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Island of Brač
CONGRESS 2013
Croatia

CAVE RESCUE FROM KITA GAČEŠINA

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Croatian Mountain Rescue Service
Cave Rescue Commission

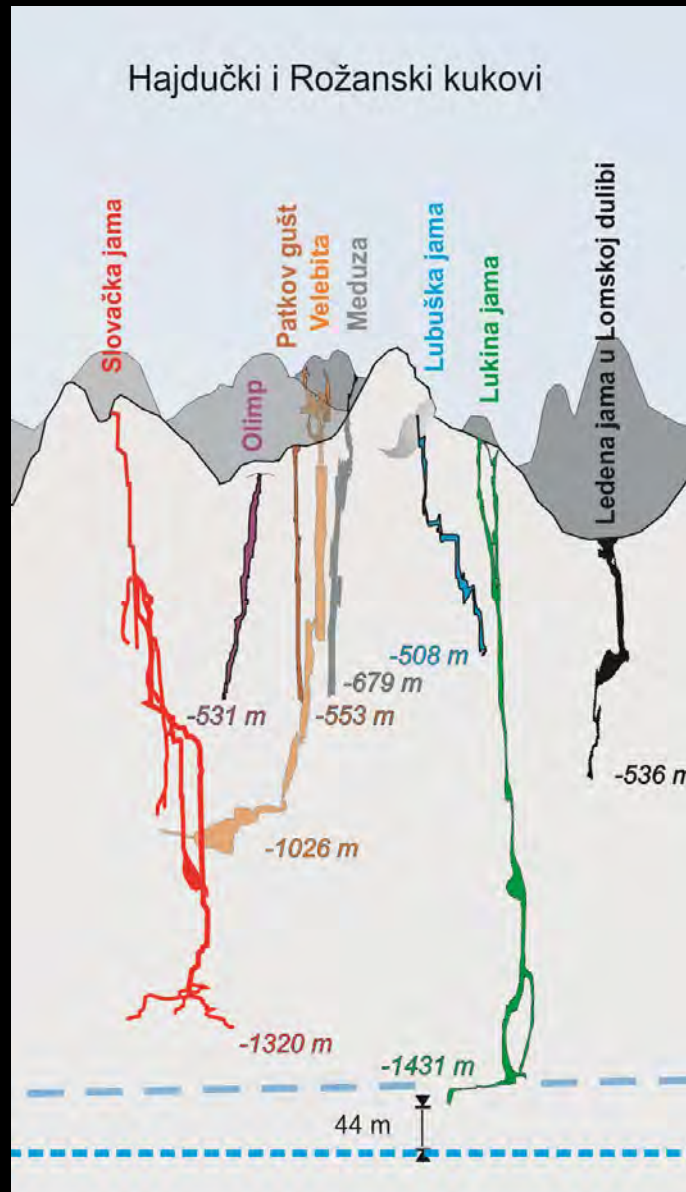
General information's about caves in Croatia

- **There are approximately 9000 known caves in Croatia;**
- **3 caves are deeper than 1000 meters:** Jamski sustav Lukina jama (-1431 m), Slovačka jama (-1320 m), Jamski sustav Velebita (-1026 m);
- **15 caves are deeper than 500 m:** Mokre noge (-831 m), Jama Amfora (-788 m), Jamski sustav Kita Gaćešina-Draženova puhaljka (-737), Meduza (-679 m), Muda labudova (-680 m), Stara škola (-576 m), Vilimova jama (-572 m), Patkov gušt (-553 m), Jama Olimp (-537 m), Ledena jama u Lomskoj dulibi (-536 m), Ponor na Bunovcu (-534 m), Crveno jezero (-528 m), Jama pod Kamenitim vratima (-520 m), Munižaba (-510 m), Lubuška jama (-508 m).
- **Large verticals:** two of them are deeper than 500 m; two are deeper than 300 m, thirteen verticals are deeper than 200 m, while 100 m deep verticals are quite common.

