

The deepest and the longest caves in Greece

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Preface

A large number of caves has been recorded and explored in Greece with a great variety of interest spanning geological, hydrogeological, palaeontological, archaeological and folkloric. The caves in Greece are estimated to number around 10.500 (including underground karst forms of all kinds). These are recorded in lists which are usually categorized with various criteria in several speleological indexes. In the past, the unforgettable Anna Petrochilou had drawn up and published indexes with the country's deep long caves in the Bulletin of the Hellenic Speleological Society (HSS). Enough databases can be found on the internet related to deep and / or long caves at national and worldwide level. One of the oldest and probably most valid cave databases is that of the French speleologist **Eric Madelaine** which can be found at the following URL: (<http://www-sop.inria.fr/agos-sophia/sis/DB/database.html>). This database has been used as a reference for the present work. It should be underlined that the specific database in question does not include caves for which there is no publication. It includes caves or potholes with depth more than 300m and / or length more than or equal to 3 kilometres. For the aims of present study caves **with depth more than -400m** and / or length **more than 6 kilometers** have been isolated and studied. The database has been updated with findings of recent explorations (period 2001-2005) in Greece.

Big potholes and caves are exceptionally infrequent and simultaneously their exploration is particularly laborious. Greece has an extent of 131.940 square km, that is to say if we suppose that the number of 10.500 caves is right, it corresponds to **one (1) cave or pothole for each 12.5 Km²**. Currently in Greece there are only 11 caves with depth more than -400m that is to say hardly **one (1) per 12.000 Km²** and hardly **one (1) cave with length more than 6000m per 44.000 Km²**. That is to say that within 12.000 Km² there are barely 1000 caves / potholes and only one of these is considered big (= > 400m depth or > 6000m length). In a lot of cases these caves have important geological or hydro geological importance with result their protection is immediately connected with the protection of underground water.

In the statistical analysis that follows, they are mentioned given based on the most topical list that is available today for the bigger caves (length and depth) in Greece. Simultaneously, an effort is made to correlate this with corresponding data from the rest of the world, the growth of explorations over time, the correlation of the number of caves with demographic elements (such as population), geographic distribution and other statistical analyses round these caves.

The main indicators that are used are the following:

- Number of deep / long caves (more than -400m depth)
- Number of deep / long caves per 50.000 Km²
- Number of deep / long caves per million of residents

Most explorations (of big potholes or caves) in our country have been made by mainly French speleologists while secondary explorations have been carried out by Greeks and British Speleologists. The majority have been found to be on Crete (45%) (see Table 1b).

The deepest and longest Greek caves

According to the World cave database, 619 caves deeper than 400m have been explored worldwide (up to 2001 – **Annex Table P3**). In Greece there have been explored until 2005 eleven (11) potholes with a depth greater than -400 metres (**Table 1a**).

Table 1a: Greek caves with depth greater than 400m (at year 2005) in descending classification (depth)

Nr.	Cave Name	Depth	Length	Year
1	Gourgouthakas	-1,208	1,000	1997
2	Tafkura	-860	6,570	1996
3	Tripa tou Orniou	-610	30	2003
4	Stoichiomeni	-581	886	2000
5	Peleta	-493	500	2000
6	Tafkos sta Petradolakia	-473	1,010	1991
7	Spilia Sternou	-460		1992
8	Epos 1	-452		1969
9	Epos 2	-419		1979
10	Provatina	-405	40	1968
11	Diplotafki	-400	1,033	1994

In Greece, only 3 caves with a length greater than 6.000 meters have been explored until 2005 (**Table 2 a**).

Table 2a: Greek caves with length greater than 6.000m, in the year 2005 in descending classification (length)

Nr.	Cave Name	Depth	Length	Year
1	Diros		15,400	1974
2	Maaras		10,340	1985
3	Tafkura	-860	6,570	1996

Today the only cave in Greece which satisfies both the two criteria above of (length and depth) is the pothole "**Tafkura**" (**- 860m**) in the Anogeia of Mylopotamos, in the Rethymnon Prefecture of Crete (**Table 3**). Respectively, at world level, there have been hardly 155 caves explored that satisfy both conditions.

Table 3: Caves with length greater than 6000m and depth greater than 400 meters.

Nr.	Cave Name	Depth	Length	Year
1	Tafkura	-860	6,570	1996

Table 1b: Greek caves with depth, more than -400m (at year 2005) per geographic region.

Nr.	Cave Name	Geographic region
1	Gourgouthakas	Crete
2	Tafkura	Crete
3	Tripa tou Orniou	Epirus
4	Stoichiomeni	Sterea Ellada
5	Peleta	Peloponnesus
6	Tafkos sta Petradolakia	Crete
7	Spilia Sternou	Crete
8	Epos 1	Epirus
9	Epos 2	Epirus
10	Provatina	Epirus
11	Djplotafki	Crete

Table 2b: Greek caves with length bigger than 6.000m, at year 2003 per geographic region.

Nr.	Cave Name	Geographic region
1	Diros	Peloponnesus
2	Maaras	Macedonia
3	Tafkura	Crete

In world level it appears that the number of deep caves are roughly equal to the number of long ones (619 and 671 respectively). However, the possibilities to discover a cave which is both deep and long are much less (155 worldwide) that is to say hardly **13.7%** of the total Number of big caves.

History of explorations in the deepest caves of Greece.

The deepest caves

You may find below a concise exploration background according to the relative bibliography, chronologically categorized from the oldest to the newer explorations for the deeper caves of the country.

"Provatina" (-408 m)

Provatina was explored by a British army expedition in 1968. The pothole was located for first time by English cavers in 1965 (Cambridge University Caving Club). Jim Eyre (1966) was the first who tried to descend and explore the cave but he stopped at -156m (he used rope ladder). The next year, British soldiers used a mechanically-driven winch and a basket with iron cable in order to descend to the bottom of the cave. Their effort was performed in two phases, first up to the depth of -177m the summer of 1967 and finally down to the bottom of the cave (-408) in 1968. An American expedition in 1973 descended the cave using speleological techniques (ropes) while the first European cavers who repeated their achievement were the French P. Sombardier and F. Poggia 1976. Since then a lot of expeditions have gone down to the bottom of this cave both foreign and Greek. The first Greek who descended Provatina was Kostas Zoupis, founding member of SPELEO club (Athens) and today Chairman of Hellenic Speleological Federation (HSF). The last known exploration effort was undertaken in 1998 by SELAS club (Athens). Nikos Mitsakis, the leader of this

expedition reported that the team explored three small new chambers after climbing from the bottom of the cave.

"Epos 1 and 2" (451m and - 419 m)

First exploration attempts took place between 1966-67-68 but without result. Only in 1969 the first of the two twin caves was explored ("Epos 1") by P. Livesey while shortly later (in 1973) American cavers repeated their achievement. "Epos 2" cave was also explored by British cavers 4 years later, in September of 1979. Since that time many expeditions have been in the cave in order to push the exploration but without any significant progress (zero new passages reported). From the day of its discovery, Epos remained the deepest cave in Greece up to 1991.

