BRAZILIAN PERMANENT ORIENTEERING TRAINING CAMPS: THE PARTNERSHIP BETWEEN THE PUBLIC UNIVERSITY AND THE BRAZILIAN ARMY IN EDUCATION AND SPORT

Pistas permanentes de orientação no Brasil: a parceria entre a Universidade Pública e o Exército Brasileiro em Educação e Esporte

RAUL MARQUES PEREIRA FRIEDMANN, M.Sc.[1,2]
LUIS AUGUSTO KÖENIG VEIGA, Dr.[1]
EDUARDO BORBA NEVES, Dr.[3]
LÁSZLÓ ZENTAI, Ph.D.[4]

[1] Universidade Federal do Paraná
Curso de Pós—Graduação em Ciências Geodésicas.
[2]Universidade Tecnológica Federal do Paraná
Departamento Acadêmico de Eletrônica.
[3] Exército Brasileiro, 5º Grupo de Artilharia de Campanha Autopropulsado;
Universidade Tecnológica Federal do Paraná — Campus Curitiba
Departamento Acadêmico de Eletrônica
Programa de Mestrado em Engenharia Biomédica.
[4] Eötvös Loránd University
Department of Cartography and Geoinformatics
International Cartographic Association, Secretary General
International Orienteering Federation Council.
raul@utfpr.edu.br, kngveiga@ufpr.br, borbaneves@hotmail.com,
laszlozentai@elte.hu

ABSTRACT

According to the International Orienteering Federation, Orienteering is a sport in which the athlete performs a route with controlling points in the shortest possible time aided by the compass and the map. It is also a valuable tool for teaching orienteering in its widest sense, cartography and land navigation for all kinds of fieldwork. When compared to other sports, orienteering requires large periods of time to prepare any kind of course, even the training ones. The Permanent

Orienteering Training Camps are an option to facilitate teaching and learning of this sport and navigational skills. This article summarizes the history of the Brazilian permanent orienteering training camps and presents the partnership among the Federal University of Technology — Paraná (UTFPR — *Universidade Tecnológica Federal do Paraná*), the Brazilian Army and other institutions for the encouragement of this sport and its educational possibilities at regional and national levels. This paper also presents the criteria and solutions adopted for these facilities and their possibilities in competition, training, education and research.
Keywords: Orienteering Cartography; University; Army; Education; Sport.

RESUMO

Segundo a Federação Internacional de Orientação, a Orientação é um esporte em que o atleta realiza um percurso com pontos de controle no menor tempo possível auxiliado por uma bússola e um mapa. Ele é também uma valiosa ferramenta para o ensino de orientação em seu sentido amplo, cartografia e navegação terrestre para todos os tipos de trabalho de campo. Quando comparada com outros esportes, a orientação necessita de períodos relativamente grandes de tempo para o preparo de qualquer tipo de percurso, mesmo os de treinamento. As Pistas Permanentes de Orientação são uma opção facilitadora do ensino e da aprendizagem deste esporte e de habilidades em navegação. O presente artigo resume a história das pistas permanentes de orientação brasileiras e apresenta a parceria da Universidade Tecnológica Federal do Paraná com o Exército Brasileiro e outras instituições para o incentivo ao esporte e suas possibilidades educacionais em âmbito regional e nacional. O artigo também apresenta os critérios e soluções usadas para estas instalações e apresenta suas possibilidades em competições, treinamentos, educação e pesquisa.
Palavras-chave: Orientação Cartografia; Universidade; Exército; Educação; Esporte.

1. INTRODUCTION

According to ISOM 2000 (International Specification for Orienteering Maps 2000) "Orienteering is a sport in which the orienteer completes a course of control points in the shortest possible time, aided only by map and compass" (IOF, 2000). Good orienteering events depend on many factors, but always need an appropriate area, a reliable map and a good set of control points (IOF, 2012).

