

Table

List of digital network stations (Petropavlovsk base station) for which preliminary spectral corrections were calculated

№	Station name	Code	Device type	Coordinates φ, N, λ, E
1	Administratsiya	ADM	Digital GSR-24+CMG-5T	53.023 158.650
2	Dalny	DAL	Digital GSR-24+CMG-5T	53.031 158.753
3	Dachnaya Ulitsa	DCH	Digital GSR-24+CMG-5T	53.057 158.639
4	Institute of Volcanology	IVS	Digital GSR-24+CMG-5T	53.066 158.608
5	Karymshino	KRM	Digital GSR-24+CMG-5T	52.828 158.131
6	Petropavlovsk Majak	MPPA	Digital GSR-24+CMG-5T	52.887 158.704
7	Mishenskaya Sopka	MSN	Digital GSR-24+CMG-5T	53.044 158.639
8	Nikolaevka	NIC	Digital GSR-24+CMG-5T	53.045 158.341
9	NIIGTC	NII	Digital GSR-24+CMG-5T	53.080 158.641
10	s/st Petropalovsk	PET	Digital GSR-24+CMG-5T	53.024 158.653
11	s/st Petropalovsk	PKC	Digital GSR-24+131 A	53.024 158.653
12	Rybachiy	RIB	Digital GSR-24+CMG-5T	52.917 158.533
13	Russkiy	RUS	Digital GSR-24+CMG-5T	52.432 158.513
14	Shkola	SCH	Digital GSR-24+CMG-5T	52.958 158.674
15	Shipunsky Cape	SPN	Digital GSR-24+CMG-5T	53.106 160.011
16	Sport camp "Zvezdnyy"	SPZ	Digital GSR-24+CMG-5T	53.056 158.666
17	Viluchinsk	VIL	Digital GSR-24+CMG-5T	52.931 158.404

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SON DOONG - THE WORLD'S LARGEST CAVE IN VIETNAM**Do Thi Dung**

Scientific adviser associate professor N.A. Osipova

National Research Tomsk Polytechnic University, Tomsk, Russia

More than 25 percent of the world's population either lives on or obtains its water from karst aquifers. Karst topography is a landscape formed from the dissolution of soluble rocks such as limestone, dolomite, and gypsum. It is characterized by underground drainage systems with sinkholes, dolines, and caves. It has also been documented for weathering-resistant rocks, such as quartzite, given the right conditions. Subterranean drainage may limit surface water with few to no rivers or lakes. However, in regions where the dissolved bedrock is covered (perhaps by debris) or confined by one or more superimposed non-soluble rock strata, distinctive karst surface developments might be totally missing. Karst regions contain aquifers that are capable of providing large supplies of water. Limestone cave system in Vietnam mainly located in the northern of the country by the focusing more limestone mountains. Currently the total cave in Vietnam was discovered nearly 1000 cave. Besides the natural beauty by nature creates, the caves also contain archaeological and historic ruins.

Son Doong Cave was recognized as a UNESCO World Heritage site in 2003. As of 2009 it is the biggest known cave in the world, Son Doong Cave is located in Phong Nha-Ke Bang National Park, Bo Trach District, Quảng Bình Province, Vietnam, near the Laos–Vietnam border.

Son Doong was created 2-5 million years ago by river water eroding away the limestone underneath the mountain, where the limestone was weak, the ceiling collapsed creating huge skylights. Inside is a large, fast-flowing underground river. It is formed in Carboniferous / Permian limestone. According to the Limberts, the cave is five times larger than the Phong Nha Cave, previously considered the biggest cave in Vietnam. The biggest chamber of Son Doong is more than five kilometres long, 200 metres high and 150 metres wide. With these dimensions, Son Doong overtakes Deer Cave in Malaysia to take the title of the world's largest cave. The cave contains some of the tallest known stalagmites in the world, which are up to 70 m tall. Behind the Great Wall of Vietnam were found cave pearls the size of baseballs, an abnormally large size. It is very difficult to travel. During the first expedition, the team explored two and a half miles of Son Doong cave before a 200-foot wall of muddy calcite stopped them. They named it the Great Wall of Vietnam. Above it they could make out an open space and traces of light, but they had no idea what lay on the other side. A year later, they have returned - seven hard-core British cavers, a few scientists, and a crew of porters - to climb the wall, if they can, measure the passage, and push on, if possible, all the way to the end of the cave [3][4].