General information's about caves in Croatia

- **Long and complicated caves:** Špiljski sustav Đulin ponor-Medvednica (16.396 m long), Panjkov Ponor -Kršlje (13.052 m long) and many other ;
- **Long, deep and complicated caves:** Jamski sustav Kita Gaćešina (24.558 m long and -737 m deep), Munižaba (9.322 m long and -510 m deep);
- **Extremely tight caves (crawlways):** Jama Amfora, Lubuška jama ...
- **Deep springs:** Crveno jezero (-281 m), spring of river Una (-205 m);
- **Deep cave siphons:** siphon at the bottom of Lukina Jama (-1355 m), siphon at the bottom of Slovačka Jama (-1320 m);
- **Springs under sea water (vrulje):** Vrulja kod Brela (-125 m)
- **Long and complicated siphons:** Majerovo Vrelo (942 m long and 104 m deep)

General information's about cave rescue in Croatia



- Ever since its foundation, in 1950, the Croatian Mountain Rescue Service (CMRS) has been successfully performing cave-rescue;

- After discovery of new deep caves on North Velebit, during 1990s, new requirements in cave-rescue have risen, which resulted in formation of **Cave-Rescue Commission** in January 2001.



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General information's about cave rescue in Croatia

CMRS capacity:

- 319 rescuers finished basic cave rescue training (cavers and climbers);
- all of them had ITLS licence;
- around 150 rescuers could perform cave rescue in deep caves (below - 1000 m);
- 21 rescuers finished cave rescue training for team leader, 2 rescuers finished training for treatment of injured person, 2 rescuers finished training for widening passages and 2 rescuers finished cave-diving rescue training in France (Speleo Secours Francais);
- 79 rescuers finished course on approaching and treatment of injured persons in caves;
- 33 rescuers finished training for cave rescue leader;
- 5 doctors that can go deeper than -500 m caves;
- 9 cave diving rescuers (-100 m deep)



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General information's about cave rescue in Croatia

International cooperation

ECRA - European Cave Rescue Association

- founding meeting 12th May 2012 in
Castelnuovo Carpagnana, Italy

ECRA MEMBERS (10 COUNTRIES): CORPO NAZIONALE SOCCORSO ALPINO E SPELEOLOGICO, **ITALY**; GORSKA SLUZBA SPASAVANJA, **SERBIA**; HRVATSKA GORSKA SLUZBA SPASAVANJA, **CROATIA**; HOEHLENRETTUNG SUEDBAYERN (BERGWAHT BAYERN), **GERMANY**; JAMARSKA RESEVALNA SLUZBA, **SLOVENIA**; BRITISH CAVE RESCUE COUNCIL - UK AND IRELAND, **GREAT BRITAIN**; OESTERREICHISCHER HOEHLENRETTUNGSDIENST, **AUSTRIA**; GORSKA SLUZBA SPASAVANJA, **MONTENEGRO**; SPASITELJNA SLUZBA V PESERI, **BULGARIA**; HUNGARIAN CAVE RESCUE SERVICE, **HUNGARY**



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General information's about cave rescue in Croatia