The practice of orienteering is growing each year throughout the world. This is a sport that contributes significantly to the individual development, improving ethics and accountability, developing intelligence, morale and contributing to the improvement of physical and mental health (XIAO-ZHI *et al.*, 2004). The development of map-reading skills, sense of spatial orientation and land navigation capabilities are the focus of orienteering as sport, but it encourages environmental awareness, respect for nature, land use and property rights (FRIEDMANN, 2009).

Orienteering also improves decision making abilities and the self-confidence, especially in children.

However, when compared to other sports, orienteering has some problematic aspects: first of all, it needs an appropriate area for practice. Then, even with a good area available, organizing training and competition is much more laborious than in other sports. For example, it can be said that "an orienteering competition takes about two months to be prepared, two days to be assembled and disassembled, and is used for about two hours for each competitor." Although this is a catchphrase, its contents describes a fact succinctly: in most competitions, a typical orienteering map requires a development time of approximately two months or more (even if starting with a good base map), the competition is usually mounted on the evening or the morning of the scheduled date and disassembled at the end of the same day, and two hours reasonably describe the time spent on the track for the majority of the orienteers to finish the proposed course in each class.

In short, even with an appropriate area available, the task of preparing an orienteering competition or even a single training is very labor intensive when compared to almost all other sports. For trainings it is possible to use the same area and map to prepare new courses, but it still requires work to launch and collect the control flags and the control system — typically mechanical punching systems like the *Silva*™ or *Suunto*™ or the electronic systems *Sport Ident*™ and *Emit*™, which records the passage of the competitor in each of the controls (hh:mm:ss time format) with the respective control code and generate individual and collective reports according the type of competition or training.

A *Permanent Orienteering Training Camp* (POTC) can be an interesting and useful teaching resource for educational or military organizations possessing appropriate areas. In a POTC (see figures 1, 2 and 3), controls are robust fixed structures and all of them can be presented in a single map, with their corresponding descriptions. So, this single map can be used for different orienteering courses: the competitor receives only one map, different control description cards (one for every training course) and, in each one, the respective control card. The same map can be used for score competitions, which is a handy format for events of a large number of participants.

In a POTC an experienced coach can trace new courses at any time just by stating the sequence of controls points (usually just called controls). Such procedure facilitates teaching of any specific knowledge and skills and, also, can provide personalized training for orienteers of different capabilities. This is particularly useful for beginners, children, students and to attract prospective new orienteering practitioners. In the case of more experienced orienteers, a good set of courses allows to extend the interest in the area for some time (but not indefinitely because, for experienced orienteers, most of the interest will always be in a new challenge, a new map and a new course in an interesting area).

Figure 1 — The upper letf part of the Atalaia POTC map (Pista Permanente de Orientação do Campo de Instrução do Atalaia) and some of its controls
Source: PIVETTA, 2011a (map), FRIEDMANN, 2012 (photos)

Furthermore, a POTC can provide controlled conditions for research and experiments related to orienteering that otherwise would be practically unfeasible. Thus, considering the difficulty in finding good areas for orienteering near urban centers and the need for the military to keep their staff trained in procedures for land navigation using topographic maps, the use of military areas for the construction of POTC is an assertive choice.

Apart from the sport, a POTC also provides conditions for the practical teaching of cartography and land navigation in its widest sense. It allows real examples and applications in topics like scales, cartographic symbols and languages, the relationship between relief and contours, soil and vegetation classification etc. These examples can benefit any courses and disciplines where the use of cartographic products is necessary or convenient, but in courses where field activities occur in unstructured environments — e.g. Archeology, Biology and Geology — these possibilities grew in importance. On the other hand, the ability to optimize trajectories into a structured network of different roads, tracks and paths is a practical skill that also can be worked in a POTC. And in all cases it is possible to perform these activities in controlled environments which allow exploring the playful aspects of teaching and learning.