"Tafkos sta Petradolakia" (-475m)

The cave was explored in 1989 up to the depth of -380m (lake). In 1991 after a cave dive (Ph.Brunet), the cave reached its current depth of -473m and thus remained the deepest in the country (until 1995). The exploration was conducted by the French cavers (GRESPA VI – responsible J.Y. Perrier). The first Greek cavers to make the descent were members of HSS (up to -380m). The most recent explorations of new departments ¹ were realized by SELAS club (Athens) in 2002 during "Anogia – Ntelina 2002" with myself leading the expedition.

"Spilia Sternou" or "Sternon" (-460 m)

The cave is located in Leuka Ori Mountains (2456m) on Crete at an altitude of 2080m. It was explored for the first time by French cavers (GSO – ASEAUUPS) in the years 1990, 1991 and 1992. The French team published their report in "Spelunca" (their survey describes the cave up to -400 m depth). The last exploration attempt took place in the summer of 2005 by SELAS club (Athens), during the "Sternes 2005" expedition led by the author. During this expedition the Greek cavers went down as far as the -460m mark and stopped in a narrow passage with very good perspectives. The Greek cavers realized that the cave had been explored up to this point (but unfortunately there had been no publication of the results).

"Djplotafki" (-400m)

This cave was initially explored in 1984 by British cavers (SUSS) up to a depth of (-174m). In 1993 the French expedition (GRESPA VI - SCSP Ales, led by J.Y.Perrier and Th. Monges) went down to a depth of -330m, while in 1994 the exploration was terminated at a depth of -400m (due to a siphon) – There was a limited participation by Greek cavers in both the 1993 and 1994 expeditions. A completely unexplored part, 250m long, was found in 2002 during "Anogia – Ntelina 2002" expedition (led by the author).

¹ Long sections at a depth of -130m as well as an alternative route that leads once again to the final sump (-450m) but bypassing the lake at -380m (It is no longer necessary to carry boats into the cave), Mission Report for Anogia Delina 2002, (under publication)

"Tafkura" (-860 m, length 6570m)

Tafkura was explored for the first time in 1978 by R. Maire (FR), up to a depth of -100m. In 1995 the exploration reached a depth of -485m (and length of 1000m) under the French association "La Tonche" with the participation of Greek cavers (Leader Th. Monges, member of CREI (committee of FFS). In 1996 a common expedition between three clubs (La Tonche – ASBE – Caving Team of the Technical University of Heraklion Crete) continued the explorations up to depth -810m and to a length of 4500m. In 1997 the first purely Greek mission "Tafkura 1997" (SP. OM. TEI and H.S.S. Dep. Crete) led by the author. At that time 500m of length were added to the cave. Finally in 2002 during SELAS expedition "Anogia – Delina 2002" the cave ended up with a new length (6570m) and a new depth after a successful -50m dive (by N.Mitsakis) in the siphon at -810m.

"Gourgouthakas" (-1208m)

As result of a consistent effort for many years, the French team GS Catamaran succeeded in 1998 to explore the Gourgouthakas cave up to its current depth (-1208m). Since that day the cave is by far the deeper know cave in Greece and one of the deepest in the world. The latest exploration in the cave took place under SELAS and SPOK clubs in 2001 (expedition leader A. Christodoulou).

"Stoichiomeni" (-581m)

The cave is situated in Viotia and was first explored (up to the depth of -70m), in the late 50's by the unforgettable I. Petrocheilos the founder of the HSS. The cave was re-explored by SPELEO club (Athens) in the early 80's up to the depth of -280m (expedition leader K.Zoupis). Later, in 1998 SELAS club organized an expedition which pushed the cave deeper (up to 463m, led by N.Mitsakis). Finally in the year 2000 a SELAS expedition led by the author (in cooperation with French cavers) reached today's known deepest bottom of Stoichiomeni at the depth of -580m. Unfortunately the cave is a subject of a major environmental catastrophe and at the present time it is not accessible. Greek cavers are undertaking actions for the protection of the cave and the restoration of its entrance.

"Peleta" (-493m)

This sinkhole was initially explored and surveyed by the unforgettable Anna. Petrocheilou (HSS) up to the depth of -70m. In year 2000 the SPELEO club Athens continued the exploration (expedition leader S.Nikolaidis) up to depth -493m. During that expedition (Peleta 2000) SPELEO's cave diver V.Trizonis dived in the bottom sump at -488m without achieving a major breakthrough (stopped at narrow underwater passage).

"Tripa tou Orniou" (-610m)

On of the most recent discoveries in Greece, which took place in the Autumn of 2003 by a joint French – Greek (Youth Committee/FFS and M. Diamantopoulos/SELAS) expedition in Astraka (Epirus). This expedition explored a completely new cave in the Vathylakkos area and descended to the depth of -580m. In the year 2004 the exploration continued until the current known bottom of the cave at a depth of **-610m**.

Biggest in length

The longest caves in Greece (except Tafkura) are also the major show caves in the country.

"Diros Caves" (15.400m)

Diros (Glyphada Dirou or Vlyhada Dirou) cave was discovered in 1923 by residents of the region. The first systematic exploration of the cave was done by the unforgettable I. Petrocheilos and his spouse in 1949. After the death of I. Petrocheilos (in 1960), Anna Petrocheilou and the HSS continued the explorations. Up to 1960, 1.6km of corridors had been explored. Since 1961 the cave is open to the public (show cave) after a proposal of A. Petrocheilou and HSS. The HSS explored some 1500m more in the period between 1960 and 1966. In the year 1971 a team of American cave divers contributed with 300m new underwater passages. In 1975 a new artificial entry was created. Up to 1989 after explorations of SPELEO club (Athens) and HSS the length of cave is almost doubled (approx. 5.3km). In 1992 the length of the cave was 6.2km due to exploration efforts of HSS, SPELEO and Hellenic Ministry of Culture. In the year 2000 Speleo Club of Nafplion and the ministry of Culture pushed the cave to 10.606m length. Most recent explorations took place in the year 2003 and 2004 by the Ministry of Culture (V.Giannopoulos) and Swiss – Italian Cave divers (J.J. Bolanz, P.Deriaz, L.Cassati). The current length is approx. 15.400m

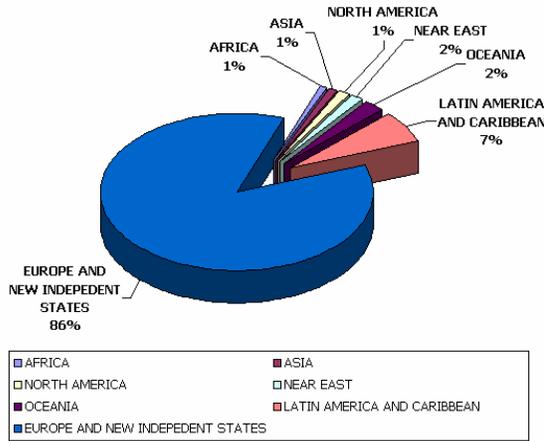
"Maaras" (10.340m)

The underground river "Maaras" is the source of the river Aggitis in Drama district. It is the cave with the longest ground plan development in Greece. The cave has huge passages and it is developed without many branches. The first systematic exploration started in the year 1978 by a French team in which Greek cavers G.Avagiannos and N.Ioannidis participated. The leader of this expedition was Mr. P. Reile. The French caver continued the explorations in 1980, 1981, 1982 and 1983 with the attendance of N. Ioannidis. In 1995 he came back with Xeidakis and continued further. Accordingly to the reports of the French team the cave (up to 2000) had a length of 10.040m. In 2002 an expedition led by T.Theodosiadis (SPELEO club Athens) undertook some diving in the caves which resulted in the exploration of 300m more.

