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THE SPECIFIC OF TOURISM AND LEISURE ACTIVITIES IN HIGH MOUNTAINS AREAS. CASE STUDY: MONT BLANC AND ELBRUS MASSIFS

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ABSTRACT. The high mountains, situated over 3000 m altitude, induce specific features of tourism and leisure activities. Their level of equipment for tourism restricts because of difficult access, rugged terrain, and adverse weather conditions. The main activities are those with extreme features, like skiing, snowboarding, ski touring, ski paragliding, wingsuit and mountaineering. This study is the result of research conducted in the highest massive of Europe, Mont Blanc (4810 m) and Elbrus (5642 m), on several issues, such as: tourism infrastructure, the organization of tourism activities, tourist flows, leisure activities fetures, management of mountain expeditions, and behavior of body to altitude.

Key words: *mountaineering, bioclimat, climate tourism, trekking, scrambling, ice climbing, aerobic endurance, adventure lifestyle, mountain risk, acute mountain sickness, high-altitude pulmonary edema, high-altitude cerebral edema, hypoxia*

REZUMAT. ***Specificul activităţilor turistice şi agrementale în munţii înalţi. Studiu de caz: masivele Elbrus şi Mont Blanc.*** Munţii înalţi, situaţi la peste 3000 m altitudine, induc caracteristici specifice activităţilor agrementale şi turistice. Gradul lor de echipare pentru turism se restrânge dactorită accesului greu, reliefului accidentat şi condiţiilor climatice nefavorabile. Activităţile principale sunt cele cu caracter extrem, respectiv schi, snowboarding, schi de tură, schi paragliding, wingsuit şi mountaineering. Studiul de faţă reprezintă rezultatul cercetărilor efectuate în cele mai înalte masive din Europa, Mont Blanc (4810 m) şi Elbrus (5642 m), asupra mai multor aspecte, cum ar fi: infrastructura turistică,

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modul de organizare a activităților turistice, fluxurile de turiști, activitățile agrementale specifice, managementul expedițiilor și comportamentul organismului uman la condițiile impuse de altitudine.

Cuvinte cheie: *alpinism*, *bioclimat*, *turism climatic*, *trekking*, *scrambling*, *cățărare pe gheață*, *anduranță aerobă*, *stil de viață aventuros*, *risc montan*, *rău de munte acut*, *edem pulmonar*, *edem cerebral*, *hipoxie*

Introduction

Mountainous regions located over 3000 m altitude, presents specific geographical features (rugged terrain, cold climates, eternal snows, glaciers) that have a big impact on tourism and leisure activities. Tourism infrastructure, may be missing or may be represented in the vicinity of tourist resorts by installation of lifts (cable cars, gondolas, chairlifts), accommodations (hotels, lodges, shelters), trails or via ferrata routes climbing, ski slopes, and the leisure activities are geared towards relaxation and adventure, such as: hiking, trekking, scrambling, rock and ice climbing, paragliding, wingsuit flying, ski touring, alpine skiing, extreme skiing and snowboarding.

Within these regions it can distinguish at least two sectors, which are under the influence of bioclimatic conditions:

- The sector from 3000 m to 4000 m, where the hypoxemia (decreased oxygen levels in the body) and hypoxia (low oxygen levels in the tissue) is less felt and leisure activities can be carried out relatively well;
- The sector up to 4000 m, where the amount of oxygen in the air increasing, and the air pressure is low, which influences the human body, hampered recreational activities.

Mountain entertainment is an aerobic activity, with big consumption of oxygen, so it is important to maintain the balance between the oxygen demand and supply of oxygen. At high altitudes, this balance changes and increases the need for oxygen. The parameter which illustrates this balance is the heart rate:

- If the hearth rate=130 beats / minute, then the effort is carried out in a perfect stable conditions;
- If the hearth rate=170-180 beats / minute, then the effort occurs in the relative stable state;
- If the hearth rate=140-150 beats / minute, is attained only 70-75% of the maximum consumption of oxygen, without producing lactic acid in the blood.

