice the tsunami on the coast of the Sea of Azov. Now, with the experience of studies of historical tsunamis in the Black Sea (e.g., those produced by the strong 1927 Yalta earthquakes and the 1939 one near the shore of Turkey), it can be stated that tsunamis, even the strong ones, generated in the Black Sea do not reach the Sea of Azov, fading in the Kerch Strait (Nikonov et al., 2018). Therefore, the 1185 earthquake and tsunami should be considered of local character, with the source located in the zone of the North Azov fault. Given the above, the parameters of the considered earthquake can be estimated in the first approximation (Table 2).

Thus, the earthquake appears to be local, of moderate intensity, similar to most known historical earthquakes that occurred in adjacent areas. To understand the importance of this event, the historical record of earthquakes in the North Azov region, revealed by independent methods, should be known.

PAST SEISMIC ACTIVITY IN THE NORTHERN SEA OF AZOV REGION

Historical Earthquakes

The issue of local earthquakes along the northern edge of the Sea of Azov Basin was raised at the turn of the 20th–21st centuries with respect to works assessing possible seismic hazards for the Rostov NPP site (Nikonov, 2002b, 2003). On the basis of previously unused initial sources, a catalog of regional earthquakes was compiled (Nikonov, 2003; Nikonov and Shvarev, 2006, 2011) to reveal that the majority of earthquakes occurred on the northern coast of the Sea of Azov. Here, in the coastal zone to the east of the Russian–Ukrainian border and almost in the area of Rostov-on-Don, earthquakes occurred in 1814 (two events), 1816, 1859, 1883, 1884, and 1902 (several events) with intensities of IV–IV–V (Nikonov, 2002a, 2002b, 2003) (Fig. 1). Notably, the shaking from the earthquake of May 10, 1814 were felt in both Taganrog and Rostov-on-Don, i.e., the axis of macroseismic field was sublatitudinally extended to the east. Three time clusters (activations) can be distinguished: 1814–1816, 1859–1884, and 1902. Based on the observations of the last 200 years, we can clearly see periodic seismic activations in the coastal zone of the Sea of Azov.

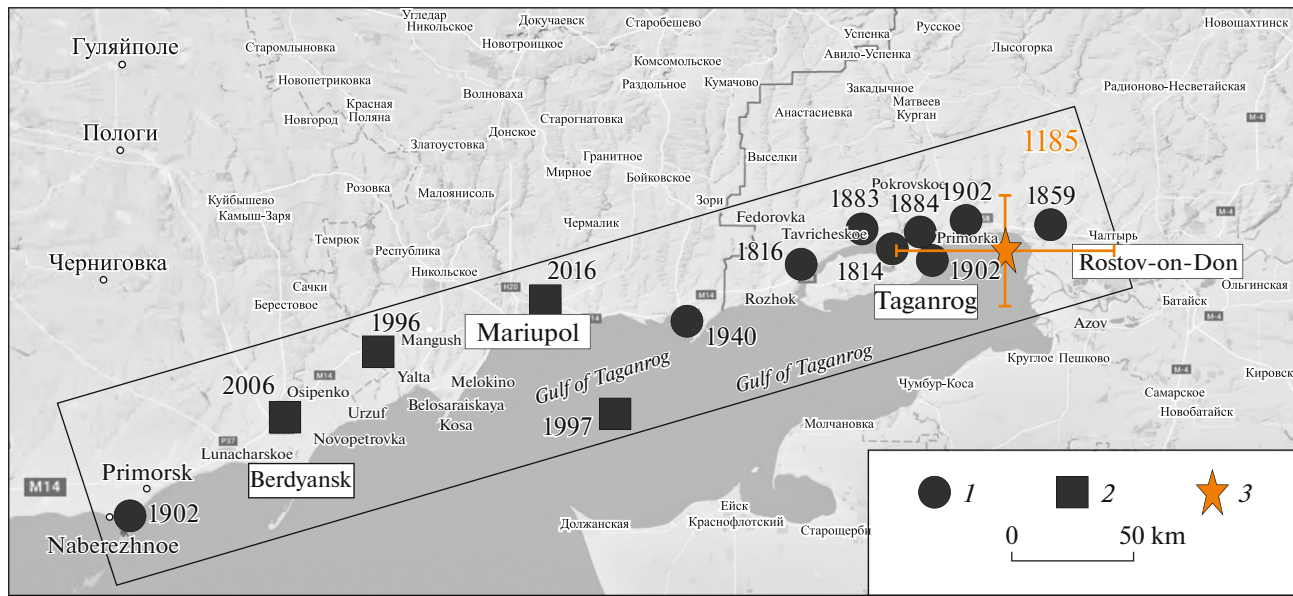


Fig. 1. Map showing epicenters of earthquakes that occurred on the northern coast of the Sea of Azov, with the largest cities, towns and nearby localities. Earthquakes: (1) in the historical period, (2) instrumentally recorded, (3) earthquake of 1185.

