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The Geyser Gazer Sput

GOSA

by Andrey Leonov

With a height of 115 ft, Velikan is the largest regular geyser in the Valley of the Geysers, Kamchatka, Russia. Self-willed and powerful, it is the true Tsar of this land (while Grot is the Spirit).

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LETTER FROM THE PRESIDENT

by David Monteith

As I write this in mid-January, the temperature here in normally balmy Seattle is in the teens and at Old Faithful it is in the mid 30s, the minus 30s that is. The warmth of Summer and anticipated trips to Yellowstone seem far in the future. Even so, this cold weather has me thinking not of the warm future but of a cold past. Nine years ago I made my only trip to Old Faithful in Winter. And it was cold.

It was a quick trip. Some good friends were able to get cheap tickets to Bozeman from a son who worked for the airlines. The trip was going to be fast and the budget was tight. We planned to stay in Gardiner and spend most of our time watching wildlife (ok, we were looking for wolves and other fuzzies – don't think too badly of us.) Of course, I also wanted to get to Old Faithful. My friends agreed so we splurged and scheduled a day trip from Mammoth via snow coach. Was two hours at Old Faithful going to be worth the long trip and expense? I hoped it would be. But, I didn't hold out much hope for the geysers. I figured we'd see Old Faithful and maybe Plume but not much else. I knew the snow coach ride would be long, uncomfortable and probably boring. But I hoped the winter scenery would make up for it. Well, I did get two things correct but I was wrong about everything else.

What I hadn't counted on was the unpredictability of the geysers and even more importantly the quality of the people you meet in Yellowstone. It seemed that everywhere we turned we ran into friends and geyser gazers. From Sandy Nykerk at the Mammoth Hotel, to Leslie Quinn on the snow coach to Mike Lang at the Snow Lodge. Each helped to make our trip a resounding success. If you ever get the chance to travel through the park with Leslie, I highly recommend it. I think it made the snow coach driver nervous to have Leslie on board but I had a great time. Leslie's depth of knowledge and passion for the park is contagious. The trip was fabulous and the scenery, well the scenery was fabulous too.

When we arrived at the Snow Lodge, it was great fun to be welcomed by Mike who, of course, quickly gave us an update on the geysers.

We didn't have much time in the geyser basin, just enough to walk the loop from the Snow Lodge to Old Faithful, Castle, Grand, Geyser Hill and back. We should have known it was a good omen when we broke through the trees and were greeted by the start of an Old Faithful eruption. (Anyone read N.P. Langford recently?) As our walk continued, the geysers continued to cooperate. As we walked up to Grand not only did Grand start but also Penta with Daisy in the distance. On Geyser Hill we not only saw Plume but also Beehive. Lest we forget that it welcomed us into the basin, Old Faithful erupted again as we were rushing back to catch the return snow coach. Our luck continued on the drive out. Baby Daisy erupted as we passed and during our guided walk at the Fountain Paint Pots, Fountain started just as came over the hill. What a day trip. Geysers, geysers and more geysers, beautiful scenery and good friends. Who could ask for more.

For me personally the best was yet to come. There was one more person that would figure prominently in my memory of the trip. Once I returned to Gardiner, I met up with Tara who was working at the Yellowstone Library. As they say, one thing led to another and we were married a year and a half later.

Yellowstone is a wonderful place. The natural wonders have the ability to enthrall us and the people can enthrall us too.

I hope you are all staying warm and taking some time to remember your own happy memories from Yellowstone.

CATALOGING OF GEYSERS IN KAMCHATKA'S VALLEY OF GEYSERS

by Andrey Leonov; edited by Jack Hobart

The "Catalogue of the Main Objects in the Valley of Geysers (Kronotskiy Reserve, Kamchatka)" was published in 2012 after official approval by the Kronotskiy Reserve and Russia's Institute of Volcanology and Seismology, IVaS FEB RAS[1]. It is the most complete list of geysers and other features in the Valley of Geysers, numbering 127 at this time.

Here, we will briefly review the history of its geyser descriptions, discuss cataloging methodology, and compare the catalog with the 1991 GOSA report[2].

History of Geyser Names and Descriptions

The Valley of Geysers was discovered in 1941 by Kronotskiy Reserve geologist Tatyana Ustinova, who first described the Valley and its geysers, and her assistant Anisifor Krupenin. Her scientific articles (1946, 1949) and especially the book, Geysers of Kamchatka (1955) became the undisputed authority for more than half a century. She named 25 main geysers (15 of which survived the 2007 landslide).

Many new names for smaller geysers and other features have since been introduced or changed, but this process was never regulated. Several comprehensive descriptions of thermal features have been made after Ustinova, including the scientific papers of Naboko (1954), Raik (1963) and Vinogradov (1964), a tourist guidebook by Semenov (1973), the GOSA report by Bryan et al. (1991), photo compilations by Nechaev (2000, 2007) and a guidebook by Sugrobov et al. (2004, 2009).