Cardio-vascular and breathing resources mobilization is very important, so it is necessary that the pace of movement and equipment to be oriented to effort economy, to extend the activity and increase the resistance of body.

Leisure activities involve the same the psychological factor, in order to fulfill its purpose, namely climbing a slope, crossing a ridge or reaching the peak. Motivation and will play an important role in this context, managing to overcome obstacles imposed by high mountain environment less hospitable.

Considering all these aspects, the study aims to highlight the particularities of tourism and entertainment activities in the two regions with high mountains, Elbrus (Caucasus) and Mont Blanc (Alps) in terms of organizational / managerial and practical aspects.

Material and methods

The present study is based on information obtained from research conducted as part of organized expeditions to Elbrus and Mont Blanc massifs during 06 - 27 August 2017. The interest concerned fields were: tourism infrastructure, the organization form of recreational activities, types of leisure, tourist flows and impacts to mountain environment.

To carry out these mountain expeditions there was several stages, relevant from methodological and organizational perspective, such as:

a) Route planning:

- There was chosen the normal routes to Elbrus (5642 m) and Mont Blanc (4810 m) peaks, relevant to the research topic;

b) Prior physical training:

- It was made by fitness exercises, hiking, trekking and cycling;

c) The choice of equipment:

1) For base camps approach and acclimatization: light equipment (flexible boots, hiking pants, softshell jacket);

2) For the summit day: because the lower temperatures there was chosen a warmer equipment consists of plastic boots, baselayer (merino underlayer) midlayer (T-shirts, fleece) and upper layer (down thermic jacket, hardshell jacket), gloves, mask, hat, accessories (backpack 30 l, crampons, helmet, ice ax, trekking poles, goggles, harness, rope, carabiners, first aid kit);

d) Establishing of food supplies:

- There was chosen high-energy foods, low weight and small volume: plain water, lime water, protein (dry meat, cashew nuts), carbohydrates (chocolate, energy bars, dry fruits), carbohydrate (dry bread, crackers);

e) Consulting the literature on the issues covered by the project:

1) Leisure activities in the areas of study (Baragunova, Kaloeva, 2014; Andreyanova, Igorevna, Ivolga, 2016; Philip, 2009);

2) Bioclimatology and mountain medicine (Stanhill, 1994; Auliciems, 1998; Peacock, 1998; Blazejczyk, 2001; Shell, 2004; Parcevaux, Hubert, 2007; Valliere, O`Reilly 2007; Richalet et al., 2012);

3) Training for sports and leisure activities in mountain areas (Costill, Fink, Pollock, 1979; Dudley, Abraham, 1982; Holloszy, Coyle, 1984; Daniels, 1989; Costill, Thomas, Robergs, Pascoe, Lambert, Barr, Fink, 1991; Foster, Hector, Welsh, Schrager, Green, Snyder, 1995; Baechle, Earle, 2000; Hawley, 2002; Şandor, 2014);

4) Sport tourism/mountain tourism (Ewert, 1985; Barry, 1992; Marsigny, B., Jammes, F.L., Cauchy, Emm., 1999; Godde, Price, Zimmermann, 2000; Beedie, Dyck, Schneider, Thompson, Virden, 2003; Hudson, 2003; Weed, Bull, 2004; Lee et al., 2006; Pomfret, 2006; Unbehaun, Pröbstl, Haider, 2008; Taher, Jamal, 2012; Tsaur et al., 2012; Richins, Hull, 2016; Elliot, Kreziak, 2017; Kennedy, 2017; Lutter, Sheikh, Schöffl, Schöffl, 2017).

Collection of information was done by direct observation, and further processing of their had didactic finalities (use of information in teaching), scientific finalities (climatic conditions, glaciers, landforms, human body behavior at altitude) and practical finalities (management of mountain expeditions and leisure activities).

Study areas

The two mountain ranges chosen for the conduct of research are the highest points of the European continent, constituting two milestones in mountaineering and adventure.