International cooperation

Project EU Proteus

Slovenian Cave Rescue Service

Croatian Mountain Rescue Service

Some of more important project tasks

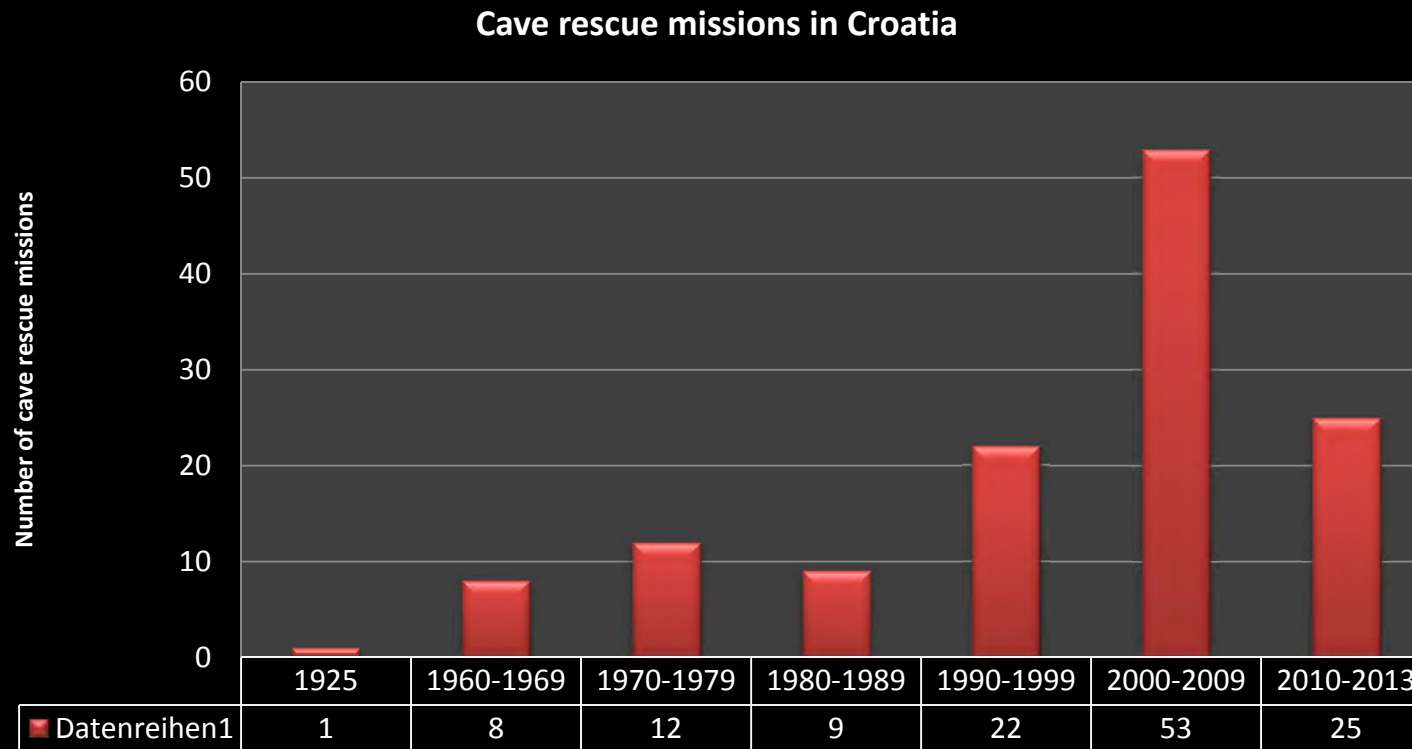
- Basic rules for safe entering and working in caves;
- Cave Rescue Unit formation and trainings;
- 2 International trainings for cave rescuers and cave rescue instructors;
- Comparison and testing of caving equipment;
- Final Cave rescue exercise (Paradana in Slovenia, -500m);
- Cave Cadastre database.

Total eligible cost 497.692,00 €



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General information's about cave rescue in Croatia



- 130 human (caver and non caver) rescue missions in total
- 31 animal rescue missions (dogs, cows, bears...)

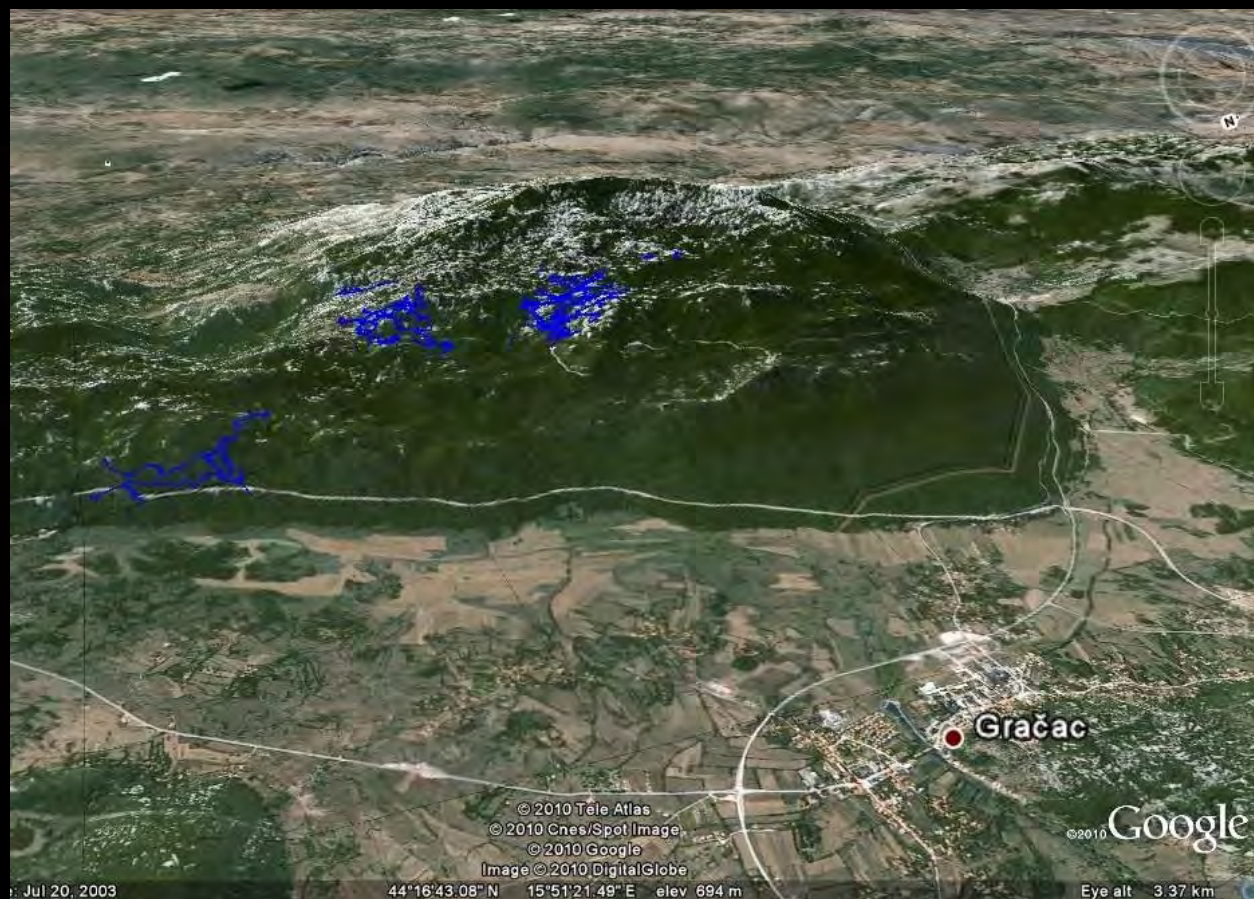
Cave Rescue in Cave system Kita Gaćešina