Volcanologists from the Institute of Volcanology started to work regularly in the Valley in the early 1970s, led by Viktor Sugrobov. They published their results in scientific articles virtually unknown to the public. In 1973, Sugrobov initiated stereo-photogrammetric surveys of the Valley, and the first large scale map (1:2000) was published in 1974, showing locations of 25 main geysers. This map was used by all following researchers, in particular, it formed the basis for Nikolaenko and Bryan to prepare the map in the 1991 GOSA report on the first American group to visit the Valley.

by Andrey Leonov

Fontan is the main actor on the Vitrazh, erupting each 25 min. Try to imagine, that in past it was twice higher! 2011

The GOSA report was the first comprehensive description of the Valley of Geysers in English. It uses feature names reported by Vitaliy Nikolaenko, a warden and scientist of Kronotskiy Reserve, who guided the GOSA expedition. Vitaliy's version of names represents mainly the verbal tradition in the Valley, including several names he coined for the visitors, such as GOSA and the Grot Yubileyniy variation of Grot. Some names differed from those used in Russian scientific publications.

Volcanologists from IVaS FEB RAS first published a systematic description of the Valley in 2004. This guidebook, The Pearl of Kamchatka - the Valley of Geysers by Viktor Sugrobov, Nina Sugrobova, Valeriy Droznin, Gennadiy Karpov, and Vladimir Leonov (father of the author) represents a "scientific" tradition for geyser naming (as used in Yellowstone - Jack Hobart). It has some differences from the GOSA report and other publications.

The catastrophic landslide of 2007 destroyed half the geysers. Some were buried and others inundated by flood waters from the dammed Geyzernaya River. Some springs changed their behavior after the landslide, and new features appeared - with new names given to them. It became obvious that the list of geysers and other objects in the Valley should be reviewed and an official version should be adopted publicly.

Tatyana Ustinova died in 2009 in the age of 95. Her death closed the epoch.

Virtual Valley of Geysers Project

The "Virtual Valley of Geysers" project was started in 2009 to digitally preserve the Valley (Sput v26, n1, February 2012). Cataloging of thermal features was one of its main goals.

In order to develop a comprehensive documentation of features, all previous publications were reviewed as were personal accounts by researchers. Extensive direct observations were conducted by the author with assis-

tance from Sergey Samoylenko, Aleksandr Bobkov and Vadim Konyshev during three expeditions in the Valley in 2009-2011. Geographic coordinates of geysers and other features were measured in the WGS84 system of coordinates based on a precisely geo-referenced 0.5 m resolution GeoEye-1 satellite image.

Finally, the Catalogue of the Main Objects in the Valley of Geysers (Kronotskiy Reserve, Kamchatka) was approved in the end of 2011 by the Scientific and Technical Council of the Kronotskiy Reserve and by the Scientific Board the IVaS FEB RAS and published in 2012 and is available online[3]. Viktor Sugrobov was its scientific consultant and input was provided by Valery Droznin, Jack Hobart from GOSA, Vladimir Leonov and many others.

The catalog comprises descriptions, photos and coordinates of 127 objects, including 56 geysers (40 geysers with known proper names and 16 previously unnamed geysers). Other objects are: springs, mudpots, pools, steam vents, thermal platforms (slopes, walls), lakes, waterfalls, rocks, etc.

Cataloging Methodology

Four cataloging processes were developed during this activity: (1) selection of a primary name for the feature if several names exist, (2) classification of thermal features, (3) a formalized Russian naming approach and (4) transfer of these proper names into English. It should be noted that this is a formalism for use in the Valley of Geysers, therefore, no coordination with organizations outside Russia was conducted.

Choosing a primary name

There is a historical concept of "the discoverer's right" in natural sciences, i.e. the right to give a name to the discovered object. Now however, the discoverer usually can only propose a name to an appropriate authority. This authority then takes into consideration not only the priority of the discovery, but also other factors such as any established naming rules under its jurisdiction, a verbal tradition, public opinion, expert judgment etc.

Ustinova's articles (1946, 1949) and book (1955) constitute the original naming source for many of the primary features. Subsequent publications suffer from the same mix of prior naming use, word-of-mouth and even author poetic license as occurs in Yellowstone and elsewhere.

Thus several factors were taken into account when choosing primary names for geysers and other objects: priority of the discoverer's name (or first published name), the current practice of naming, and opinions of specialists, primarily scientists of the Kronotskiy Reserve and the IVaS FEB RAS.

by Andrey Leonov and Vadim Konyshev

Large and beautiful, the Gorizontalnyy geyser has so inconspicuous structure and location that T. Ustinova did not discover it! 2011

Classification of thermal features

Thermal feature classifications have been established for the purpose of classifying Valley features, therefore are not necessarily applicable to other thermal areas.

"Geyser" refers to a boiling spring that erupts periodically. That is, it periodically erupts hot water and steam above a surface of the ground. Its action can be characterized by consecutive stages: water outflow, eruption (spouting) of a steam-water mixture, steaming and full rest (quiescence), based on Sugrobov's guidebook.

The eruption is not always a regular, "classical" fountain. It can take the form of water splashing or a pulsing outflow, especially for the small geysers.