Mont Blanc massif is situated in the Alps, is part of a Graian Alps and reaches an altitude of 4810 m, and Elbrus belongs to the Caucasus Mountains, the Greater Caucasus, has an altitude of 5642 m, and it is considered the highest peak in Europe. Due to this, the Elbrus peak is part of the circuit 7 Volcanic Summit, which involves climbing the highest volcano on every continent (fig. 1).

Mont Blanc is a folding mountain system characterized by great altitudes, declivities and fragmentation, steep slopes, sharp ridges (arête), peaks towering (domes, aiguilles, horns), and deep saddles (col), glacial mark crevasses and seracs, glacial and periglacial spectacular landforms (circuses, through, rock glaciers, ridges, cliffs, chimneys, needles, towers, debris).

Orographic configuration of the Mont Blanc massif itself, dominated by the 4810 m elevation, is radial-divergent, from the top unhooking the three main ridges: northwest ridge (Les Bosses), north-northeast ridge (Trois Monts), and southeast ridge (Mont Blanc du Courmayeur- Brouillard), whose flanks descend steeply to glaciers Bossons (N), Mont Blanc (SV) Freney (SE) and Brenva (E). The flanks of Mont Blanc are developed for tourism (tourist routes, shelters, gondolas), leisure activities gravitating towards the two tourist centers, Chamonix, north, and Courmayeur, south (fig. 2).

Fig. 1. Geographical localization of Elbrus and Mont Blanc massifs in Europe (*https://commons.wikimedia.org/wiki/Europe physical map-with changes*)

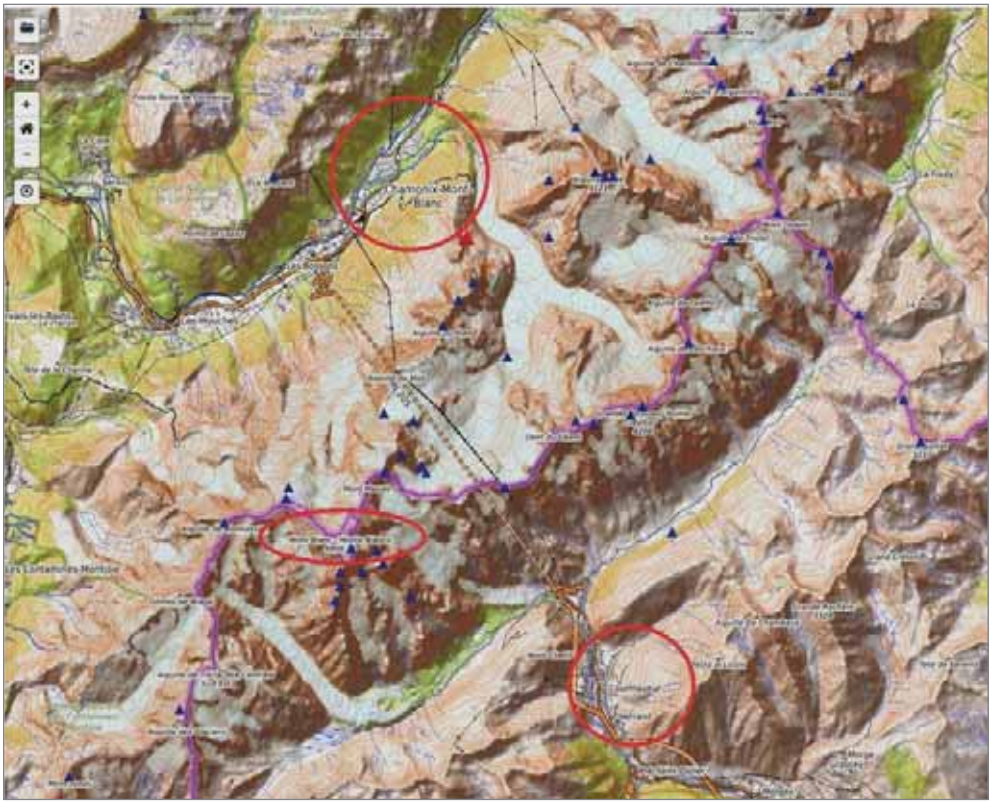

Fig. 2. Mont Blanc area
(*https://www.mountain-forecast.com/peaks/mont-blanc/forecasts/4810-with changes*)