This article presents the history of the Brazilian POTCs and also considerations for planning these training camps, their implementation, the mapping strategy adopted, the control choices criteria and possible uses in education, training and research.

For the most part, the paper discusses the implementation of POTCs in the context of a partnership between Federal University of Technology - Paraná and the Brazilian Army (*UTFPR - Universidade Tecnólogica Federal do Paraná* and *Exército Brasileiro*). At national level the main goal of this partnership is, until 2015, to establish POTCs at the main professional military schools of the Brazilian Army; and regionally (Paraná and Santa Catarina States), in barracks with great potential for the practice and dissemination of orienteering. This partnership has the support of the International Orienteering Federation (IOF), Geodetic Sciences Postgraduate Course / Federal University of Paraná (*UFPR - Universidade Federal do Paraná / CPGCG - Curso de Pós-Gradução em Ciências Geodésicas*) and local partners.

2. HISTORY OF THE BRAZILIAN PERMANENT ORIENTEERING TRAINING CAMPS

In Brazil, the first permanent orienteering training camp was inaugurated on 7th november, 2004, on the Indigenous Nations Park (P*arque das Nações Indígenas)*, in Campo Grande, Mato Grosso do Sul State, for the Orienteering at the Park Project (*Projeto Orientado-se no Parque*). It was a pioneering work developed by the Military Command of the West (*Comando Militar do Oeste*) in partnership with the Centre for Orienteering and Adventure Sports of Campo Grande (*Centro de Orientação e Desporto de Aventura de Campo Grande / CODAC* — an orienteering

local club) and other public and private institutions (SILVA, 2011). The orienteering mappers were Arilson Lima da Silva e Edson Ribeiro de Morais, both Brazilian Army sergeants.

The second one was opened on 11th february, 2006 in the Historical Park Marshal Manoel Luis Osorio (*Parque Histórico Marechal Manoel Luis Osório*), in Tramandaí, and was named Camp General Calasans (*Pista General Calasans*) in honor of one of the orienteering pioneers in the Brazilian Army. The Camp Colonel Tolentino Paz da Silva (*Pista Coronel Tolentino Paz da Silva*), in Redemption Park (*Parque da Redenção*), city of Porto Alegre, inaugurated on 19th august, 2006, was the third and honors "the father of the Brazilian orienteering". Both are in the Rio Grande do Sul State and were made through a partnership between the Military Command of the South (C*omando Militar do Sul*) and the Rio Grande do Sul State Orienteering Federation (*Federação Gaúcha de Orientação*).

The fourth one, opened on 28th august, 2010, also in the city of Campo Grande, is located at the Federal University of Mato Gosso do Sul (UFMS — *Universidade Federal do Mato Grosso do Sul*) and was made in partnership with the aforemen-tioned CODAC and the State Government.

The fifth Brazilian permanent orienteering training camp is the Permanent Sprint Orienteering Training Camp Captain Salomão da Rocha (*Pista Permanente de Orientação Sprint Capitão Salomão da Rocha*), inaugurated in 1st june, 2011 (FRIEDMANN, 2011). It was a joint effort by the Brazilian Army and Federal University of Technology — Paraná (UTFPR) prepared during the first half of 2011, in Curitiba, Paraná State, on the 5th Self-Propelled Field Artillery Group (5º GAC AP / *5º Grupo de Artilharia de Campanha Autopropulsado*) a remarkable military urban area (see section 8 and figure 4). This POTC was, from the beginning, designed to be a multipurpose civil and military orienteering training camp: a place for teaching groups of different ages and backgrounds and, also, capable of providing good conditions for mass events and research works. From now on, the term *permanent orienteering training camp* should be understood in this context and the rest of this paper discusses, in general, the partnership between the Brazilian Army and UTFPR for the implementation of POTCs at regional and national levels.