Number of deep caves (more than the 400m depth)

Among all continents, by far the most deep caves (400m or more) are located in Europe (including also new independent states that resulted from the dissolution of Soviet Union). **(Diag.1)**

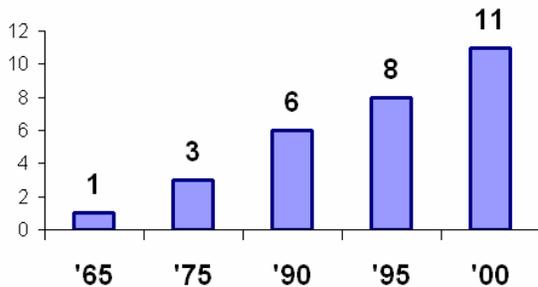
Diagram 1: Number of caves with depth bigger than 400m per continent.



This is explained because Speleology (and especially vertical techniques) is more developed in Europe than other regions. More specifically, 533 deep caves (the 86% of deep caves on the planet) exist in Europe, 43 exist in Latin America (6.7%) while 14 exist in Oceania (2.2%).

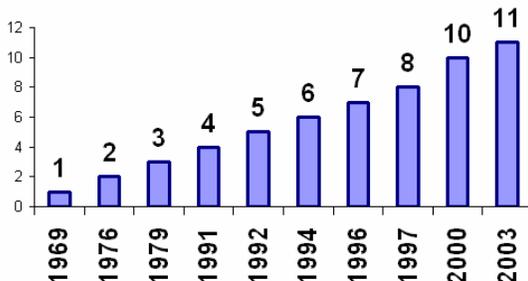
Speleology in Greece, is developing rapidly in the last 20 years. The number of speleological clubs is increasing continuously (Diagram 4) which combined with the efforts of foreign expeditions and the development of techniques and equipment had contributed to rapid increases in the number of deep caves explored in Greece. (Diagram 2 and 3 and 3a).

Diagram 2: Number of known deep caves in Greece per exploration year (classified every five-years).



It should be noted that not only did the number of deep caves increase but so did the absolute depth of caves in Greece, which almost tripled compared to previous decades. (Diagram 3a)

Diagram 3: Trend of number of deep caves explored in Greece per year of exploration.



It can be noticed that there is a very rapid growth over the last ten years. Up to 1995 the number of deep caves was six (6) and in a period of eight (8) years this almost doubled and became 11 (in 2003 - Diagram 2). Today, Greece is ranked 11th in the worldwide classification and 9th in the European classification of countries by number of deep caves (Diagram 5 and Diagram 6)

Number of deep caves per 50.000 square kilometers

It is true that deep caves are exceptionally infrequent. In the European continent today we find on average 0.98 deep caves per 50.000 km² (Diagram 7).

In Greece this ratio appears to be much higher (4.3 caves per 50.000 km², explaining to a certain extent how the country is classified 11th in world and 9th in Europe. Slovenia, now the base of UIS, is ranked first (with 49.3 caves per 50.000 km²) followed by Austria (38.2 caves per 50.000 km²) and Switzerland (with 29.1 caves per 50.000 km²) (Diagram 8). The worldwide (Top 15) classification is almost the same as the European one. (Diagram 9)

Diagram 3a: Depth of the deepest cave in Greece by the decades.

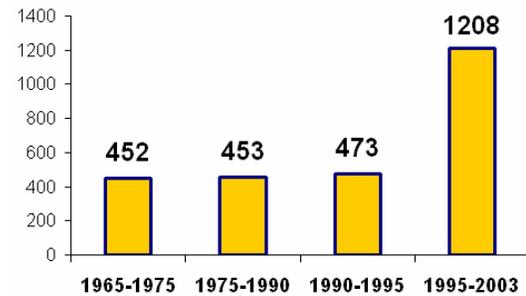


Diagram 4: Number of speleological clubs in Greece per decade.

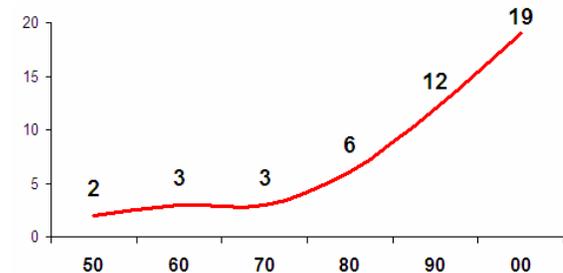


Diagram 5: Number of deep caves per country - World classification - Top 15 countries

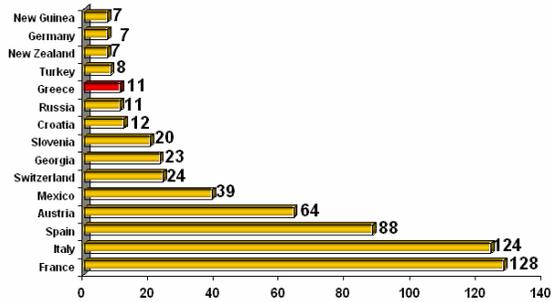


Diagram 6: Number of deep caves European countries - classification - Top 15 countries

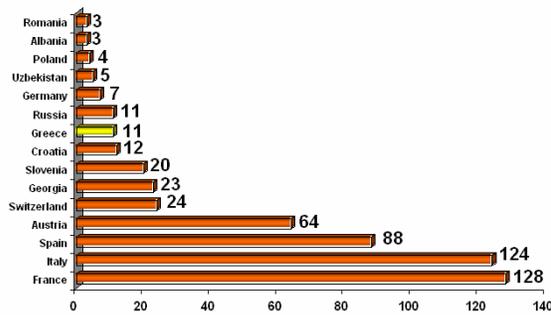


Diagram 7: Number of deep caves per 50.000 Km² (per continent).