Elbrus massif is a stratovolcano, with two peaks, representing the two craters residues. Western peak is 5642 m and the eastern peak has 5621 m. In terms of orographic, the mountain building is characterized by two morphological levels: the conical proeminence at more than 4,000 meters, and basalt plateau located around the peak, at 3000-4000 m, highly fragmented by the tributaries of Baksan, Kuban and Malka rivers, and covered with glaciers (Azau, Garabashi, Terskol, Illukon, Karachaun, Illycyran, Kyukyurtlyu, etc.).

Southern flank of the mountain Elbrus is affordable and is designed for tourism (shelters, cable cars, gondolas), and at its foot, in Baksan Valley, there are several tourist resorts (Terskol, Cheget, Azau Poliana) (fig.3).

Fig. 3. The Southern flank of Elbrus massif
(*http://www.ersh.sp.ru/caucasus/ski10-photo.html*)

Results and discussions

A) Tourism issues

a) Mont Blanc area

Mont Blanc is a milestone for european and world mountaineering. The tourist infrastructure is very developed, and tourist flows are very high. At the foot of the mountain are numerous resorts (Argentiere, Chamonix, Les Houches, Courmayeur), and in the high area operating modern shelters (Cosmique Grand Mulets, Tre-la Tete, Nid Daigle, Tete Rousse, Gouter, Vallot etc.). According to Petzl Foundation (2017), in Mont Blanc operates 120 tourist companies (50 Italian side, 70 on the French side, of which 20 in Chamonix), there are 350 km of tourist routes, the number of visitors is between 20 000-35 000 per year, and on the top of Mont Blanc reach 20000 climbers each year.

The access to the high area is facilitated by high mountain cableways, via gondolas operating on the route Chamonix-Plan de l`Aiguille-Aiguilles du Midi, and Courmayeur-La Palud-Le Pavilion-Rifugio Turin-Helbronner-Aiguille du Midi. It should also be mentioned the narrow railway transport, represented by the Tramway du Mont Blanc (cogwheel train) on the route: Le Fayet-Saint-Gervais-les-Bains-Nid d`Aigle (12.4 km).

Leisure activities carried out are: hiking, muntaineering, rock climbing, skiing, alpine skiing, snowboarding and extreme skiing, paragliding skiing. One of the many sporting events that are held in the Mont Blanc is Ultra Trail du Mont Blanc (UTMB), with five distance categories: 53, 101, 119, 166 km and 300 km.

b) Elbrus area

In Elbrus reach 260 000-350 000 visitors annually, entering the Baksan Valley to Ceghet, Terskol (2079 m) and Azau (2350 m) resorts, where high up with the cable car (Polyana Azau-Krugozor, 3000 m), gondolas (Polyana Azau-Krugozor-Mir, 3400 m), and chair-lift (Mir-Garabashi, 3800 m). At altitude, for tourist accommodation there are there are some container shelters, but the conditions are poor: Diesel Hut-Barrels (3750 m), Pryut 11 (4100 m), LEAPRus (3912 m) etc.

The leisure activities are: hiking, ice climbing, mountaineering, hang-gliding, paragliding (Ceghet), alpine skiing, ski touring, snowboarding. Since 2014 it initiated the modernization of the ski slopes being allocated 1 million rubles for modernization if Azau-Elbrus ski area, totaling 23 km of slopes (Baragunova, Kaloeva, 2014). In the period 2014-2015 the Elbrus recorded 140 000 skiers (fig. 4). Among the sporting events that are held in summer in Elbrus should be noted Adidas Elbrus World Race, with five distance categories 11, 34, 46, 59 and 112 kilometers.