Some geysers have no stage of outflow. Sometimes the steaming stage is almost imperceptible, because cold water flowing into the geyser's conduit or pool stops the boiling.

The term "periodically" does not necessarily mean uniform eruptions. Some geysers have irregular action, that is, the length of quiet and eruptive stages varying significantly from cycle to cycle.

An essential point of the geyser's definition is a presence of a full-pause, a spontaneous break in its action. If the hot water and steam erupts continuously, it is not a geyser but a perpetual spouter.

In practice, the difference between a pulsating spring and a geyser with a short stage of a full rest is subjective. Ustinova noted that "Many springs are a kind of transient form between the two types, and their identification as one type or another is arbitrarily in some degree." Naboko (1954) considered springs whose stage of a full rest is less than one minute as pulsating springs, and springs whose stage of full rest is more than one minute as geysers, emphasizing that this distinction is arbitrarily.

The main difficulty when composing the list of geysers is that geyser action sometimes varies significantly over time. These changes can be connected with the variations in heat

flow, hydrometeorological conditions, water chemistry, seismicity, changes of the morphology of the terrain etc. For example, the Pervenets (firstborn) geyser worked as a geyser at first observations (Ustinova, 1955), then as a pulsating spring (Vinogradov, 1964), and then as a geyser again (Semenov, 1973). After the 2007 landslide it was buried with a 6-meter layer of the landslide deposits, but quickly broken through them and worked as a pulsating spring in 2008-2010, and finally started to work as a geyser again in 2011!

In the "Catalogue..." we considered a boiling spring as a geyser if at least one observer described it as a geyser, regardless of its current state. It simplified composing the list and maximized the list of observed geysers. Under this approach, we can count 40 geysers with proper names in the Valley of Geysers. But in this case the list of geysers includes those that are currently perpetual spouters (Averyevskiy, Verkhniy, Vrata Ada, Grotik, Ivanushka, Plachushchiy) and those that rarely erupt (Grot, Kotly, Verkhniy v Rusle). Also we label Malyy a geyser, since it is still active under the lake.

The GOSA 1991 expedition led to an estimate of closer to 200 geysers, however there were insufficient observations of the smaller geysers to include them in the catalog. Many were only seen once by people unfamiliar with the Valley. It is impossible to check this estimation now because a large part of the Valley was destroyed by the 2007 landslide.

The many small geysers erupting from vertical walls are especially difficult to classify. The Martyshka (Monkey Face) Geyser is a notable exception due to the fact that it was videotaped in eruption several times in 1991 and visually observed in other powerful 1991 eruptions of Grot. Since it only erupts for seconds before these eruptions, it may still erupt before these rare eruptions.

Writing composite Russian names

According to Russian spelling convention, all geographic names start with a capital letter with exceptions such as generic terms (island, sea, mountain etc.) and functional descriptions. Thus, common descriptive terms for geographic names are generally in lower case.

Thus we write in Russian: "geyzer Verkniy v Rusle" (Verkniy v Rusle Geyser), "istochnik Malakhitoviy Grot" (Malakhitoviy Grot Spring), "ushchelye Zheltykh Skal" (Yellow Rocks Canyon) etc. as opposed to English in which every word in a title (including composite geographic names) starts with a capital letter.

The "Dolina geyzerov" (Valley of Geysers) name has also the version "Dolina Geyzerov." The first spelling emphasizes that geysers are located here, while the second spelling represents the Valley as a complex of natural objects (not only geysers). Both names are in use; the author prefers the first one.

Transferring names into English

There are no standards or even commonly used rules for transferring Russian proper names into foreign languages. Among others, it is also the case for Russian place-names, whose principles for transferring are different in literature, legal texts, scientific writing and other purposes. In practice, the method of proper name transferring is taken to the particular situation. Conventional matching is the priority, if any; if not, then either transliteration or translation is used. Transliteration is the conversion of Russian letters into English whereas translation is the conversion of the name's meaning into English.

In the "Catalogue..." we use the transliteration as a primary method of transferring Russian proper names into English. Exceptions are the names that have a conventional matching in English.

All authors following Tatyana Ustinova tried to give descriptive, memorable names to features. As in Yellowstone, thermal features are, for the most part, not named after people.

We propose that transliteration be used in general, with a translation to English used at least once in a publication for case where the Russian name is descriptive, and this description would be of interest to an English reader. Note that this translation would not have an initial capital letter, since it is informational, not a title.

Another consideration is a conflict with names of geysers in other locations. Velikan and Grot were, and

by Andrey Leonov

Unusual geyserite structure of this little geyser covers a slope like a cloth. Plashchanitsa means "(Christ's) Shroud" – really folk name! 2011

by Jack Hobart

The water rise for a large Grot Geyser eruption, July 1991. An unnamed vent that erupts along with Grot can be seen above its opening.

still are used within GOSA for the major Valley geysers, since Giant and Grotto are major Yellowstone geysers and much confusion would result if such translations were used.