During the instrumental period, moderate earthquakes occurred with an interval of ten years. The 2006 Osipenko (Berdyansk) earthquake with $M_w = 3.3$ and 2016 Mariupol one with $M_w = 4.6$ continued filling the seismic gap between epicenters of the October 1, 1902 and June 20, 1940 earthquakes (Nikonov and Gabsatarova, 2012; Gabsatarova et al., 2017) (Fig. 1). The North Azov fault zone was identified on the basis of these facts, and, in this respect, it is natural to expect that earthquakes could have occurred within its limits in the late 12th century.

Ancient Destructive Earthquakes

After establishing the existence of the North Azov fault as a large seismogenic zone, it is natural to assess its potential. Certain data were presented earlier based on our own observations (Nikonov, 2002a, 2002b; Pustovitenko et al., 2012; Nikonov, Gabsatarova, 2012). In the beginning of the 21st century, the author visited the archeological excavations of Tanais, the town of ancient and Roman periods, which existed in the northeastern Sea of Azov region for more than a millennium, from the 4th century BC until the 5th century AD. As the problem of the zone potential cannot be considered here in detail, several key facts from the ancient Greek and Roman history of northern Sea of Azov region will be concisely given. As early as the 1970s, D.B. Shelov revealed several building horizons (supported by later findings) at the site of ancient town; it was found that these horizons were divided by layers of massive destructions of various buildings, including strong fortress walls, and the destructions occurred in the period from the middle of

the 3rd century BC until 150–160 BC (Shelov, 1970, 1972). Following the traditional interpretation, archeologists interpreted these destructions as the results of military activities, although there were no direct signs of such activities. In the early 21st century, using the criteria and methods of archeoseismic approach, the author has found evidence that the mentioned destructions at several excavation sites were caused by strong ($I = VIII–IX$) earthquakes (Fig. 2); however, these arguments have not convinced archeologists. The excavations at Tanais revealed several writings on stone slabs, mentioning the fact of construction of defensive structures in the end of the 2nd and in the first half of the 3rd centuries AD, and, notably, none of these writings dated back later than 244 AD (Shelov, 1975). The same period of time was remarkable for a great fire in the ancient town. However, neither the alleged destruction of the town (its vicinities) by the barbarian tribes, nor fire could produce the characteristic earth fills and complete rubbles in basements with valuable houseware and food being stored there (these basements with objects in them were observed personally by the author in 2001 during his visit to the excavation site).

Archeological excavations were also made later in this area, not only at the Tanais site, but also at adjacent sites (Elizavetinskoe and Nedvigovskoe) of ancient Greek towns. The destructions revealed at these sites, as well as subsequent restoration, were dated the same as those at the Tanais site, and the conclusions made by archeologists were also the same. However, in some cases, archeologists indicated the cause of destructions as unknown. At the Elizavetinskoe site, representing the remains of an ancient