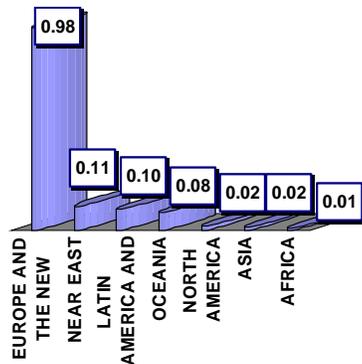


Diagram 8: Number of long caves per 50.000 Km² - World classification - Top 15 countries.

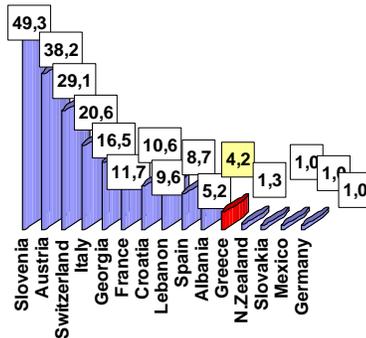
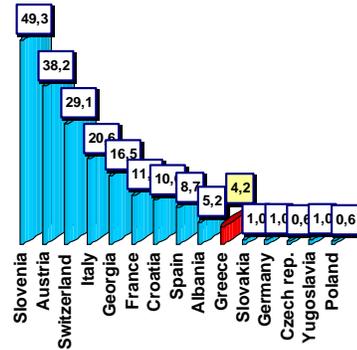


Diagram 9: Number of deep caves per 50.000 Km² - Classification of Top 15 countries in Europe.



Number of deep caves per million of habitants

In examining number of deep caves per million habitants in different countries (or continents) a slight variance between Europe (with 0.7 caves / million inhabitants.), Oceania (0.5 caves / million inhabitants), Latin America (with 0.1 caves / million inhabitants) and the rest of the world becomes visible (**Diagr. 10**).

Diagram 10: Number of deep caves per million habitants by Continent

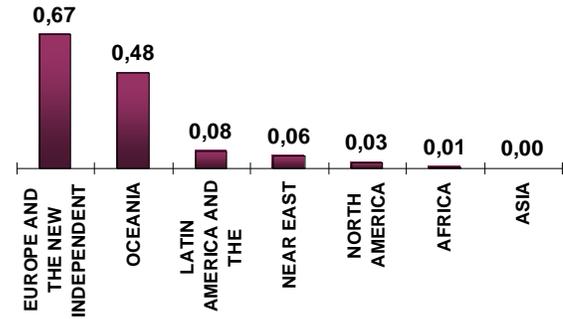
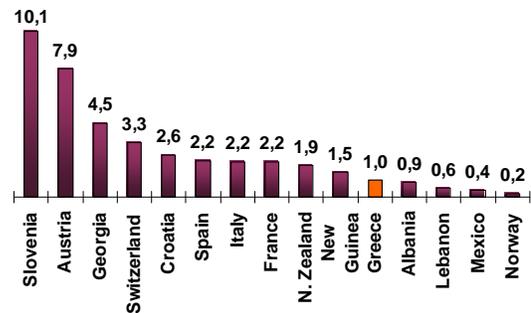


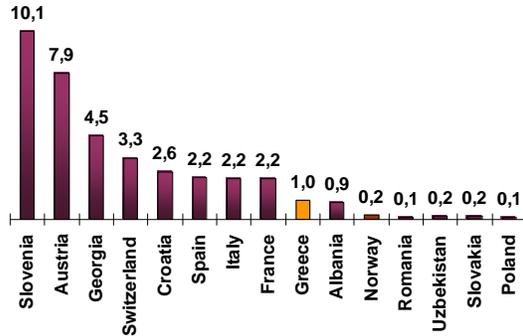
Diagram 11: Number of deep caves per million habitants by country - World classification of Top 15 countries.



At country level (world classification) Slovenia appears to have 10.1 deep caves per million habitants, Austria follows with 7.9 and Georgia with 4.5. Greece, takes the 11th place with 1 deep cave per million inhabitants. (**Diagr.11**). The picture is the same for the

top three countries in Europe. Greece is ranked 9th in this classification (**Diagr.12**).

Diagram 12: Number of deep caves per million habitants per country – European classification of Top 15 countries.



Number of long caves (more than 6000m length)

The number of long caves in Greece is very small compared to other countries in Europe and worldwide. In the diagrams that follow (Nrs 14 to 21) Greece is absent. Comparing continents, Europe is in the lead with 354 long caves against 185 of North America. The 3rd position is occupied by Latin America with 51 caves of this category. (**Diagr.13**). At the country level, the USA is ranked 1st worldwide with 178 long caves (including the longest cave ever found in the world) followed by France (108 caves) and Italy (40 caves) (**Diagr.14**). France and Italy are also at the top of the European classification followed by Spain (35 caves) (**Diagr.15**)

Diagram 13: Number of long caves per 50.000 Km² (by continent).

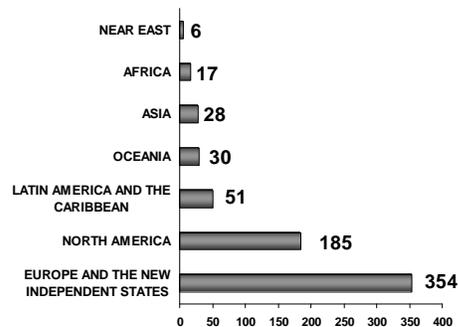


Diagram 14: Number of long caves by country – World Situation of 15 leading countries.

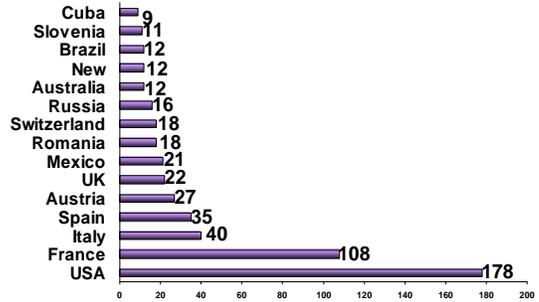
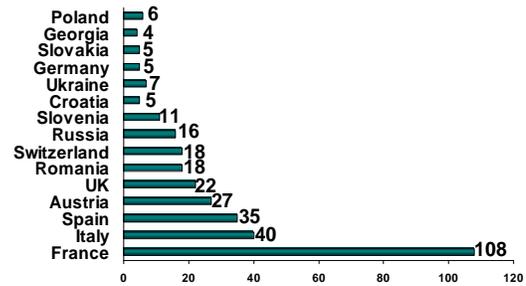


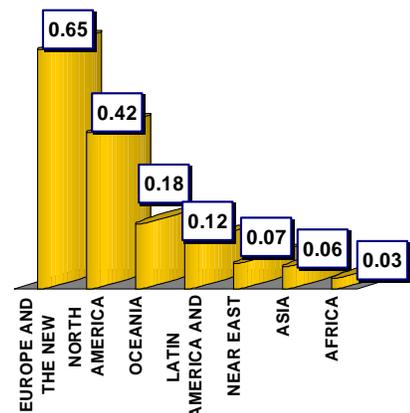
Diagram 15: Number of long caves by country – European classification of 15 leading countries.