Two biggest accidents:

- 16th July 2011.
 - caver had hypoglycaemic coma during his sleep
 - bivouac at -300 m, 600 m from entrance
 - rescue mission took 28:17 hrs (injured caver exit cave), last rescuer after de-rigging exit cave after 39:22 hrs.
- 7th June 2012.
 - caver had lumbal spine injury
 - 483 m, 3 km from entrance
 - rescue mission took 30:53 hrs (injured caver exit cave), last rescuer after de-rigging exit cave after 41:08 hrs.

Cave Rescue in Cave system Kita Gaćešina

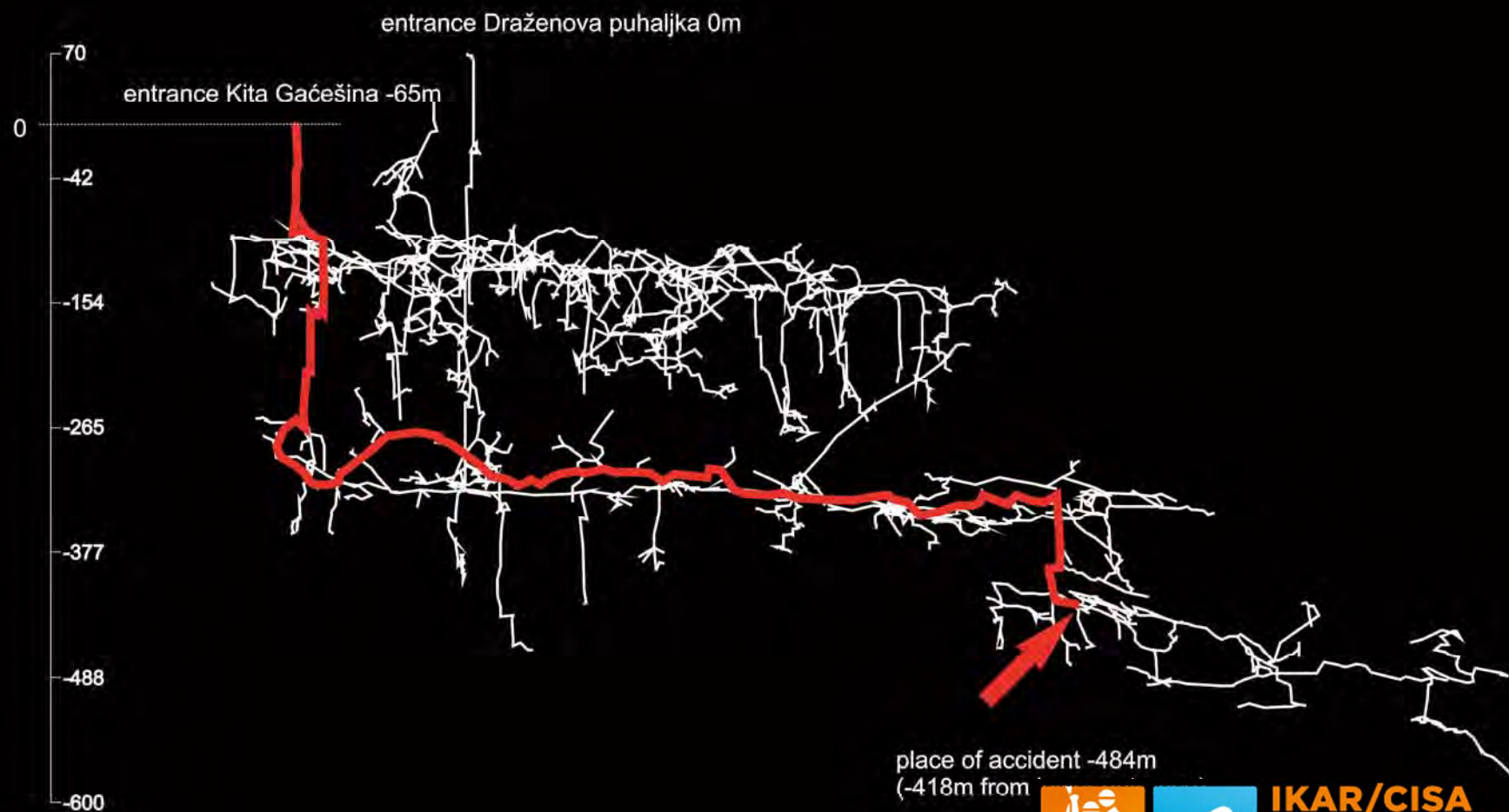
Position



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Cave Rescue in Cave system Kita Gaćešina

Cave system Kita Gaćešina – Draženova puhaljka
length: 24.558 m, depth: -773 m, Crnopac



place of accident -484m
(-418m from