The same model, solutions and partnership, with minor adjustments and improvements, were used in the Permanent Orienteering Training Camp of the Atalaia (*Pista Permanente de Orientação do Campo de Instrução do Atalaia*) — the sixth POTC in Brazil, inaugurated on 20th april, 2012. The seventh one (already completed, and scheduled for inauguration in august, 2012) is the Permanent Sprint Orienteering Training Camp Sergeant Max Wolf Filho (*Pista Permanente de Orientação Sprint Sargento Max Wolf Filho*). Both, the sixth and the seventh, are located in the School of the Sergeants of the Arms (*Escola de Sargentos das Armas*), in Três Corações, Minas Gerais State. So, this Brazilian professional military school will become the first one in South America with permanent orienteering training camps — foot and sprint (IOF, 2007a) disciplines — being

able to use them in professional military instruction in a regular basis. In a very short way, the foot orienteering occurs mainly in forested areas and sprint orienteering has a high speed profile and occurs in park and densely built urban areas, where the need to represent more accurately the barriers, obstacles and buildings (as crossable or uncrossable / forbidden to cross) is greater and crucial to ensure fair competitions. So, the International Specification for Sprint Orienteering Maps (ISSOM) revises and extends the ISOM 2000 symbol set "in order to better accommodate parks and urban terrain" (IOF, 2007a). Foot orienteering adopts ISOM 2000 and sprint orienteering adopts ISSOM 2007.

In Brazil there are other public records about areas inaugurated with the purpose of teaching, training and disseminate orienteering on a regular basis - although, in practice, it is not noticeable the continuity of works. Perhaps the discontinuity is due to the absence of links with educational institutions, such as an University or the Armed Forces. Furthermore, in some cases, there are restrictions of access, calendar, environmental or other reasons preventing the use of the area on a regular or intensive basis, situations that are not dependent on orienteers involved and that in practice, prevent the initial desired objectives. Nevertheless, they are commendable initiatives and among these areas can be mentioned, for example, Duke of Caxias POTC / *Pista Permanente de Orientação Duque de Caxias* (General Câmara, Rio Grande do Sul state, General Câmara War Arsenal Instruction Field / *Campo de Instrução do Arsenal de Guerra General Câmara*, 3-jun-2006) and the Vidal de Negreiros POTC / *Pista Permanente de Orientação Vidal de Negreiros* (João Pessoa, Paraíba state, Beijamim Maranhão Botanical Garden / *Jardim Botânico Beijamim Maranhão*, 29-aug-2008).

3. AREAS FOR PERMANENT ORIENTEERING TRAINING CAMPS

The ISOM 2000 declares: "Good orienteering terrain contains a large number and a great variety of features". These requirements — quantity and diversity of features — is a fundamental condition for any good orienteering event. But the requirements for a permanent orienteering training camp are more comprehensive. The area selected should also:

- Be continuous, well defined and controlled by a single organization, institution or owner;
- Be available for use during a significant portion of time or, if this is not possible, available by appointment;
- Offer good safety conditions in the various aspects involved;
- Possess good infrastructure for visitors (parking, changing rooms, toilets, drinking water etc.);
- Some kind of basic health care for minor incidents or ease of travel to places with possible medical care.

In Brazil, within the federal executive branch, a large number of barracks of the Armed Forces, Military Educational Institutions, Federal Universities and

Federal Institutes for Education, Science and Technology have areas with such characteristics. And these federal public institutions also have a permanent professional staff of academics that can, to some extent, benefit from orienteering (the organizational model of the Brazilian Army is largely focused on training its Effective Variable that, after the compulsory military service, joins the Mobilizable Reserve. In this context the officers and sergeants involved in the military training of the troops act, in part, as military teachers.) These combined factors make these organizations the best options for permanent orienteering training camps.

At the state level there are several appropriate areas in some Military Police Academies and State Universities.