There are several transliteration systems for Romanization of Russian. It seems that BGN/PCGN system (1947) with different simplifications is the most popular today. This system, in general, is used by the U.S. Department of State, Google Earth/Maps, Wikipedia, etc. We also use the BGN/PCGN system with some simplifications.

The 1991 GOSA report used the ALA-LC system which is not popular for Russian geographic names and should be avoided.

The Catalog of Features

Table 1 presents the geyser subset of the 127 cataloged features. There are 56 geysers including 16 unnamed geysers, two of which included names proposed by the author (in quotes, like "Vorchun").

Location of the features is shown in Figure 1 [page 13], the overview map of the Valley. Additional detail in the central portion is shown in Figure 2 [page 14].

Comparison with the 1991 GOSA report

Correspondence between the catalog and the 1991 GOSA report is shown in the table.

Geysers destroyed by the 2007 landslide are not included. These consist of all GOSA report geysers located in Groups II thru V (except Malyy and Bolshoy). Also omitted are: (a) unnamed springs of no special interest, or not found; and (b) mistakes.

Errors in the GOSA report include:

6a-2. Kogichka (Little Claw). It is a funny mistake. The Russian name of waterfall "Kosichka" (pigtail) was written unclear on the map and transcribed in English wrong. The translation is a pure fantasy. A hot spring under the waterfall had no name and was buried with gravel spit after the 2007 landslide. In fact, the "Little Claw" phantom geyser has actually been translated back in Russian by some authors!

6a-5a. Sorok Dva (Forty-two). Appears to be a mistake.

6b-5. Pyostryi. It seems that the name Pestryy (variegated) was used for several Thermal Area VII features, including the Kotly (pots) geyser. It doesn't apply to any specific feature.

7a-3. Unnamed steam vent of no special interest.

7a-7. Vitalii. During our expeditions, we did not found any spring in the described location that fits to description. Perhaps individual notes from expedition members could shed light on the intended feature.

7b-1a. Unnamed geysers/springs in Velikan area. First of the described features is well-known Samozvanets (impostor) spring. Two of geyserite cones, described later, are included in the "Catalogue..." as unnamed geysers. Description of the Karlek (dwarf) geysers in this paragraph is a mistake: they are located not in Velikan area, but on Ustinova Wall upstream along the river.

To be precise, Ustinova introduced a proper name "Wall of dwarf geysers" for the steep slope on the left bank of the Geyzernaya River upstream the Velikan Geyser, between the Rozovyy Konus and Plashchanitsa geysers. The term "dwarf geysers" here is a descriptive name (like "dwarf stars"). Later the title "wall/slope of dwarf geysers" started to be used as a descriptive name for other similar thermal walls in the Valley. The wall named by Ustinova became "Ustinova wall (of dwarf geysers)".

7b-4, 7c-5. Springs of no special interest.

7c-9 to 7c-12. Two of them are probably Nora and Travyanoy geysers, included in the catalog. The other two are probably unnamed hot springs of no special interest.

7c-14 and 14a. One of them is a Spokoynyy geyser, and another one is an unnamed pulsating spring ("Rozovyy"). Both are included in the catalog.

7c-15. Not found.

Conclusions

The Valley of Geysers within the Kronotskiy Reserve of Kamchatka is one of the most popular and remote tourist destinations in Russia. It is also a unique subject for scientific research. There has been a wave of interest in the Valley as a result of the 2007 landslide. Damaged and bruised, the Valley has survived and continues to attract tourists and scientists from all over the world. The catalog presented in this article comprises the most complete and up-to-date list of geysers and other thermal features in the Valley.

Since this article is quite long, the status of area affected by the landslide is deferred to a later article. Extensive, illustrated articles coauthored by the author of this article can be found on the Valley of Geysers website[4].