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Cave Rescue in Cave system Kita Gaćešina

- 7th June 2012.
- aim of caving team was to continue research in the deepest parts of the Vertical cave system Kita Gaćešina
- at the last pit in Nebozemlje, just after 22:30 hrs, the last anchoring plate broke. Marijan was located on the rope below the stated anchor plate, so he uncontrollably fell at the bottom of the vertical from 2 - 4 meters of height.

Cave Rescue in Cave system Kita Gaćešina

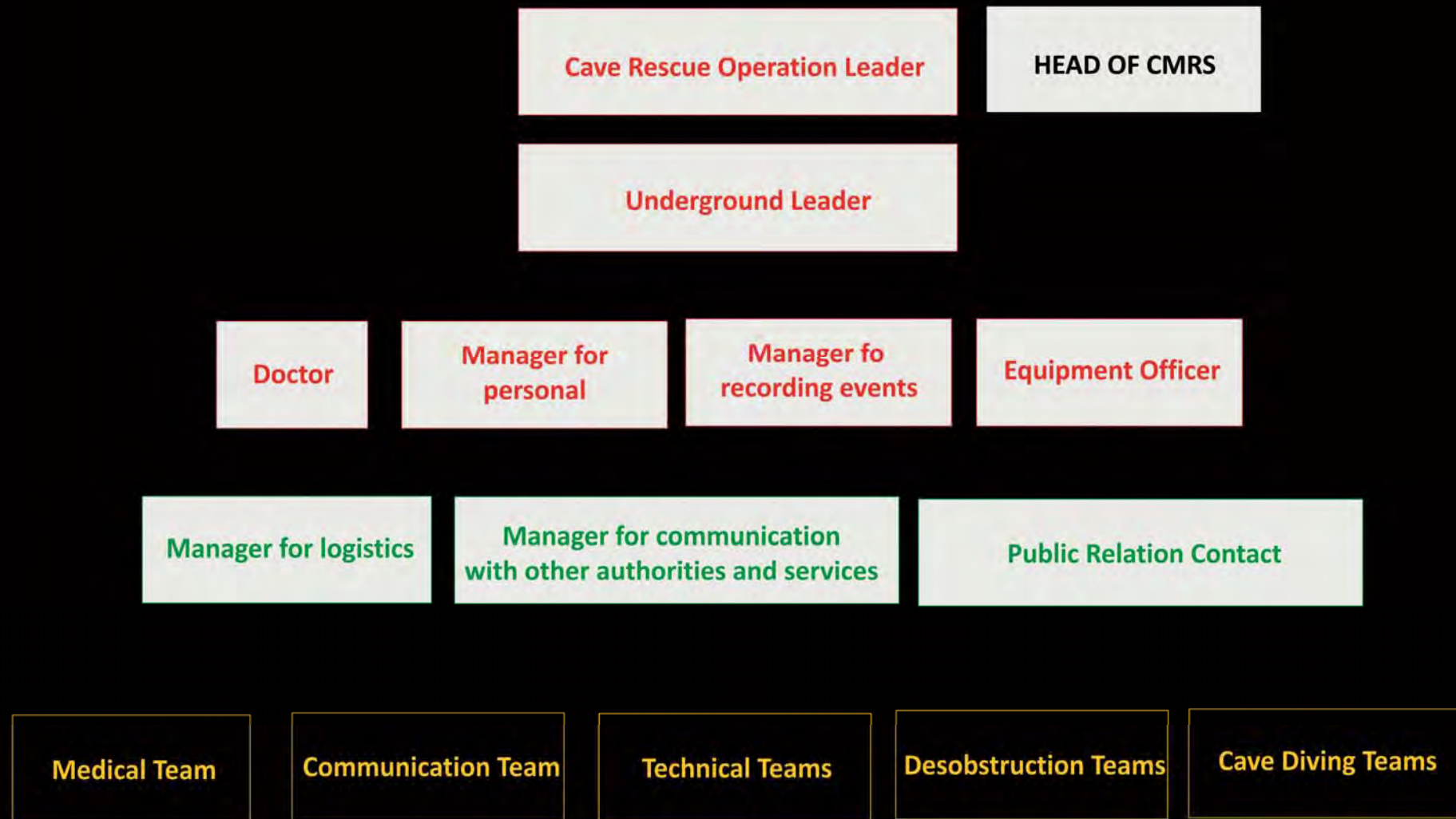
- It can be assumed that Marijan held descender's handle squeezed when the anchor failed, so that he slipped through the rope to the bottom. He fell on two transport bags that he carried beneath himself and although his bags cushioned the blow, he hit with the middle part of his back on the stone.