Number of long caves per 50.000 Km²

The European Continent once again appears to have the higher frequency of in the number of long caves per 50.000 Km² (0.65 caves per 50.000 Km²) - see **Diagr.16**) while North America has 0.42 and Oceania 0.18. The first country in the worldwide classification is Slovenia (with 27.1 caves), followed by Switzerland (21.8 caves) and Austria (with 16.1 caves) (**Diagr.17**)

Diagram 16: Number of long caves per 50.000 Km² (by continent).



Precisely the same picture is also observed at European level (**Diagr.18**) it is clear that the way Europe is broken into states is a decisive factor especially affecting this indicator.

Diagram 17: Number of long caves per 50.000 Km² – World classification by country.

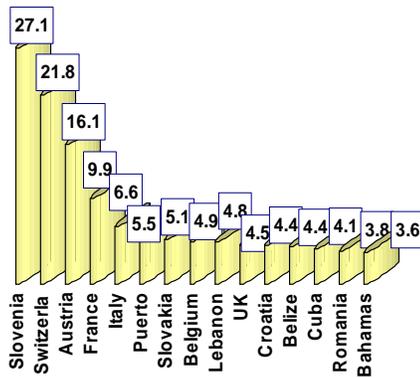


Diagram 18: Number of long caves per 50.000 Km² – European classification by country.

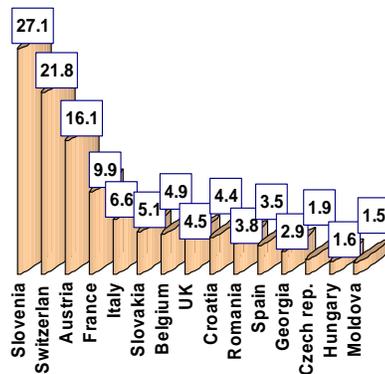


Diagram 20: Number of long caves per million inhabitants – Worldwide classification by country.

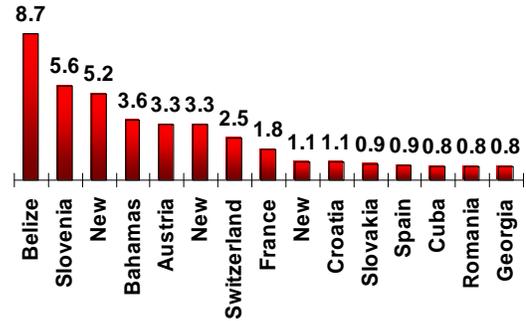
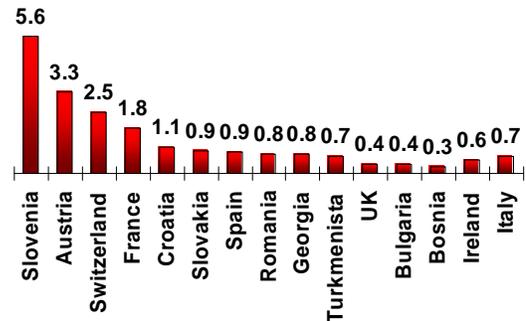


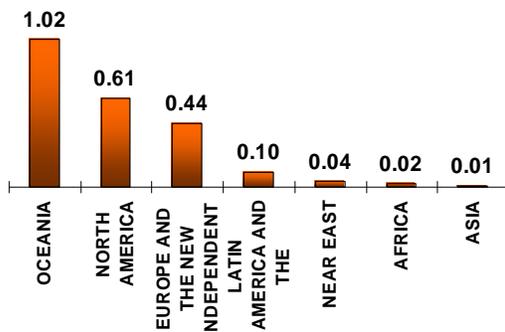
Diagram 21: Number of long caves per million inhabitants – European classification per country.



Number of long caves per million of habitants

Nr of Long caves per million of habitants in countries or in continents gives different perspectives. Oceania is present for the first time in a leading place (1.02 per million habitants) (**Diagr.19**) At country level (worldwide classification) countries with very small populations appear to be at the top (Belize, Slovenia and New Caledonia) (**Diagr.20**). At the European level Slovenia is once again first followed by Austria and Switzerland (**Diagr.21**).

Diagram 19: Number of long caves million habitants (by continent).



Conclusions

Unfortunately there is no world database of all caves regardless of length and depth. Such a database would allow us to make statistical analysis and to answer questions like "which is the country with more caves than any other in the globe?" etc. However with the data that are available it is confirmed inductively that Greece is a country with great potential and a very high number of deep caves compared to the rest of Europe or rest of the world. Future developments in the explorations will increase these figures more. The potential of the country both in number of caves and in depth is great. It could be stressed that the unforgettable E.Platakis had recorded in Anogia region (Crete) only three (3) caves while in practice today more than 250 have been explored.

From the statistical analysis it is obvious that in Europe there are not so many long caves as compared to the American continent. The opposite is the case with the number of deep caves, which exist in much higher numbers in Europe than in America.

At country level, Slovenia the base of UIS, possesses the first place above all the others, almost in every indicator, whereas Greece is usually ranked well (between 8 and 12) in most indicators concerning the deep caves.