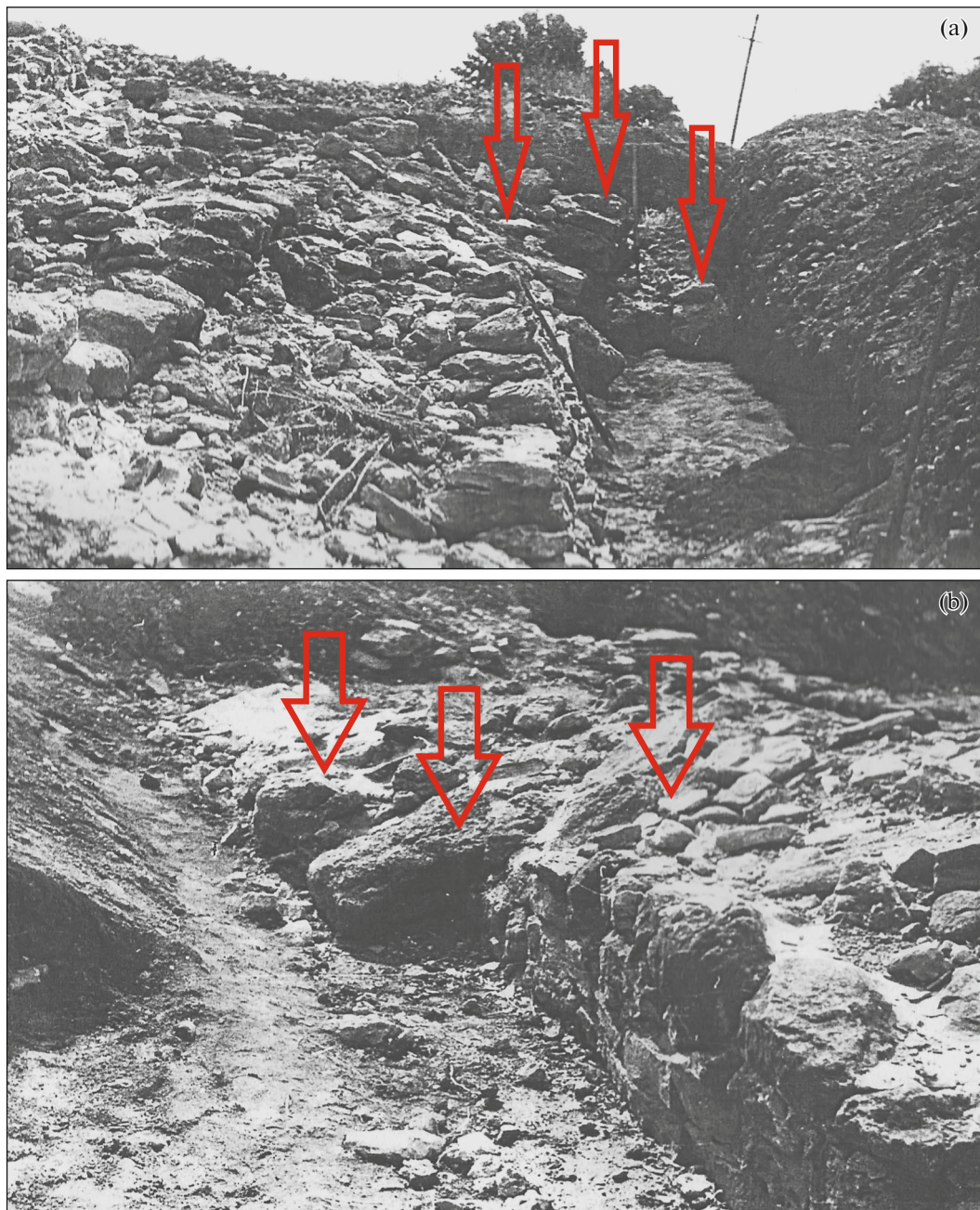


Fig. 2. Defensive walls of the ancient town (archeological excavation of the Tanais ancient town site, near the city of Taganrog), viewed from two sides (a, b). Image by A.A. Nikonov, 2001. The one-sided collapse piles and inrushes of a solid masonry can be seen; arrows indicate the shifts of masonry slabs to the same side.

Greek colony to the east of Tanais, in the layers of the second half of the 4th century AD, heavy destructions of the southern defensive wall were revealed—archeologists traditionally interpret this as a result of enemy assault (Kopylov et al., 2002). During the excavations of Tanais on the shore of the Gulf of Taganrog, first Shelov (1970, 1972) in the 1960s and then S.A. Naumenko (2002) in the early 21st century dated the complete destruction of a flourishing trade center back to the 340s BC, characterizing it as a “catastrophe.” In

1977–1980, earth-filled basements were revealed in several excavation pits within different town quarters and adjacent *усадеб* (basements contained shattered amphoras, glass vessels, and terracotta), and also piles with ceramic vessels. The destructions were clearly dated back to the mid-3rd century AD and were attributed to the city’s destruction by Gothic tribes (Arsen’eva, 1983).

The destructions were revealed both in residential quarters and in heavy buildings of the mid-3rd cen-

tury AD. However, taking into account the reported finding of reinforcing elements (chases for wooden beams along the entire length of walls, which are known as a typical ancient solution of earthquake-resistant design) in defensive walls of the Roman period, the earlier destruction could have been caused by an earthquake, and this seems to be the true cause. Moreover, the character of destruction itself (with horizontal displacements of heavy constructions) leaves no doubts regarding the origin of such damage: it should be seismic effects corresponding to $I = IX$. It seems that value should be regarded as the seismic potential of the North Azov seismogenic zone. Taking into account the possible destruction of the Belaya Vezha town at the eastern flank of this zone in the Middle Ages, the recurrence interval of the strongest earthquakes in this area can be approximately determined at 600–1000 years.