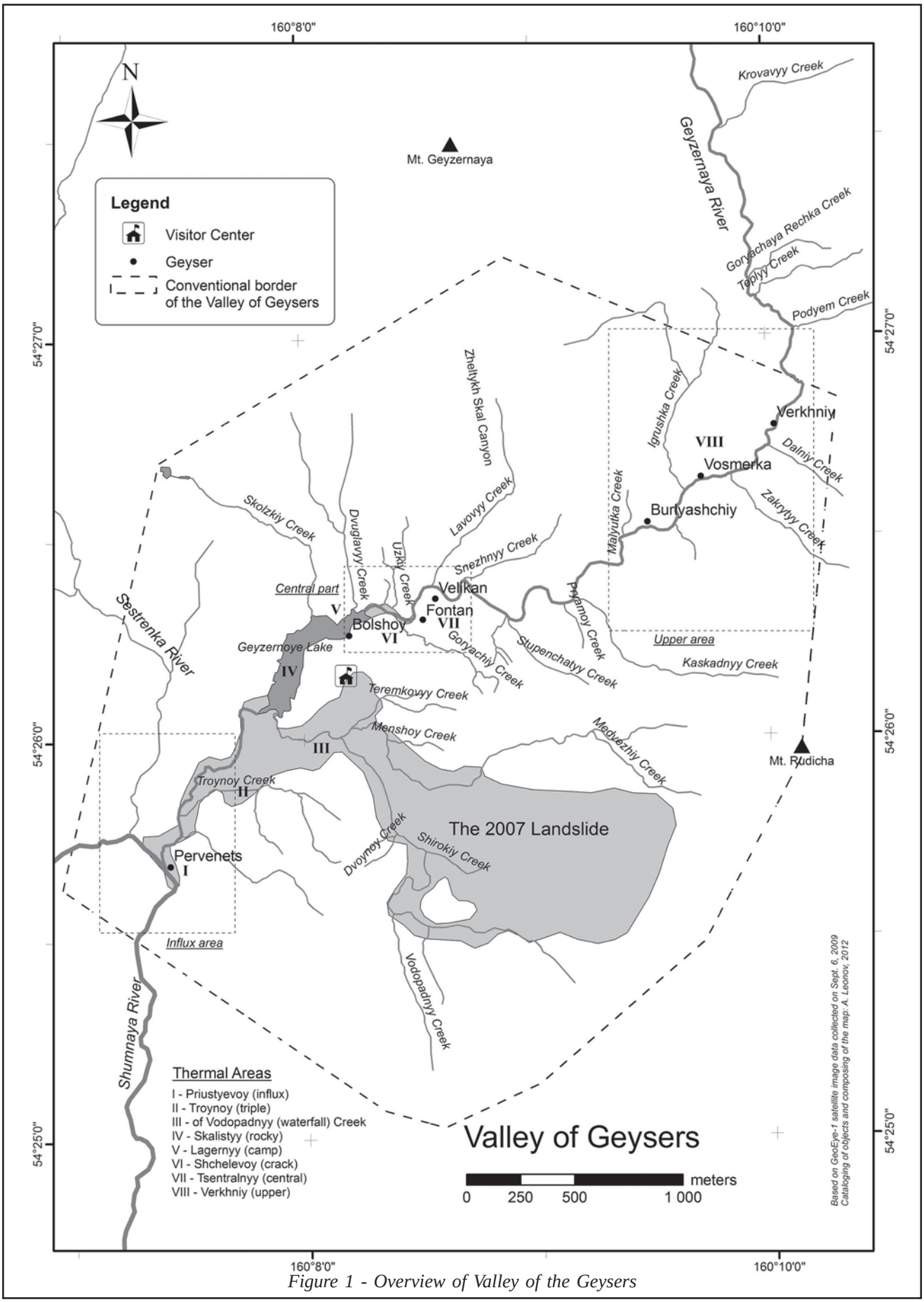

Figure 1 - Overview of Valley of the Geysers

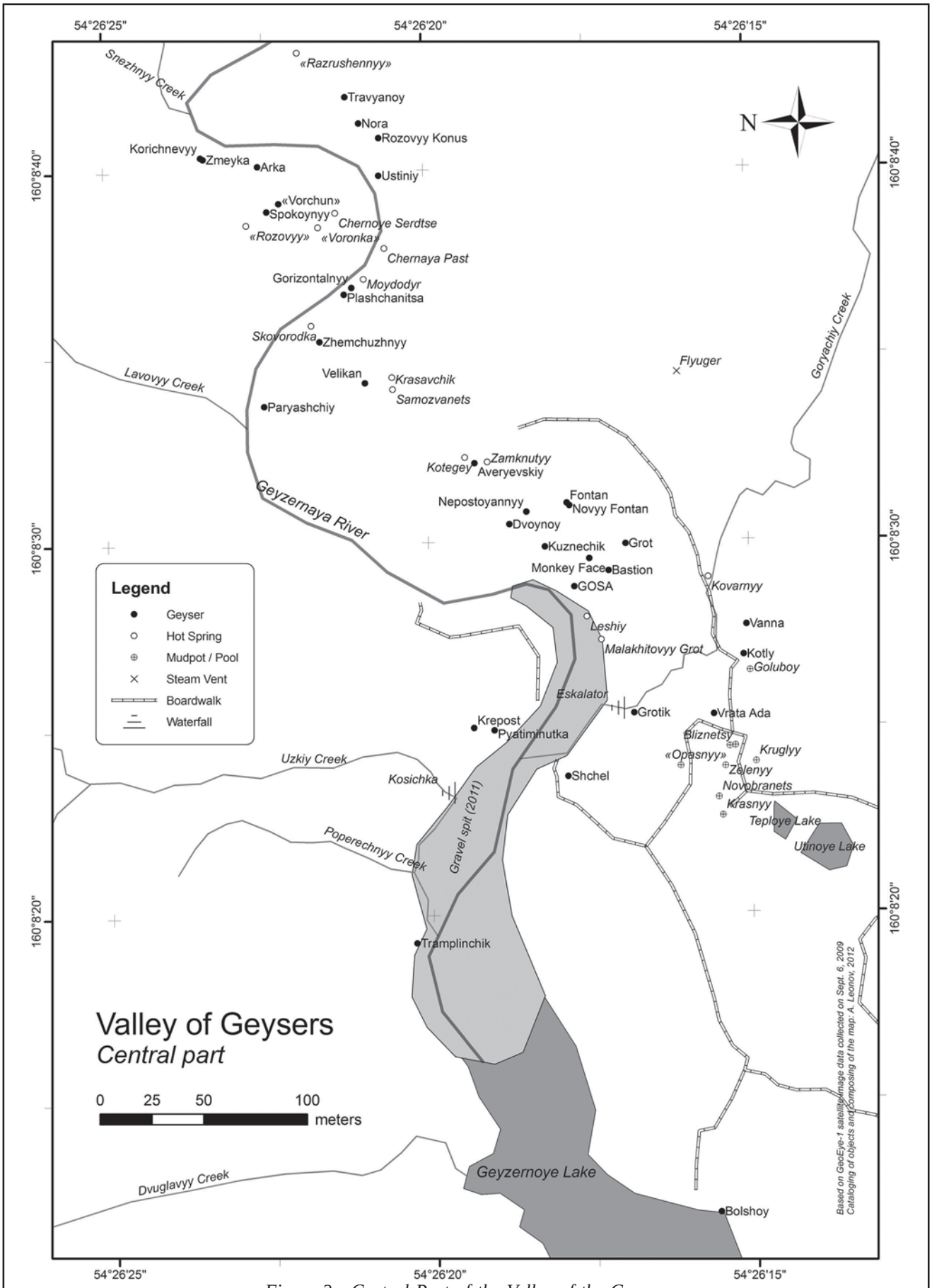

Figure 2 - Central Part of the Valley of the Geysers

Catalog of Geysers in the Valley of Geysers

#	Object Name & English Equivalent (* marks the conventional matching)	Coordinates (N. Lat, E. Long.)	Catalog Page	GOSA Report Entry	Current Status (2011)
1	Аверьевский, Averyevskiy	54°26'19.26" 160° 8'32.00"	pp. 61-62	7a-18. Averii	pulsating mode. Perpetual flowing at H = 3-5 m.
2	Арка, Arka (arch)	~54°26'22.58" ~160° 8'40.03"	p. 63	7c-16. Arka	water appears in the outflow channel each 5 min.
3	Бастион, Bastion (bastion)	~54°26'17.19" ~160° 8'29.08"	p. 64	7a-8. Zastenok	upper vent: H = 0.5-1 m, T – ? lower vent: pulsating mode, H=0.5 m.
4	Большой, Bolshoy (large)	54°26'15.58" 160° 8'11.84"	p. 65	5-9. Bolshoi	H = 10 m, T = 1 hour.
5	Бурлящий, Burlyashchiy (seething)	54°26'32.05" 160° 9'29.09"	p. 66	8-3. Burlishchii	H = 2-3 m, T = 20 min.
6	Ванна, Vanna (bath)	54°26'15.05" 160° 8'27.60"	p. 67	6b-3. Vanna	H = 1-2 m, T = 1-2 min (irregular).
7	Великан, Velikan (giant)	54°26'20.95" 160° 8'34.19"	p. 68	7b-1. Velikan	H = 35 m, T = 5-7 hours (during cyclones T may increase up to >1 day).