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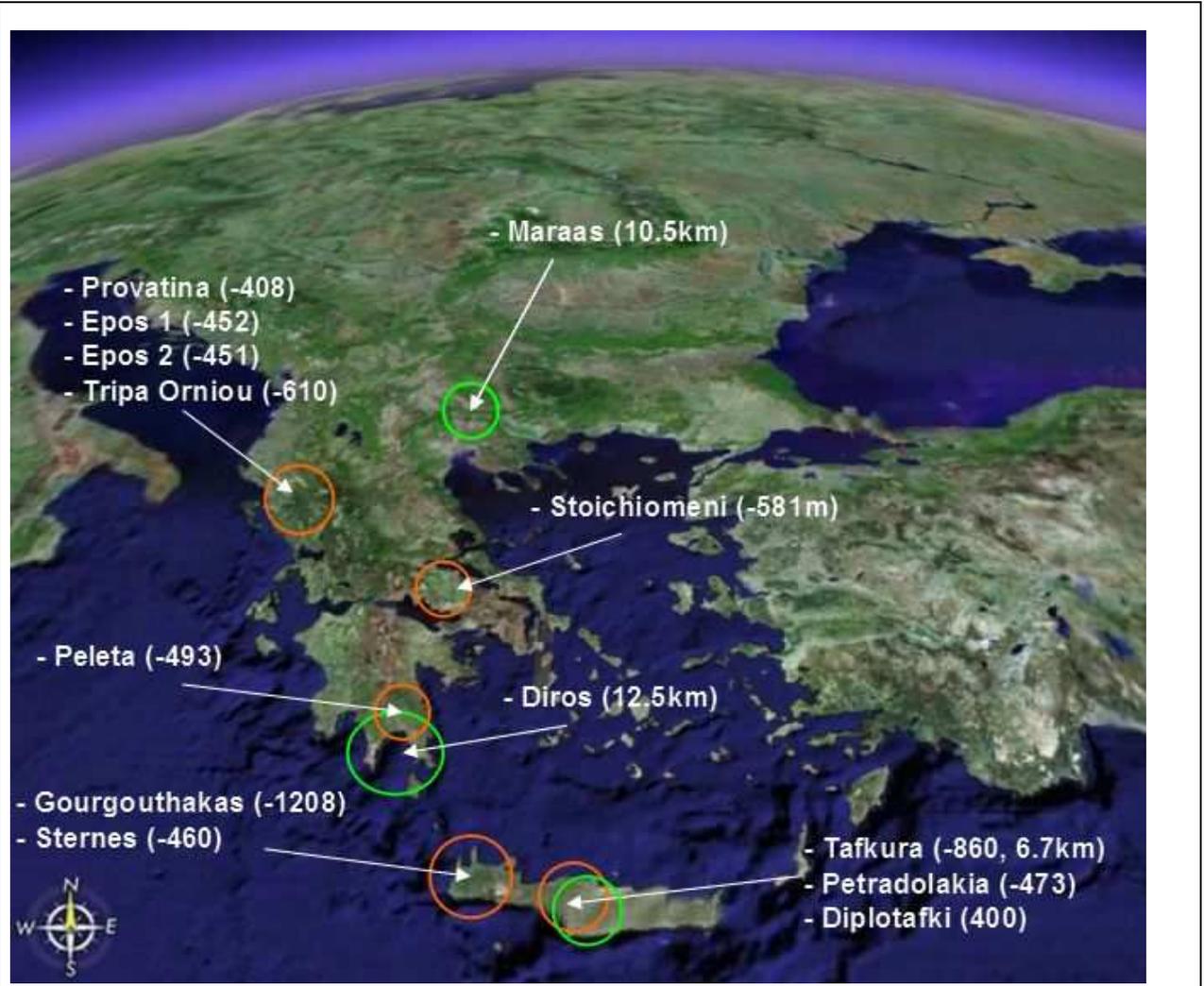
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- Demographic data: U.S. Census Bureau, Population Division, International Programs Center, Washington, DC 20233-8860, Sep 2003
- Extent per country: Information taken from Internet (see Annex)

ABSTRACT

This article is a statistical analysis on the number of deep and long caves using several indicators like number of deep caves, number of deep caves per 50000 sq Km, number of deep caves per million inhabitants, number of long caves, number of long caves per million inhabitants and number of long caves per 50000 sq Km. Caves deeper or equal to the depth of -400m are considered as deep while caves longer or equal to 6000m are considered as long. Greece is the focus but the analysis was made against the rest of the world using Eric Mandelane 's, World Cave Database (<http://www-sop.inria.fr/agos-sophia/sis/DB/database.html>) as a source. Population data is sourced from U.S. Census Bureau, Population Division. Land surface information per country has been collected through internet resources. As a general conclusion caves found in Europe and Asia are deeper than the caves in all other continents. Caves in America are longer than those in the rest of the World. The top country according to most of the indicators is Slovenia. Greece is ranked between 8th and 11th place worldwide or within Europe on the indicators concerning deep caves.



Pict.1: Satellite image of Greece with the approximate deep and long cave locations.

Table P 1: Number deep and long caves per country – Elements 2001 World Cave Database.

Geographical Area	Country	Nr of Deep Caves	Nr of Long Caves	Total Nr of Caves
AFRICA	Algeria	3	1	4
	Ethiopia		1	1
	Kenya	1	1	1
	Madagascar		6	6
	Morocco	1	2	3
	South Africa		4	4
	Tanzania		1	1
Zaire		1	1	
AFRICA Total		5	17	21
ASIA	China	2	4	5
	India		1	1
	Iran	1		1
	Japan	2	1	3
	Laos		2	2
	Malaysia	2	4	6
	Philippines		6	6
	S. Korea		3	3
Thailand		4	4	
Vietnam		3	3	
ASIA Total		7	28	34
EUROPE AND THE NEW INDEPENDENT STATES	Albania	3		3
	Austria	64	27	68
	Belgium		3	3
	Bosnia		1	1
	Bulgaria		3	3
	Croatia	12	5	17
	Czech rep	1	3	3
	France	128	108	196
	Georgia	23	4	26
	Germany	7	5	12
	Greece	11	3	13
	Hungary		3	3
	Ireland		2	2
	Italy	124	40	144
	Moldova		1	1
	Norway	1	1	2
	Poland	4	6	6
	Portugal		2	2
	Romania	3	18	19
	Russia	11	16	25
Slovakia	1	5	6	
Slovenia	20	11	27	
Spain	88	35	104	
Switzerland	24	18	30	
Turkmenistan		3	3	
UK		22	22	
Ukraine	2	7	9	
Uzbekistan	5	2	5	
Yugoslavia		1	1	
EUROPE AND THE NEW INDEPENDENT STATES Total		533	354	756
LATIN AMERICA AND THE CARIBBEAN	Bahamas		1	1
	Belize		2	2
	Brazil	1	12	13
	Cuba		9	9
	Guatemala		1	1
	Honduras	1		1
	Mexico	39	21	51
	Peru	1		1
	Puerto Rico		1	1
	Rep Dominicaine		1	1
Venezuela		3	3	
LATIN AMERICA AND THE CARIBBEAN Total		42	51	84
NEAR EAST	Lebanon	2	1	3
	Syria		1	1
	Turkey	8	4	11
NEAR EAST Total		10	6	15
NORTH AMERICA	Canada	3	7	9
	USA	5	178	179
NORTH AMERICA Total		8	185	188
OCEANIA	Australia		12	12
	New Caledonia		1	1
	New Guinea	7	5	10
	New Zealand	7	12	14
OCEANIA Total		14	30	37
Grand Total		619	671	1135

Table P 2: Extent per country in square kilometers (km²).