At the municipal level, some public parks with sufficient extension offer good possibilities. For example, the Ibirapuera Park, the most famous Brazilian city park (in São Paulo - SP) and one of the most visited, is an exceptional area to sprint orienteering. Occasionally it has been used in orienteering exercises by some Non-Governmental Organizations, Physical Education teachers and by the local Center for Preparation of the Reserve Officers (CPOR SP / *Centro de Preparação de Oficiais da Reserva de São Paulo*) and other Military Organizations, but not on a regular basis. In some ways, it is surprising the absence of a permanent orienteering training camp in this park.

The fact that Brazilian Armed Forces, Federal and State Universities possess good areas for orienteering provides good opportunities for cooperation with nearby schools and colleges. Another possible cooperation is with public or private sports related organizations.

4. ABOUT THE MAP QUALITY

In the process of preparing the map for each POTC for the UTFPR & Brazilian Army partnership, the general coordinator of the work made the effort to join the best base maps or cartographic inputs available, orienteering mappers with extensive experience, coaches or elite orienteers with extensive knowledge of the chosen area and, sometimes, additional complementary surveys conducted by professionals. In addition, each map has been reviewed by the editor of ISOM 2000 and chairman of ISSOM 2007 in order to ensure full compliance with the specifications and guidelines established by the IOF.

The cartographic products selected for each area, in general, are quite up to date and meet the official criteria for positional quality — in the Brazilian case, the *Padrão de Exatidão Cartográfica* (PEC) / Cartographic Accuracy Standards (BRASIL, 1984). Then they are matched, inserted and adjusted in the OCAD software (the use of OCAD is practically consensus among the orienteering mappers throughout the world) and passed to mappers selected among the Brazilian orienteering mappers elite.

At the request of UTFPR, the Brazilian Army is calling for these tasks mappers with significant mapping experience in the *World Military Orienteering Championship* (in 1983 Brazil hosted the 17th edition, in 1992 the 25th, and in 2006

the 39th), the *CISM World Military Games* (in 2011 Brazil hosted the 5th edition), the Brazilian Armed Forces Orienteering Championship (*CamOrFA - Campeonato Brasileiro de Orientação das Forças Armadas*), held annually since 1972, and the Brazilian Orienteering Championship (*CamBOr - Campeonato Brasileiro de Orientação*), held annually since 1999. Coaches with extensive experience in the local area help in the choice of possible controls and in testing maps. Furthermore, the orienteering teams trained by them are, in some cases, used to test various courses.

If necessary, additional complementary surveys are conducted by Geodetic Sciences Postgraduate Course / Federal University of Paraná (*UFPR - Universidade Federal do Paraná / CPGCG - Curso de Pós-Gradução em Ciências Geodésicas*) or by a local partner in order to ensure positional quality for new features in the area— for example, roads, lake borderlines, cultivated areas and so on. And finally, the IOF revision acts as an official endorsement, a guarantee that the final drawing is consistent with the competition rules and the international specifications published by the IOF —the ISOM 2000, the ISSOM 2007 and the IOF Control Descriptions 2004 — and accepted worldwide (IOF, 2000, 2004 and 2007a).

There is not a standard methodology for assessing the positional quality of orienteering maps, not even official criteria established by IOF, but the ISOM 2000 declares that "In general if the distance between neighbouring features deviates less than 5% this will satisfy accuracy requirements." This can be associated with an accuracy of 1/20 in distance and circa 3º in directions (FRIEDMANN, 2006). In practice, base maps of the same scale or greater and consistent with the PEC (or other similar standards) can guarantee sufficient positional quality for the final orienteering map. (The PEC is a scale-independent standard. The typical scales in brazilian POTCs are 1:10.000, 1:7.500 and 1:5.000 for foot orienteering maps and 1:5.000 and 1:4.000 for sprint). In short, once the base maps have better positional quality, they provide a good set of features to tie the local surveys carried by the orienteering mappers

Typically, the elite of Brazilian orienteering mappers are not professional surveyors or cartographers, but very experienced military orienteers with a remarkable feature classification and drawing abilities enhanced on field and edition work for several years. The related mapping strategy seeks to combine their practical skills with appropriated base maps and local surveys to ensure a quality result (FRIEDMANN, 2006 and 2008). In several respects, the strategy and procedures adopted are consistent with the IOF recommendations for controlling the map making of major events (IOF, 2007b).