8	Верхний, Verkhniy (upper)	54°26'46.43" 160°10' 1.94"	p. 69	9-1. Verkhenii	pulsating mode. Perpetual outflow and active steaming.
9	Верхний в Русле, Verkhniy v Rusle (upper, in the streambed)	~54°26'46.73" ~160°10' 2.32"	p. 70	—	underwater within the Geyzernaya River.
10	Восьмёрка, Vosmёrka (8-shaped)	54°26'38.74" 160° 9'42.97"	p. 71	8-2. Vosmorka	H = 2 m, T = 40 min.
11	Врата Ада, Vrata Ada (gates of hell)	54°26'15.58" 160° 8'25.20"	p. 72	6b-2. Vorota Ada	pulsating mode. Perpetual boiling and steaming.
12	Горизонтальный, Gorizontalnyy (horizontal)	~54°26'21.14" ~160° 8'36.75"	p. 73	7c-2. Gorizontalnyi	H = 10 m at 45°, T = 1.5 hours.
13	Гоша, Gosha (GOSA *)	~54°26'17.73" ~160° 8'28.66"	p. 74	7a-4. Gosha	H = 1-2 m at 45°, T – ? (only one cycle was registered at T = 7.5 min).
14	Грот, Grot (grotto)	54°26'16.92" 160° 8'29.80"	p. 75	7a-9. Grot Yubileinyi and 7a-10. Serebryannaya Vanna	periodical outflow, T – ? (Sugrobov: 31-48 min). very rare eruptions up to 60 m at 40-70° from vertical axis (last photo: 2010).
15	Гротик, Grotik (little grotto)	54°26'16.82" 160° 8'25.26"	p. 76	6b-1. Eskalator	Pulsating mode, H = 0.5 m.
16	Двойной, Dvoynoy (double)	54°26'18.73" 160° 8'30.35"	p. 77	7a-15a. Dvoynoy Sedlo and 7a-15b. Dvoynoy Stremya	Upper vent: H = 0.5-1 m, T = 20-40 sec. Lower vent: H = 1-3 m, T = 85-115 sec.