Injury: lumbal spine injury



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Cave Rescue in Cave system Kita Gaćešina

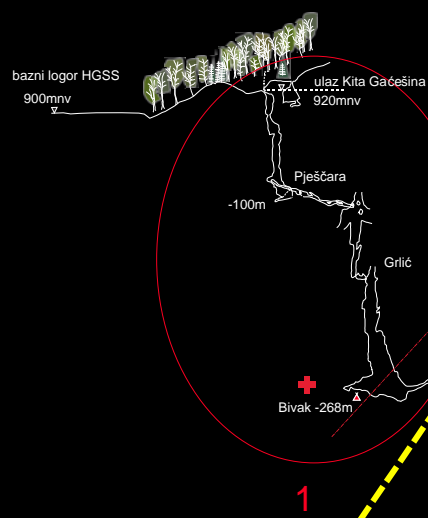


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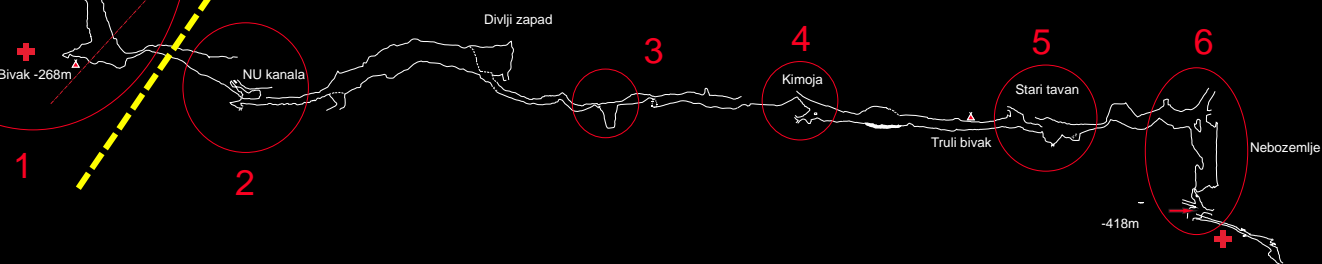
Cave Rescue in Cave system Kita Gaćešina

- First team – medical team (5 rescuers);
- Second team – communication team (3 rescuers);
- Headquarter - CAVE RESCUE TEAM LEADERS

France system



Italian system



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Cave Rescue in Cave system Kita Gaćešina



Rescuers and equipment transfer by Transport Croatian Air Force helicopter



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Cave Rescue in Cave system Kita Gaćešina