5. ABOUT THE ORIENTEEGING CONTROLS

According to ISOM 2000, "Controls are the most important building blocks of a course. Choice of sites, placing of the markers, checking their positions, and locating controls in competition, all put definite demands on the map." In a POTC, this statement grows in importance.

Typically, in an orienteering competition, the main criterion for choosing the controls is the difficulty level set for the categories: the choice of positions must be technically compatible, in each class, with the expected navigation skills of the competitors. Eventually some easier controls can be chosen, but associated with a longer leg distance and a sequence that results in a course consistent with the corresponding level of difficulty (PASINE, 2003 and 2007; GÓMEZ, 2001).

As a POTC is essentially an environment for teaching and learning, additional criteria should be considered. In each selected area, the choice of the controls should also exploit, as far as possible:

- The diversity of map symbols (ISOM 2000 or ISSOM 2007);
- The control description symbols (IOF Control Descriptions 2004);
- Visually nice or striking places, peculiar and curious natural features, atypical special man-made features etc (see figures 1 and 2).

Figure 2 — Three controls of the POTC Capitão Salomão da Rocha
Source: PIVETTA, 2011b (map) e FRIEDAMNN, 2011b (photos)

Figura 3 — The POTC control (metal plate, mechanical punching system, a keyword and a north arrow at the top) compared with the traditional control flag. Source: FRIEDMANN, 2006 and 2012 (photos)

In summary, this combination of criteria considers the area, the levels of difficulty, the international specifications for the maps and for the control descriptions, which, together, provide a holistic view for teaching and learning orienteering.

Being part of a permanent installation, the controls of a PTOC require a very high degree of mechanical strength and durability that simply do not exist in the nylon control flags traditionally used in orienteering. Moreover, it is necessary, as far as possible (1) to employ a solution which is aesthetically compatible with existing environments and, simultaneously, (2) to maintain the visual identity of the sport. The solution adopted is shown in the photographs in figure 2. The figure 3 compares the POTC control with the traditional control flag used in competitions.

As much as possible, the controls are old wood railway sleepers positioned vertically. The control flag is replaced by a stylized metal plate positioned on the upper part of the sleeper, which has a mechanical punch and the control code followed by a keyword. This keyword is a technical reserve to prove the passage of the orienteer by a control where, perhaps, the punch is damaged (in this case, on arrival, the competitor informs the control code and the corresponding keyword).

The solution of using old wood railway sleepers has a rustic look that blends with various types of environment in the area of PTOCs and, simultaneously, gives an environmentally and ecologically sound disposal for this material (environmental education fits into the orienteering context and the use of recycled wooden sleepers as controls is a real and permanent example of recycling materials). In general the wood sleepers were donated to the project by *América Latina Logística* (ALL), a railway company, and its transportation and placement were made by the military organization that hosts each POTC. In some cases, by example in densely built-up areas, the plates are fixed directly on walls or special man-made features.

Due to problems of battery life, it is not viable to maintain a permanent electronic control system in a POTC. However, in special events where such control

system is desirable, electronic controls should be positioned next to corresponding fixed mechanical controls.

6. ABOUT THE CONTROL CODES AND THE DIFFICULTY LEVELS

In orienteering, the degrees of difficulty — N (novice), B (experienced), A very experienced), E (elite) — are associated with the courses and consider not only the controls, but also the leg distances, the different possible route choices and others factors. However, in a POTC every control must be classified only according to its inherent degree of difficulty and safety, without considering possible courses using it.