It becomes clear that professional archeoseismic investigations are necessary in this area (Nikonov, 2015). However, even now, as was noted earlier by the author—see (Nikonov, 2002a, 2003)—the seismic potential of the North Azov zone should be assessed taking into account the destructive earthquakes of ancient and Roman periods.

North Azov Fault as a Seismogenic Zone

The data obtained on earthquakes in the Northern Sea of Azov region are unique in some respects. These are 13 events documented for the time interval of 200 years in a narrow linear zone extending by up to 250 kilometers along the northern coast of the Sea of Azov. The North Azov seismogenic zone was distinguished earlier, based on earlier data on eight earthquakes in this area and archeoseismic and geological data (Nikonov, 2003), however, the geological traces of its activity were not considered in detail. Some of them are presented below.

The distinguished zone is a tectonic fault of high order at the boundary between the East European Platform and Scythian Plate, dividing the Near-Azov crystalline massif on land from the sedimentary sequence on the bottom of the Sea of Azov. This is a subvertical tectonic suture penetrating into the crystalline basement to as deep as (at least) 8–10 kilometers. Interestingly, this is the depth of two instrumentally determined hypocenters of the earthquakes that occurred in the 21st century (Nikonov and Gabsatarova, 2012; Gabsatarova et al., 2017). The fault zone is 5–15 km wide, extending as a straight line by 250 kilometers, supporting the idea that it is a high-order suture (Potapchuk et al., 1985; Chebanenko et al., 1987; Potapchuk, 1988; Nikonov and Shvarev, 2011). According to the data from Ukrainian geologists, in the western part of this zone, between meridians of Obitochnaya and Berdyansk spits, immediately to the south of the shoreline, the surface of Precambrian basement abruptly sinks from 200 to 900 meters

depth and is additionally cut by a series of step-wise sublatitudinal normal faults, two of which are 40 and 80 meters in amplitude (this can be seen especially clearly in the profile located near Berdyansk). The basement top along the profile of the Obitochnaya spit dips in a SSW direction. In addition to the main “stem” of the fault, which the present-day shoreline follows, a series of minor young step-wise faults was revealed on the adjacent bottom of the Sea of Azov by geophysical methods: these are sublatitudinally trending faults with amplitudes of displacement of the basement top of up to several tens of meters, with the maximum of about 300 meters documented along the Berdyansk profile (Kharechko, 1960).

The sinking of the Azov Basin relative to adjacent land along the fault has continued, and this is reflected in the present-day topography. S.A. Nesmeyanov provided evidence, including drilling data, that there is a recent North Taganrog fault at least 80 kilometers long, extending from the Miuss liman eastwards to the lower stream of Don river (Leonova et al., 2006). The earlier data, supporting young tectonic activity, on the one hand, and supplementing the catalog of historical earthquakes in the discussed zone, were published in the form of fractures and seismogravitational Holocene dislocations (Nikonov, 2002b, 2003). Various dislocations in Late Pleistocene and Holocene deposits, in cultural layers of the Stone Age sites, and in excavations of the Tanais polis (including its Greek and Roman periods) carry the unambiguous traces of paleoseismodeformations, both fractured and seismogravitational.

CONCLUSIONS

The small-amplitude normal faults revealed by drilling, as well as the set of deformations identified during archeological excavations in the coastal zone of Northern Azov region, indicate seismic activity of the established fault zone both in the Holocene and in the last millennia (Potapchuk et al., 1985; Nikonov, 2002b, 2003; Leonova et al., 2006). The features of young tectonic activity, on the one hand, and the data on weak earthquakes in the zone for the last 200 years, on the other hand, give us solid grounds to believe that the North Azov fault is a potential earthquake source (PES) zone, as was supposed earlier (Nikonov and Gabsatarova, 2012) and reflected in the General Seismic Zoning maps (OSR-2014 and OSR-2016), however, not taking into account the data on destructive earthquakes that occurred in the Antiquity and earlier (Ulomov et al., 2015). It is obvious that the current long-term seismic hazard assessment for this zone needs to be corrected.

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