	Time	Activity
Accident	22:30 hrs	Anchor plate broke. Caver Marijan Marović sustained injuries of a lumbar vertebra due to the fall from 2 to 4 m of height to the bottom of the channel at -483 m (-418 m from the lower entrance)
	4:45 hrs	The injured caver was warmed up and looked after. Marin Glušević and Katja Milišić climbed out from the pit to alarm CMRS.
	03:15 hrs	CMRS was alarmed. 08.06.2012.
	04:00 - 5:20 hrs	Preparation of medical equipment, blasting equipment and communication.
	06:20 hrs	11 rescuers took off by Croatian Air Force helicopter to Crnopac.
	07:10 hrs	Team of 11 rescuers landed in Gračac where three vehicles from CMRS Gospić awaited them.
9:50 hrs	08:20 hrs	Physician with an escort entered the pit.
	09:35 hrs	Team for blasting of two rescuers entered the pit.
	10:47 hrs	Team for communication of three rescuers entered the pit.
	11:00 - 12:00 hrs	Technical teams E1 and E2 of 14 rescuers for rigging and transport entered the pit.
13:30 hrs	12:00 hrs	Physician reached the injured caver.



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Fracture of processus spinosus and articulare at third lumbar vertebra.



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Cave Rescue in Cave system Kita Gaćešina

Time	Activity
16:00 hrs	E1 reached the vertical above the injured - entrance to Nebozemlje and started rigging of the vertical, team E2 stayed to set up a bivouac 2 for the injured caver
17:40 hrs	Communication reached the team E1. It was decided that the communication would not descend to the injured because the pit was being rigged and it was possible to communicate with team accompanying the injured by voice.
18:20 hrs	Team E13 of 10 rescuers set off to aid teams E1 and E2.
21:05 hrs	19:35 hrs Transport of stretcher with the injured caver began.
20:10 - 23:35 hrs	All teams for rigging the pit and transport from E3 - E12 entered the pit or were at the entrance of the pit.
22:05 hrs	Stretcher with the injured reached "Truli bivak". E13 reached Truli bivak and joined E1 and E2. The whole time, rescuers are aided by the cavers caught in the pit.

09.06.2012.

01:10 hrs	Stretcher at -268 m. Injured was warmed up and examined; immobilization was repaired in the bivouac.
02:40 hrs	Transport of stretcher with injured from the bivouac at -268 m starts.
03:37 hrs	Stretcher passed the narrowing Grlid.
04:26 hrs	Stretcher passed Pieščara.
30:53 hrs	05:23 hrs Stretcher with the injured exited the pit 26:08 hours after the alarm
09:25 hrs	Team of 10 members entered the pit to de-rig.
41:08 hrs	15:38 hrs Last rescuer exited the pit.



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Cave Rescue in Cave system Kita Gaćešina

Rescuers caught in cave - 3

Medical team - 2 rescuers
Communication - 3 rescuers

Blaster team - 3 rescuers

E1 – E2 - 12 + 10 rescuers

E2 – E12 – 36 rescuers

De-rigging team – 10 rescuers

79 rescuer in cave

35 rescuers outside cave

TOTAL 114 rescuers

NO.	TEAM	NAME AND SURNAME	STATION	NO.	ENTERED	EXITED
1	PHYSICIANS	Lana Donlagić	ZG	1	8:20	6:09
2		Katija Milišić	ST	2	8:20	Caving team
3	BLASTERS	Ronald Železnjak	ZG	1	9:35	2:13
4		Mladen Palinić	ST	2	9:35	18:26
5		Slaven Boban	ZG	3	9:35	1:46
6	COMMUNICATION	Filip Bach	ZD	1	10:45	12:30
7		Ivica Radić	ZG	2	10:45	7:12
8		Marko Budić	ZG	3	10:45	7:06
9	E1	Darko Bakšić	ZG	1	12:00	8:31
10		Tomica Bošnjak	SAM	2	12:00	8:00
11		Ljubo Majica	ZD	3	12:00	13:40
12		Anika Ivković	ZD	4	12:00	7:46
13		Ena Vrbek	ZG	5	12:00	8:26
14		Danijel Frla	RI	6	12:00	7:43
15		Danko Škalamera	RI	7	12:00	11:10
16		Igor Petrić	RI	8	12:00	10:53
17		Moreno Almassi	PU	9	12:00	8:47
18		Goran Rnjak	ŠI	10	12:00	5:56
19		Neven Galant	PU	11	12:00	9:58
20		Marin Glušević	ST	12	12:00	Caving team
21	E13	Ivan Mišur	ZG	13	18:30	7:04
22		Tomislav Nagy	ZG	14	18:30	8:48
23		Zoran Brajković	PU	15	18:21	8:42
24		Ivica Šnajder	DE	16	18:21	7:35
25		Tomislav Skendar	DE	17	18:21	9:36
26		Branislav Grubić	NO	18	18:21	8:30
27		Marko Lukačević	PŽ	19	18:21	7:32
28		Nikola Šoić	ZG	20	18:30	6:52
29		Božo Nikl	SAM	21	18:21	9:28
30		Sanjin Gotić	RI	22	18:21	11:23
31	BIVAK E2	Matej Mirkac	PU	1	11:05	7:05
32		Krešimir Prskalo	ZD	2	11:05	13:04
33		Petar Matika	PU	3	11:05	8:27
34	E3	Siniša Atlija	ZG	1	20:10	6:41
35		Ivan Mijat	ŠI	2	20:10	6:36
36	E4	Darko Troha	ZG	1	20:15	6:22
37		Dalibor Pleskalt	BJ	2	20:15	7:01
38	E5	Luka Mudronja	ZG	1	20:18	5:46
39		Sunčica Hrašćanec	ZG	2	20:18	5:44
40		Tihana Boban	ZG	3	20:18	6:10
41		Matija Čepelak	ZG	4	20:18	5:3
42		Mile Močić	ŠI	5	20:18	6:2
43		Darko Štefanac	ZG	6	20:18	6:5