Son Đòong Cave is not just gigantic in size. It houses a vast collection of unique features and rich biodiversity (as I will explain later). Special features like the two collapsed dolines provide natural openings where sunlight filters down to the bottom. Vegetation and tropical jungles grow inside the cave, unlike those seen anywhere else in the world. Initial research had shown that there were more than 200 species of vegetation identical to those living on the mouth of

the dolines. At the first doline, the flora was thin, comprising mostly of herbaceous vegetation and ferns. Meanwhile, the flora at the second collapsed doline was much richer and formed a tropical jungle known as the 'Garden of Edam'.

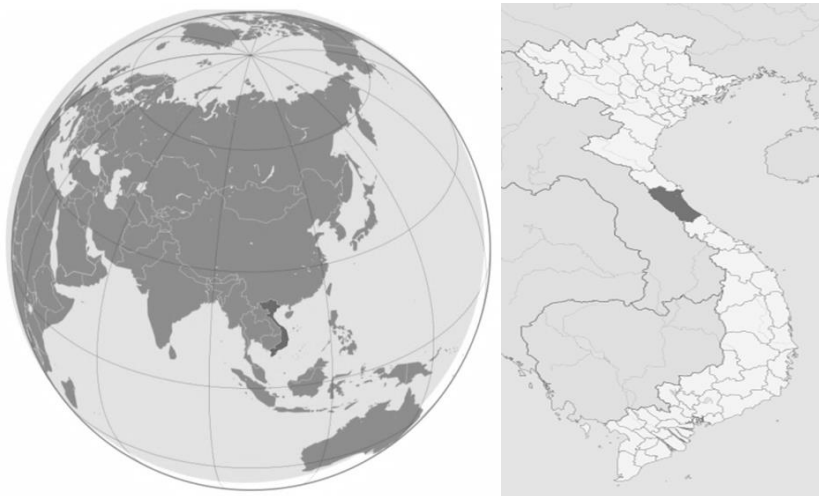


Fig. 1. Location of Son Doong Cave in Vietnam

There is selection of cave pearls as big as ping-pong balls. The spherical or oval calcite cave formations (speleothem) were housed in unique 'step terraces.' These 'terraces' are common in Son Đòong Cave and cave pearls can be found in many of them. The cave pearls would form when saturated calcium bicarbonate $\text{Ca}(\text{HCO}_3)_2$ water passed over an area and crystallised into small sand-like beads. Afterwards, layers of calcite would cover the outer surface and increase the pearl's size. As the water continued to run over the top, the pearls would roll into their spherical shape. Some were colourful and admired the work of mother nature's hands. In the many caves the scientists had seen in the world, they had never found so many pearls like they had here - some even as heavy as 1kg [5].

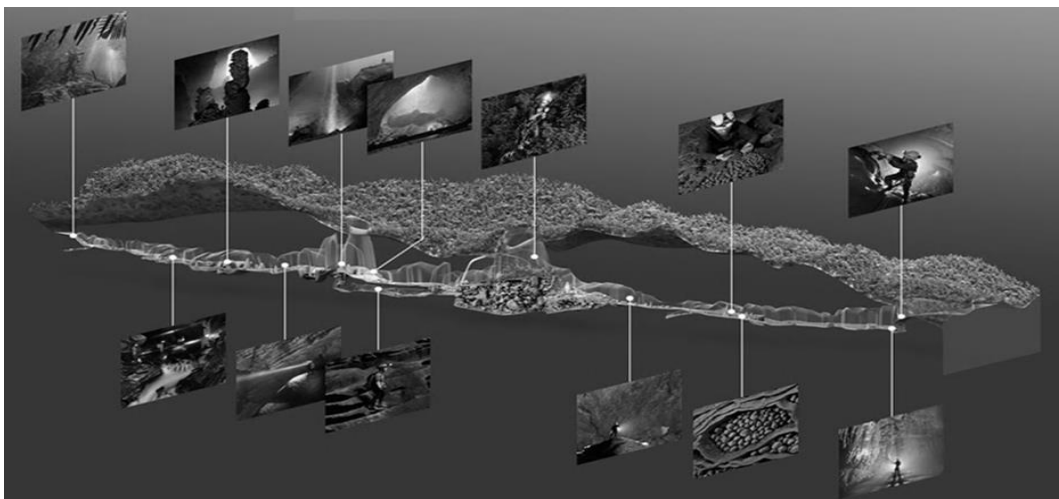


Fig. 2. Detailed structure diagram of Son Doong Cave[3]