Country	Land-Km2	Country	Land-Km2	Country	Land-Km2	Country	Land-Km2
Afghanistan	647,500 km2	Dominica	754 km2	Kuwait	17,820 km2	Romania	237,500 km2
Albania	28,748 km2	Dominican Republic	48,730 km2	Kyrgyzstan	198,500 km2	Russia	17,075,200 km2
Algeria	2,381,740 km2	East Timor	15,007 km2	Laos	236,800 km2	Rwanda	26,338 km2
American Samoa	199 km2	Ecuador	283,560 km2	Latvia	64,589 km2	Saint Helena	410 km2
Andorra	468 km2	Egypt	1,001,450 km2	Lebanon	10,400 km2	Saint Kitts and Nevis	261 km2
Angola	1,246,700 km2	El Salvador	21,040 km2	Lesotho	30,355 km2	Saint Lucia	616 km2
Anguilla	102 km2	Equatorial Guinea	28,051 km2	Liberia	111,370 km2	St. Pierre & Miquelon	242 km2
Antarctica	14 mil km2	Eritrea	121,320 km2	Libya	1,759,540 km2	St.Vincent Grenadines	389 km2
Antigua and Barbuda	443 km2	Estonia	45,226 km2	Liechtenstein	160 km2	Samoa	2,944 km2
Arctic Ocean	14.056 mil km2	Ethiopia	1,127,127 km2	Lithuania	65,200 km2	San Marino	61.2 km2
Argentina	2,766,890 km2	Europa Island	28 km2	Luxembourg	2,586 km2	Sao Tome Principe	1,001 km2
Armenia	29,800 km2	Falkland Islands	12,173 km2	Macau	25.4 km2	Saudi Arabia	1,960,582 km2
Aruba	193 km2	Faroe Islands	1,399 km2	Madagascar	587,040 km2	Senegal	196,190 km2
Ashmore and Cartier Islands	5 km2	Fiji	18,270 km2	Malawi	118,480 km2	Serbia/Montenegro	102,350 km2
Atlantic Ocean	76.762 mil km2	Finland	337,030 km2	Malaysia	329,750 km2	Seychelles	455 km2
Australia	7,686,850 km2	France	547,030 km2	Maldives	300 km2	Sierra Leone	71,740 km2
Austria	83,858 km2	French Guiana	91,000 km2	Mali	1.24 mil km2	Singapore	692.7 km2
Azerbaijan	86,600 km2	French Polynesia	4,167 km2	Malta	316 km2	Slovakia	48,845 km2
Bahamas, The	13,940 km2	French Antarctic s	7,829 km2	Man, Isle of	572 km2	Slovenia	20,273 km2
Bahrain	665 km2	FYROM	25,333 km2	Marshall Islands	181.3 km2	Solomon Islands	28,450 km2
Baker Island	1.4 km2	Gabon	267,667 km2	Martinique	1,100 km2	Somalia	637,657 km2
Bangladesh	144,000 km2	Gambia, The	11,300 km2	Mauritania	1,030,700 km2	South Africa	1,219,912 km2
Barbados	431 km2	Gaza Strip	360 km2	Mauritius	2,040 km2	S.Georgia-S.Sandwich	3,903 km2
Bassas da India	0.2 km2	Georgia	69,700 km2	Mayotte	374 km2	Southern Ocean	20.327 mil km2
Belarus	207,600 km2	Germany	357,021 km2	Mexico	1,972,550 km2	Spain	504,782 km2
Belgium	30,510 km2	Ghana	239,460 km2	Micronesia	702 km2	Spraty Islands	less than 5 km2
Belize	22,966 km2	Gibraltar	6.5 km2	Midway Islands	6.2 km2	Sri Lanka	65,610 km2
Benin	112,620 km2	Glorioso Islands	5 km2	Moldova	33,843 km2	Sudan	2,505,810 km2
Bermuda	53.3 km2	Greece	131,940 km2	Monaco	1.95 km2	Suriname	163,270 km2
Bhutan	47,000 km2	Greenland	2,166,086 km2	Mongolia	1.565 mil km2	Svalbard	62,049 km2
Bolivia	1,098,580 km2	Grenada	344 km2	Montserrat	102 km2	Swaziland	17,363 km2
Bosnia and Herzegovina	51,129 km2	Guadeloupe	1,780 km2	Morocco	446,550 km2	Sweden	449,964 km2
Botswana	600,370 km2	Guam	549 km2	Mozambique	801,590 km2	Switzerland	41,290 km2
Bouvet Island	58.5 km2	Guatemala	108,890 km2	Namibia	825,418 km2	Syria	185,180 km2
Brazil	8,511,965 km2	Guernsey	78 km2	Nauru	21 km2	Taiwan	35,980 km2
British Indian Ocean Ter	60 km2	Guinea	245,857 km2	Navassa Island	5.2 km2	Tajikistan	143,100 km2
British Virgin Islands	153 km2	Guinea-Bissau	36,120 km2	Nepal	140,800 km2	Tanzania	945,087 km2
Brunei	5,770 km2	Guyana	214,970 km2	Netherlands	41,526 km2	Thailand	514,000 km2
Bulgaria	110,910 km2	Haiti	27,750 km2	NL Antilles	960 km2	Tokelau	10 km2
Burkina Faso	274,200 km2	Heard & McDonald Isl.	412 km2	New Caledonia	19,060 km2	Tonga	748 km2
Burma	678,500 km2	Holy See (Vatican City)	0.44 km2	New Zealand	268,680 km2	Trinidad and Tobago	5,128 km2
Burundi	27,830 km2	Honduras	112,090 km2	Nicaragua	129,494 km2	Tromelin Island	1 km2
Cambodia	181,040 km2	Hong Kong	1,092 km2	Niger	1.267 mil km2	Tunisia	163,610 km2
Cameroon	475,440 km2	Howland Island	1.6 km2	Nigeria	923,768 km2	Turkey	780,580 km2
Canada	9,976,140 km2	Hungary	93,030 km2	Niue	260 km2	Turkmenistan	488,100 km2
Cape Verde	4,033 km2	Iceland	103,000 km2	Norfolk Island	34.6 km2	Turks & Caicos Isl.	430 km2
Cayman Islands	262 km2	India	3,287,590 km2	N.Mariana Isl.	477 km2	Tuvalu	26 km2
Central African Republic	622,984 km2	Indian Ocean	68.556 mil km2	Norway	324,220 km2	Uganda	236,040 km2
Chad	1.284 mil km2	Indonesia	1,919,440 km2	Oman	212,460 km2	Ukraine	603,700 km2
Chile	756,950 km2	Iran	1,648 mil km2	Pacific Ocean	155.557 mil km2	United Arab Emirates	82,880 km2
China	9,596,960 km2	Iraq	437,072 km2	Pakistan	803,940 km2	United Kingdom	244,820 km2
Christmas Island	135 km2	Ireland	70,280 km2	Palau	458 km2	United States	9,629,091 km2
Clipperton Island	6 km2	Israel	20,770 km2	Palmyra Atoll	11.9 km2	Uruguay	176,220 km2
Cocos (Keeling) Islands	14 km2	Italy	301,230 km2	Panama	78,200 km2	Uzbekistan	447,400 km2
Colombia	1,138,910 km2	Jamaica	10,991 km2	Papua N. Guinea	462,840 km2	Vanuatu	12,200 km2
Comoros	2,170 km2	Jan Mayen	373 km2	Paracel Islands	NA km2	Venezuela	912,050 km2
Congo	2,345,410 km2	Japan	377,835 km2	Paraguay	406,750 km2	Vietnam	329,560 km2
Congo, Republic of the	342,000 km2	Jarvis Island	4.5 km2	Peru	1,285,220 km2	Virgin Islands	352 km2
Cook Islands	240 km2	Jersey	116 km2	Philippines	300,000 km2	Wake Island	6.5 km2
Coral Sea Islands	less than 3 km2	Johnston Atoll	2.8 km2	Pitcairn Islands	47 km2	Wallis and Futuna	274 km2
Costa Rica	51,100 km2	Jordan	92,300 km2	Poland	312,685 km2	West Bank	5,860 km2
Cote d'Ivoire	322,460 km2	Juan de Nova	4.4 km2	Portugal	92,391 km2	Western Sahara	266,000 km2
Croatia	56,542 km2	Kazakhstan	2,717,300 km2	Puerto Rico	9,104 km2	Yemen	527,970 km2
Cuba	110,860 km2	Kenya	582,650 km2	Qatar	11,437 km2	Zambia	752,614 km2
Cyprus	9,250 km2	Kingman Reef	1 km2	Reunion	2,517 km2	Zimbabwe	390,580 km2
Czech Republic	78,866 km2	Kiribati	811 km2				
Denmark	43,094 km2	Korea, North	120,540 km2				
Djibouti	23,000 km2	Korea, South	98,480 km2				