NO.	TEAM	NAME AND SURNAME	STATION	NO.	ENTERED	EXITED
44	E6	Igor Jelinić	KA	1	20:38	6:31
45		Željko Bačurin	KA	2	20:38	6:50
46		Andrej Stroj	ZG	3	20:38	6:14
47	E7	Zlatko Balaš	KA	1	21:07	9:19
48		Marko Kurpez	KA	2	21:07	8:54
49		Siniša Rudolf	DE	3	21:07	8:20
50	E8	Krešimir Pogačić	KA	1	21:59	9:21
51		Domagoj Eklić	KA	2	21:59	9:15
52		Gajo Dojčinović	KA	3	21:59	9:01
53		Ivica Čukušić	ZG	4	21:59	8:37
54	E9	Željko Vukušić	ŠI	1	22:32	5:44
55		Mladen Matetić	ŠI	2	22:32	5:50
56		Toni Butković	DE	3	22:32	6:01
57	E10	Anton Vukičević	ŠI	1	23:15	5:36
58		Dražen Starović	NO	2	23:15	5:44
59	E11	Dinko Novosel	ZG	1	23:35	5:34
60		Maja Kriška	RI	2	23:35	5:38
61		Marko Krpešić	RI	3	23:35	5:38
62	E12	Ivan Došen	ŠI	1	23:55	5:38
63		Marko Kulaš	KA	2	23:55	5:38
64		Diego Košta	RI	3	23:55	5:38
65		Ivica Perković	ST	4	23:55	5:38
66		Grgo Puljas	ST	5	23:55	5:38
67	RESCUERS-caught in the pit zatečeni u jami	Ana Bakšić	ZG	1	član speleoekipe	član speleoekipe
68		Antonio Kovačić	ST	2	član speleoekipe	23:00
69		Frane Kožemelj	ST	3	član speleoekipe	23:00
70	DE-RIGGING 1	Dalibor Jirkal	ZG	1	9:27	14:29
71		Stipe Tutiš	SOŽ	2	9:27	14:34
72		Ruder Novak	ZG	3	9:27	13:33
73		Zvonimir Završki	SOŽ	4	9:27	14:30
74	DE-RIGGING 2	Josip Tomaić	GS	1	9:27	13:21
75		Josip Tomljenović	GS	2	9:27	13:27
76		Milan Abramović	GS	3	9:27	13:22
77	DE-RIGGING 3	Mario Musulin	VŽ	1	9:25	15:38
78		Alan Rinkovec	VŽ	2	9:25	15:38
79		Zoran Ateljević	DU	3	9:25	13:59



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Cave Rescue in Cave system Kita Gaćešina

- From the report on the accident, until the extraction of the caver, the operation lasted more than **26 hours (30:53 hours from accident)**.
- All together, when the last rescuer exited, it amounted to **41:08 hours**.

Cave Rescue in Cave system Kita Gaćešina

Acknowledgement

CMRS members would like to thank the crew of the **Croatian Air Force helicopter**, members of **Cave Rescue Service of Slovenia** for their stand-by and readiness to join the cave rescue operation in a very short time.

Also, we would like to thank for the help offered by the **Corpo Nazionale Soccorso Alpino e Speleologico (CNSAS) from Italy** and the **Alliance of speleological organizations in Serbia**.



Questions ?



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