In early August 2013, the first tourist group explored the cave on a guided tour at a cost of US\$3,000 each of them. Son Doong hikes currently offered by a single provider, Oxalis, demand strength, time, and money. Recently, Quang Binh's provincial leaders have pledged to push ahead with a plan to build a gondola lift in the world's largest cave, apparently without having secured approval from national authorities[2].

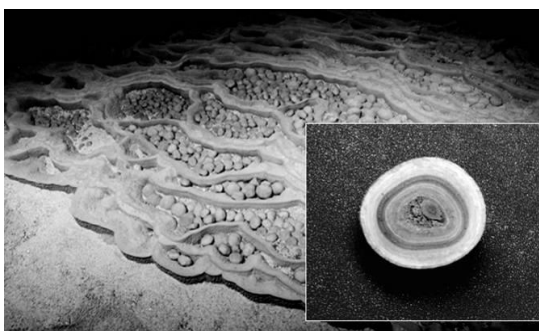


Fig. 3. Cave pearls formed in the stone cages. Each has concentric structure [5]

The cable car ride would allow any visitor to admire Son Doong and other attractions at the park without endeavoring on an adventurous tour. This project has been opposed by most scientists and communities in Vietnam and around the world. Because cable car construction project could lead to cave collapses and will threaten the pristine cave with further development. The cable car will definitely attract tourists in large numbers. But the noise of the engine, the amount of household waste has been found difficult to control in the place of another cable operator is really disturbing environment where biodiversity is high in Phong Nha - Ke Bang. The Phong Nha-Ke Bang (PNKB) karst has evolved since the Paleozoic (some 400 million years ago) and so is the oldest major karst area in Asia. Phong Nha-Ke Bang National Park is one of the world's two largest limestone regions. It should take measures to prevent the development of karst processes to conserve natural heritage and creating a premise towards the first natural heritage of biodiversity.

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CHOICE OF RATIONAL STRUCTURE OF DIESEL GENERATORS FOR AUTONOMOUS ELECTRIC POWER SUPPLY OF OIL DEPOSITS

A.V. Doroshenko, Y.Zh. Sarsikev

Scientific advisor professor B.V.Lukutin, associate professor I.A. Matveenko
National Research Tomsk Polytechnic University, Tomsk, Russia

Petroleum industry is a large consumer of electric energy. Electric supply of oil deposits is important issue for electric power industry. Quantity of independent power supply sources depends on the possible damage in case of fault. Independent power supply source is a source which continues supply of consumers in case of faults on other sources Diesel electric power stations are often used as independent electric power supply sources for oil deposits.

Advantages of diesel electric power stations:

- high efficiency (0,35-0,4);
- simple technological process;
- possibility of building diesel power plants of modular type.

Voltage on this source must stay in frames for stable work of power consumers. Voltage on independent power supply source must contain 60% of nominal during action time of relay protection devices in case of fault.

The main purpose of this work is developing methods for selecting the quantity and the power of diesel generators.

The most important technical indicators of autonomous diesel power plant which provides decentralized consumers power supply are the quantity and the power of installed power units. These indicators define the reliability of electric power supply and the effectiveness of diesel power plant [2].

The total power of diesel generators should cover the maximum design load taking into account meet generators' own needs and provide motors start. The quantity of working units is determined in accordance with the schedule of loads and available diesel generators' nomenclature. Available regulations do not contain specific recommendations and procedures for the selection of the quantity and the power of diesel generators. Meanwhile, the indicators under consideration are extremely important, as technical and economic characteristics of the power plant are largely depend on them.