In the orienteering context, the N/B/A/E classes are an almost natural choice. But, in a POTC it is very important to keep in mind (1) that such suggestion should be considered more as an auxiliary indicator than anything else and (2) that course planning is a task that requires extensive experience, knowledge and critical thinking in various scenarios (IOF, 2012; DORNELLES, 2008).

In a POTC courses and trainings in no specific order are quite commons. So it is important to classify controls in some way and the N/B/A/E classes are a good starting reference — either for the course planner or to the individual practitioner.

This controls classification has additional advantages. It allows, for example, score competitions with mass start, in no specific order and different weights for the controls (by example, 1 point for N controls, 2 for B, 3 for A and 4 for E).

With the controls properly classified, it is possible to establish the following guidelines for course planning in a POTC: an N course must contain only N controls; a B course can use N/B controls; an A course can use N/B/A controls; an E course can use N/B/A/E controls. In other words, an elite (E) course can use any level of controls, but a novice (N) course must employ only the easy ones.

In order to organize the control codes and to differentiate their difficulty, the following coding strategy was adopted:

- All controls are identified by three digits;
- N level controls (beginners) are numbered 101, 102, 103 ... ;
- B level controls (difficult) are numbered 201, 202, 203 ... ;
- A level controls (very difficult) are numbered 301, 302, 303 ... ;
- E level controls (elite) are numbered 401, 402, 403 ... .

The magnetic north lines divide the orienteering map in equally spaced columns. To facilitate the location of any control on the map, within the same level of difficulty, the numbering of the controls:

- Starts at the leftmost column (the west part of the orienteering map, which is always magnetic north up) and, within this same column, increments following a scan from left to right and top to bottom;
- Continues in each of the following columns using the same scan criteria.

These scan criteria, which can be observed in figure 1 (the upper left part of the map of the Permanent Orienteering Training Camp of the Atalaia / *Pista*

Permanente de Orientação do Campo de Instrução do Atalaia), minimizes the luck factor in the location of any control on the map and collaborate to fair competition.

7. ABOUT TRAINING AND COMPETITION EVENTS IN A POTC

A permanent orienteering training camp supports all competition and training formats usually practiced. Furthermore it is a versatile installation that comprises other possibilities.

Very probably, the best possible collective use of a POTC can be obtained through a simple and straightforward strategy: an experienced course planner — or, preferably, a group of course planners — must prepare a *library of courses* for the most common type of competition and training: the *single-race competition*, *day* (in daylight), *individual*, *in a specific order* (IOF, 2012).

Such a library should cover a wide range of distances (long, middle, sprint, other) and difficulty (N, B, A, E) combinations and take into account "the course planner's golden rules" and other principles and IOF guidelines for course planning (IOF, 2012). It is also necessary to keep in mind that most of orienteers will use the POTC several times and this fact requires even greater attention to ensure a good mix of technical, environmental and recreational aspects in the library of courses.

Obviously each POTC has its own characteristics and possibilities. However, experienced course planners and practical data suggest that in a POTC with approximately 100 controls is easy and useful to prepare an initial repertoire of 10 courses at each difficulty level (N, B, A, E). It allows coaches, teams and less experienced orienteers to take advantage of the expertise of course planners with great experience and knowledge. Later on, it is possible to plan new courses to attend the local and specific needs in education and training, the different difficulty levels, personal skills to be developed etc.

A POTC is naturally suited to carry out massive events. The simple fact of being a permanent structure and also, in general, being located in barracks or in school environments encourages and promotes this type of event. Due to the large number of participants, these events are naturally suited to competitions with *mass start* and courses *in no specific order*.

The *score competition*, where the goal is to visit as many controls as possible within the time limit, is a particularly interesting format for festive events such as the presentation of the training camp for new students or the celebration of national or local holidays. In military schools, accomplish two other similar competitions throughout the year can provide indicators to measure the individual development and statistics to compare groups and courses involved.