Table P 3: Elements of population per continent and per country (in thousands habitants) –1998.

Region	Country	Total	Region	Country	Total	Region	Country	Total
AFRICA	Algeria	30,481	OCEANIA	American Samoa	62	LATIN AMERICA AND THE CARIBBEAN	Anguilla	11
	Egypt	66,050		Australia	18,613		Antigua and Barbuda	64
	Libya	5,691		Fiji	803		Argentina	36,265
	Morocco	29,114		French Polynesia	238		Aruba	68
	Tunisia	9,380		Guam	148		Bahamas, The	280
	Angola	10,865		Marshall Islands	63		Barbados	259
	Benin	6,101		New Caledonia	194		Belize	230
	Botswana	1,448		New Zealand	3,625		Bolivia	7,826
	Burkina Faso	11,266		Northern Mariana	67		Brazil	169,807
	Burundi	5,537		Papua New Guinea	4,600		Chile	14,677
	Cameroon	15,029		Samoa	225		Colombia	38,581
	Cape Verde	400		Solomon Islands	441		Costa Rica	3,605
	Central African	3,376		Tuvalu	10		Cuba	11,045
	Chad	7,360		Vanuatu	185		Dominica	66
	Comoros	546	OCEANIA Total	29,274	Dominican Republic		7,999	
	Congo (Brazzaville)	2,658	EUROPE AND THE NEW INDEPENDENT STATES	Albania	3,331		Ecuador	12,337
	Congo (Kinshasa)	49,001		Bosnia and	3,366		El Salvador	5,752
	Cote d'Ivoire	15,446		Bulgaria	8,240		French Guiana	163
	Djibouti	441		Croatia	4,672		Grenada	96
	Equatorial Guinea	454		Czech Republic	10,286	Guadeloupe	416	
	Eritrea	3,842		Hungary	10,208	Guatemala	12,008	
	Ethiopia	58,390		FYROM	2,009	Guyana	708	
	Gabon	1,208		Montenegro	680	Haiti	6,781	
	Gambia, The	1,292		Poland	38,607	Honduras	5,862	
	Ghana	18,497		Romania	22,396	Jamaica	2,635	
	Guinea	7,477		Serbia	10,526	Martinique	407	
	Guinea-Bissau	1,206		Slovakia	5,393	Mexico	98,553	
	Kenya	28,337		Slovenia	1,972	Netherlands Antilles	213	
	Lesotho	2,090		Armenia	3,422	Nicaragua	4,583	
	Liberia	2,772		Azerbaijan	7,856	Panama	2,736	
	Madagascar	14,463		Belarus	10,409	Paraguay	5,291	
	Malawi	9,840		Estonia	1,421	Peru	26,111	
	Mali	10,109		Georgia	5,109	Puerto Rico	3,857	
	Mauritania	2,511		Kazakhstan	16,847	Saint Kitts and Nevis	42	
	Mauritius	1,168	Kyrgyzstan	4,522	Saint Lucia	152		
	Mayotte	109	Latvia	2,385	Saint Vincent and the	120		
	Mozambique	18,641	Lithuania	3,600	Suriname	428		
	Namibia	1,622	Moldova	4,458	Trinidad and Tobago	1,117		
	Niger	9,672	Russia	146,861	Uruguay	3,285		
	Nigeria	110,532	Tajikistan	6,020	Venezuela	22,803		
	Reunion	705	Turkmenistan	4,298	Virgin Islands	118		
	Rwanda	7,956	Ukraine	50,125	Total	507,357		
	Saint Helena	7	Uzbekistan	23,784	ASIA	Afghanistan	24,792	
	Sao Tome and	150	Andorra	65		Bangladesh	127,609	
	Senegal	9,723	Austria	8,134		Bhutan	1,908	
	Seychelles	79	Belgium	10,175		Brunei	315	
	Sierra Leone	5,080	Denmark	5,334		Burma	47,305	
	Somalia	6,842	Faroe Islands	42		Cambodia	11,340	
	South Africa	42,835	Finland	5,149		China	1,236,915	
Sudan	33,551	France	58,805	Hong Kong S.A.R.		6,707		
Swaziland	966	Germany	82,079	India		983,377		
Tanzania	30,609	Gibraltar	29	Indonesia		212,942		
Togo	4,906	Greece	10,662	Iran		68,960		
Uganda	22,167	Guernsey	65	Japan		125,932		
Zambia	9,461	Iceland	271	Laos		5,261		
Zimbabwe	11,044	Ireland	3,619	Macau		507		
AFRICA Total	760,503	Italy	56,783	Malaysia		20,933		
NEAR EAST	Bahrain	616	Jersey	89		Maldives	290	
	Cyprus	761	Liechtenstein	32		Mongolia	2,579	
	Gaza Strip	1,054	Luxembourg	425		Nepal	23,698	
	Iraq	23,034	Malta	380		North Korea	22,178	
	Israel	5,644	Man, Isle of	75	Pakistan	135,135		
	Jordan	4,435	Monaco	32	Philippines	77,726		
	Kuwait	1,913	Netherlands	15,731	Singapore	3,490		
	Lebanon	3,506	Norway	4,420	South Korea	46,417		
	Oman	2,364	Portugal	9,928	Sri Lanka	18,934		
	Qatar	697	San Marino	25	Taiwan	21,908		
	Saudi Arabia	20,786	Spain	39,134	Thailand	60,037		
	Syria	16,673	Sweden	8,887	Vietnam	76,236		
	Turkey	64,567	Switzerland	7,260	ASIA Total	3,363,431		
	United Arab Emirates	2,303	United Kingdom	57,721	NORTH AMERICA	Canada	30,675	
	West Bank	1,557	Total	798,154		Greenland	59	
	Yemen	16,388			United States	270,312		
	Total	166,298			Total	301,046		