17	Жемчужный, Zhemchuzhnyy (pearl)	54°26'21.65'' 160° 8'35.31''	p. 78	7b-3. Zhemchuzhnyi	H = 5-6 m, T = 3 hours 40 min.
18	Змейка, Zmeyka (snake)	~54°26'23.43'' ~160° 8'40.24''	p. 79	—	water appears in the outflow channel each 70-90 sec.
19	Иванушка, Ivanushka	54°26'40.28'' 160° 9'50.79''	p. 80	—	pulsating mode, H = 0.2-0.3 m.
20	Коричневый, Korichnevyy (brown)	~54°26'23.47'' ~160° 8'40.28''	p. 81	—	H = 0.1-0.2 m, T = 9 min.
21	Котлы, Kotly (pots)	54°26'15.10'' 160° 8'26.79''	p. 82	probably 6b-4. unnamed	this pool is a geyser in some seasons. H = 1 m, T – ?
22	Крепость, Krepost (fortress)	54°26'19.33'' 160° 8'24.90''	p. 83	6a-3. Krepost	H = 3 m, T – ? (only one cycle was measured with T = 2.5 hours).
23	Кузнечик, Kuznechik (grasshopper)	~54°26'18.18'' ~160° 8'29.74''	p. 84	7a-5. Kuznechik	H = 1 m at 45° in two opposite directions, T = 1.5-2.5 min.
24	Малый, Malyy (small)	~54°26'15.94'' ~160° 8'10.55''	p. 85	5-7. Malyi	flooded by the lake (9 m below water level). Active under water
25	Мартышка, Martyshka (Monkey Face *)	~54°26'17.49'' ~160° 8'29.41''	pp. 86-87	7a-6. Unnamed	observed only before strong Grot eruptions in 1991. Not noticed since then due to lack of opportunities, but probably active. H = 0.5 m
26	Непостоянный, Nepostoyannyy (inconstant)	54°26'18.46'' 160° 8'30.68''	p. 88	7a-14. Nepostoyannyi	H = 3 m, rare splashes up to 6 m. T = 1-5 min (irregular).
27	Новый Фонтан, Novyy Fontan (new fountain)	~54°26'17.79'' ~160° 8'30.84''	p. 89	7a-11. Novii Fontan	H = 1-3 m. T – ?, irregular (full cycle measured by different researchers varies from 11 min to 154 min, with eruption stage generally several times longer than the quiescence stage).
28	Нора, Nora (hole)	~54°26'20.99'' ~160° 8'41.16''	p. 90	7c-9 to 7c-12. unnamed	H = 0.5 m at 45°, T = 9 min.
29	Парящий, Paryashchiy (steaming)	54°26'22.53'' 160° 8'33.59''	p. 91	7b-2. Paryashchii	H = 1-3 m. T – ?, irregular (Sugrobov: 30 hours). Eruption lasts for several hours.
30	Первенец, Pervenets (firstborn)	54°25'41.26'' 160° 7'25.03''	p. 92	1-1. Pervenets	H = 1 m, T = 13 min.
31	Плачущий, Plachushchiy (weeping)	54°26'39.32'' 160° 9'49.76''	p. 93	8-4. Plachushchii	pulsating mode. Perpetual pulsating outflow and steaming.
32	Плащаница, Plashchanitsa (shroud)	~54°26'21.26'' ~160° 8'36.57''	p. 94	7c-1. Platchenitza	H = 0.3 m, T = 0.5 hours.
33	Пятиминутка, Pyatiminutka (five minutes)	~54°26'19.01'' ~160° 8'24.83''	p. 95	6a-4. Primernyi	H = 0.1-0.3 m, T = 5 min.