Due to high altitudes, leisure activities in two mountainous areas takes place under threat of many risks, as follows:

a) Avalanches:

- on the southern flank of the mountain Elbrus, avalanches are rare;
- in Mont Blanc, the situation is more dramatic, in 2012 year 28 climbers have lost their lives, 11 on the route to Mont Maudit;

b) Acute mountain sickness:

- AMS is felt in both massive, and is most evident in the Elbrus from 5000 m up, when air pressure registers 420 mmHg, and the amount of oxygen in the air is 55% than above sea level;

- in Mont Blanc, at 4000 m, air pressure is 475 mmHg, the amount of oxygen in the air is 63% than at sea level, and the partial pressure of oxygen in blood is 85 mmHg than 160 mmHg as it is at sea level;

In this context, altitude sickness is worse in Elbrus, which is manifested by headaches, nausea, stomach pain, sleeplessness, confusion, exhaustion, fainting. If there is not a proper acclimatization, mountain sickness generates pulmonary and cerebral edema.

Fig. 4. Azau-Elbrus ski area
(*http://kavkazskitur.com/skiing-mount-elbrus*)

c) Rockfall and escalating accidents:

- in Elbrus, rock fall are rare, but can occur in Polyana Azau-Garabshi sector, where there are steep slopes and volcanic ridges affected by weathering;

- in Mont Blanc, the phenomenon is present in Grand Couloir, between Tete Rouse and Gouter refugees, where from 1990 to 2011 there have been 74 deaths and 180 injured (Petzl Foundation, 2011);

d) Sliding on ice and fall into crevices:

- is a risk that must be taken into account in both massive;

- in Elbrus, large crevices are rare, but in Mont Blanc they are present in large numbers on the route Gouter-Mont Blanc.

e) Over-crowded on routes and peaks:

- in both massifs, the number of tourists is very high, both on the way to the peaks and the peaks, being held between 350 and 400 tourists / day during the summer;

- in the summit day, were recorded on Elbrus 100 climbers in one hour (09-10 a.m.), and in Mont Blanc only 30 climbers in one hour (09-10 a.m.) due to adverse weather conditions (fog and strong wind).

f) Depletion due to poor physical condition, the weather conditions and inadequate acclimatization:

- in the two massifs record 80-100 rescue interventions each year for rescuing tourists;

- in Mont Blanc killed 20 people in 2014 and 11 people in 2017 (Petzl Foundation, 2017);

- Elbrus massif is the highest, most accessible, but dangerous because of the altitude;

- Mont Blanc massif is smaller, inaccessible, and dangerous because of the weather (storms, fog, strong wind.

h) Sunstroke, ophthalmia:

- in sunny days due to snow, reflection is very high and can have serious consequences on the eyes, unless protective measures are taken (sunglasses, goggles glaciers);

- also, the wind can cause certain eye diseases unless wearing goggles.

B) The management of expeditions

To achieve two research expeditions to Elbrus and Mont Blanc were several stages as follows:

a) Prior physical training:

-by fitness exercises, hiking, cycling, running through the forest, mountain climbing;

b) Establishing routes:

-was chose standard routes where traffic and tourism infrastructure are better represented and relevant to specific research;

c) The segmentation of the route>

-to covering distances and differences in level, for the determination of effort and good acclimatization the routes was divided into several phases (Mont Blanc: 4 stages; Elbrus: 4 stages);

d)selecting suitable equipment:

1) To travel to the shelters: flexible boots, softshell pants, shirts, fleece, sofshell jacket, trekking poles, helmet, backpack 80 l;

2) To summit day:

-due to lower temperatures warmer equipment was chosen consists of: plastic boots, baselayer (merino), midlayer (primaloft jacket, feece) and upper layer (thermic jacket, hardshell jacket), gloves, mask, hat, accessories (backpack 30 l, crampons, helmet, ice ax, goggles, harness, rope, carabiners, first aid kit);