34	Розовый Конус, Rozovyy Konus (pink cone)	54°26'20.68" 160° 8'40.76"	p. 96	7c-7. Conus Rozovwyi	H = 1-1.5 m, T = 15 min.
35	Спокойный, Spokoynyy (calm)	54°26'22.45" 160° 8'38.81"	p. 97	probably 7c-14. unnamed	H = 0.5 m, T = 1 min.
36	Травяной, Travyanoy (grassy)	54°26'21.20" 160° 8'41.87"	p. 98	probably 7c-9 to 7c-12. unnamed	H = 1 m, T = 1 min.
37	Трамплинчик, Tramplinchik (ski-jumping hill)	~54°26'20.27" ~160° 8'19.15"	p. 99	6a-1. Tramplinchik	H = 0.3 m, T – ?
38	Устиний, Ustiniy	~54°26'20.69" ~160° 8'39.75"	p. 100	7c-6. Ustiney	H = 0.5 m, T = 45 min.
39	Фонтан, Fontan (fountain)	~54°26'17.83" ~160° 8'30.91"	p. 101	7a-13. Fontan	H = 10 m, T = 25 min.
40	Щель, Shchel (crack)	54°26'17.87" 160° 8'23.58"	p. 102	6a-5. Shchell	H = 2-3 m, T = 30-33 min.
41	unnamed geyser below Bastion Geyser	~54°26'17.21" ~160° 8'29.07"	p. 103	7a-8a. unnamed (“Zastenok’s Hole”)	H = 0.1 m, T – ?
42	unnamed geyser on Fontan’s Platform	~54°26'17.10" ~160° 8'30.42"	p. 104	—	H = 0.1 m, T – ?
43	unnamed geyser in front of Novyy Fontan Geyser	~54°26'17.82" ~160° 8'30.78"	p. 105	7a-12. unnamed (“Novii’s Geyser”)	H = 0.5 m, T – ?
44	unnamed geyser above Nepostoyannyy Geyser	~54°26'18.31" ~160° 8'31.58"	p. 106	probably 7a-16. Unnamed (“Red Geyser”)	H = 0.5 m, T – ?
45	unnamed geyser above Dvoynoy Geyser	~54°26'18.77" ~160° 8'31.01"	p. 107	—	H = 0.5 m, T – ?
46	unnamed geyser to the right from Averyevskiy Geyser, the upper one	54°26'19.17" 160° 8'31.54"	p. 108	—	H = 0.3 m, T – ?
47	unnamed geyser to the right from Averyevskiy Geyser, the lower one	54°26'19.43" 160° 8'31.12"	p. 109	—	H = 0.5 m, T – ?
48	unnamed geyser on Velikan’s Platform, the upper one	~54°26'20.43" ~160° 8'33.03"	p. 110	mentioned in 7b-1a	H = 0.1 m, T – ?
49	unnamed geyser on Velikan’s Platform, the lower one	~54°26'20.55" ~160° 8'32.79"	p. 111	mentioned in 7b-1a	H = 0.1 m, T – ?
50	unnamed geyser to the right from Ustiniy Geyser	~54°26'20.55" ~160° 8'39.20"	p. 112	—	H = 1 m, T = 15 min.
51	unnamed geyser to the left from Ustiniy Geyser	~54°26'20.68" ~160° 8'39.81"	p. 113	—	H = 0.5 m, T = 45 min.
52	unnamed geyser below Rozovyy Konus Geyser, the upper one	54°26'20.74" 160° 8'40.53"	p. 114	7c-8. unnamed	H = 2 m at 45°. T – ? (Sugrobov: 36 min).

53	unnamed geyser below Rozovyy Konus Geyser, the lower one	54°26'20.79" 160° 8'40.54"	p. 115	—	H = 0.1-0.2 m. T – ? (Sugrobov: eruption lasts for 16 min).
54	unnamed geyser below Spokoynyy Geyser: "Vorchun" (grumbler) [5]	54°26'22.26" 160° 8'39.03"	p. 116	—	H = 0.1 m, T = 1 min.
55	unnamed geyser to the left from Arka Geyser	~54°26'22.30" ~160° 8'40.01"	p. 117	—	H = 0.3 m, T – ? (Sugrobov: 25-30 min).
56	unnamed geyser below Burlyashchiy Geyser: "Yashcherka" (lizard)	~54°26'31.68" ~160° 9'29.57"	p. 118	—	H = 0.5 m, T – ?

1. All coordinates are measured on the basis of the geo-referenced 0.50 m GeoEye-1 satellite image collected on Sept. 6, 2009. Coordinate accuracy is limited by resolution of the satellite image, precision of its geo-referencing and by accuracy of locating objects on the image. We estimate error < 1 m for most objects. Some objects are hard to pinpoint on the image, so their approximate coordinates are prefixed with " ~ ".
2. The coordinate system used is WGS84.
3. "H" means "size of the eruption (fountain, jet, splashes etc.)". "T" means " total period of the geyser's activity cycle", that is, the cycle of start-to-start. The table presents average values of H and T observed (measured) by the author in August 2011, and/or registered on photos and videos.
4. "T - ?" means that only one cycle was measured directly or registered on video, or that the whole cycle was not measured/registered at all. If no measurements were made, data from previous publications are cited, if available (primarily Sugrobov, 2009).
5. The author suggests several names for previously unnamed objects. Such names are quoted (e.g. "Vorchun").

Footnotes

[1] Institute of Volcanology and Seismology, Far Eastern Branch of the Russian Academy of Sciences (IVaS FEB RAS)

[2] Bryan, T. Scott. The Geysers of 'The Valley of Geysers': A Prelimnary Report by the GOSA Expedition of June 28-July9, 1991, GOSA, October 1991.

[3] http://www.virtual.ihst.ru/2012/catalogue-2012.pdf

[4] http://valleyofgeysers.com/

by Andrey Leonov

Vanna (bath) is actually a pool that splashes each 1-2 minutes. The shape of splashes varies, so you never know what is coming! 2011

by Andrey Leonov and Vadim Konyshev

Long flowing of the Zhemchuzhnyy (pearl) is absolutely charming. With the best access amoung the large geysers, it is one of the loved ones. 2011