Conducting expeditions had also several steps:

a) Approaching to mountainous areas:

-plane and bus to Baksan Valley from Elbrus;

-car to Chamonix, Mont Blanc;

b) Moving toward the base camps:

- In Elbrus: moving to the altitude refugees with gondola and chairlift, route Polyana Azau-Garabashi (3800 m);

1) In Mont Blanc: moving to shelters was made with Tramway du Mont Blanc (Le Fayet-Nid d`Aigle), and by trekking-scrambling, route Nid d`Aigle-Tete Rousse-Gouter (3835 m);

c) Acclimatization:

1) in Mont Blanc, due to the lower altitude, acclimatization was done by trekking to the shelters, in two stages:

-day 1: from Nid d`Aigle (2334 m) to Tete Rousse (3167 m) and overnight at the shelter;

-day 2: displacement from Tete Rousse refuge to Gouter refugee (3835 m) and overnight;

2) In Elbrus acclimatization was done in four stages:

-day 1: climbing Ceghet peak (3700 m), starting from Terskol resort (2079 m);

-day 2: climbing up to the base camps Garabashi (4200 m), and sleep lower in Terskol resort;

-day 3: Garabashi ascent base camp (4200 m) and then up to 5000 m, descent and overnights at the shelter;

-day 4: up to 5000 m ascent, descent and overnight at the shelter;

d) Summit day:

1) starting climbing to Mont Blanc peak from Gouter refugee (3835 m) at 02 a.m.;

-to achieve the summit two steps were completed: Gouter-Vallot refugee (4635 m) and Vallot-Les Bosses ridge;

2) Starting climbing to Elbrus peak from Garabashi refugee (4200 m) at 12.30 a.m.;

e) Recovery day in base camp:

-after the withdrawal of the two peaks followed a day of recovery to the base camps;

f) Lowering the massive base:

-the descent of Mont Blanc was made by trekking from Gouter to Nid d`Aigle, where was taken Tramway du Mont Blanc to Le Fayet station;

-the descent from Elbrus was made by chairlift and gondola to the Polyana Azau resort (2350 m).

C) Comparative analysis of standard routes to the top of the two massifs

Standard routes of the two massive, leading to the highest peaks, are designed for climbing and are more secure and frequented by many climbers. They are listed as less difficult, and they have the following technical characteristics:

A) Elbrus:

a) Route:

1)Poliana Azau (2350 m)-Mir-Garabashi (3800 m):

-cable car, gondola, chairlift, cars;

-hiking: on the main road;

2) Garabashi-High Camp 4200 m:

-ice hiking;

-ice climbing;

-snowmobile, ratrack;

3) High Camp-Elbrus summit (5642 m):

-ice climbing;

-ice trekking;

b) The level difference: 1450 m (between Polyana Azau and Garabashi), 1842 m (between Garabashi and Elbrus summit);

c)duration: 10-12 hours;

d) Terrain features: ice and snow;

e) Difficulty: less difficult (route length, slope, altitude sickness);

f) Stages:

-Poliana Azau-Garabashi;

-Garabashi-High Camp 4200 m;

-High Camp-Elbrus summit and return (fig. 5);

Fig. 5. Normal route to Elbrus peak (Garabashi-Elbrus sector)
(*https://www.torkjelhurtig.no/elbrus*)

B) Mont Blanc:

a) Route:
1) Le Fayet-Nid d`Aigle:
-tramway du Mont Blanc (12,4 km);
-hiking;
2) Nid d`Aigle-Tete Rouse:
-hiking, trekking;
3) Tete Rousse refugee-Gouter refugee:
-scrambling on Gouter Face;
4) Gouter refugee-Mont Blanc summit:
-ice climbing;

b) Level difference: 2643 m from Nid d`Aigle (2167 m) to Mont Blanc summit;

c) Time: 12-14 hours;

d) Technical features: rough terrain, rocky walls, ridges, rocky couloirs, ice ground, crevasses;

e) Difficulty: less difficult (long route, varied terrain, heavier features, weather variables);

f) Stages:

-Le Fayet-Nid d`Aigle-Tete Rousse;

-Tete Rousse-Gouter refugee;

-Gouter refugee-Vallot refugee-Mont Blanc summit and retourn (fig.6);

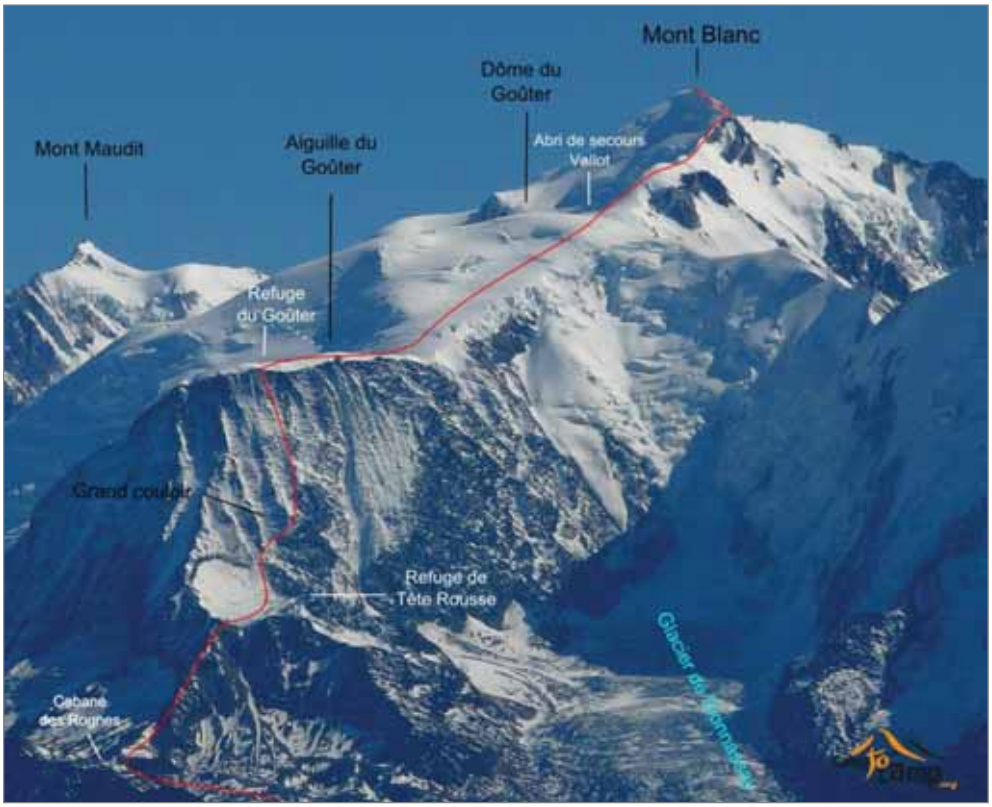

Fig. 6. Normal route to Mont Blanc summit (Tete Rousse-Mont Blanc sector) (*https://commons.wikimedia.org/wiki/File:Mont_Blanc_-Gouter_route.jpg*)

Conclusions

Elbrus and Mont Blanc massifs are part of high mountains, which induce certain characteristics in leisure and tourism activities within them.

Factors that determine the types of activities, their practice and their chances of success are:

-altitude: expressed by the need for acclimatization and altitude sickness manifested in lack of good acclimatization;

- terrain: rock, snow and ice;
- landformsl: inclined slopes, height differences, steep increases;
- wheater: stable or unstable weather.
- phisycal and mental fitness: obtained through prior aerobic training.

Both massifs are equipped for altitude mountaineering, with differences imposed by the overall economic development, and traditions, and predominant leisure activities is climbing the two main peaks, Mont Blanc (4810 m), and Elbrus (5642 m). In this context, an important role have the managing ascents process, which involves physical training, route planning, optimal selection of equipment, establishment of food supplies and segmentation of route in stages.

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