The end of the year — civilian or academic — can be linked to a special competition with the stated goal of completing all controls in a given time limit. The finishers receive, for example, the *Atalaia Orienteering Medal* (*Medalha de Orientação do Atalaia*) and the others receive a different medal for participation. Matching the name of the medals to the name of the training camp helps to promote and strengthen the emotional bond with the place and the institution — something

particularly important in military schools.

In order to rank these competition results, a linearly decreasing score criterion can be adopted. For example, for N finishers, the first receives N points, the second N-1, the third N-2, ..., the penultimate 2 and the last 1 point. The ranking of courses and teams can be done directly averaging the points of its members and a trophy can be awarded to the top-ranked — also for example, *Atalaia Orienteering Trophy* (*Troféu de Orientação do Atalaia*). Inside every group, the standard deviation is a good criterion to estimate the individual variations.

8. ADITIONAL POSSIBILITES IN ORIENTEERING, CARTOGRAPHY AND OTHER DISCIPLINES

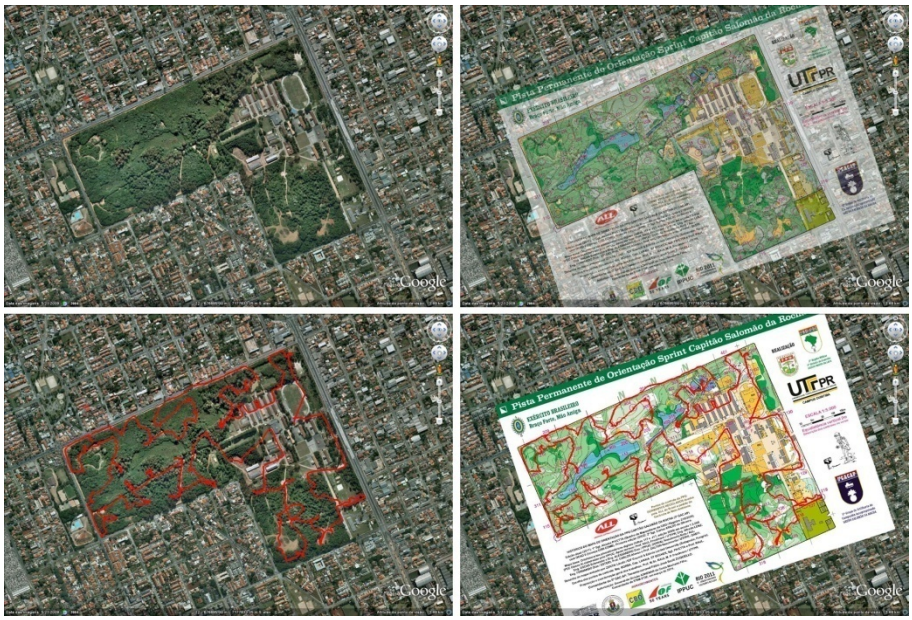
The procedures adopted in preparing a POTC map ensure a positional quality that, in general, allows matching the final orienteering maps and their controls with the corresponding images on Google Earth. As a result, many Google Earth resources can be used as tools for teaching and training. Comparing an orienteering map with image(s) available on Google Earth does not guarantee positional quality, but previous surveys and field tests can show if will be possible to match the orienteering map, the image(s) and portable GPS receivers data satisfactorily.

For example, (1) the relationship between the orienteering map and the corresponding real-world images can be explored by controlling the transparency of the superimposed map (see figure 4). This is a powerful interactive tool for teaching orienteering, topographical maps and cartography. Moreover, (2) downloading data collected by a GPS receiver during a training course can show the paths chosen by the competitor and allows a discussion of their successes, their mistakes and the quality of their choices and strategy. And once downloaded, these data can be displayed in a dynamic and three-dimensional way within Google Earth, which adds interest and an entertainment component.

For example, figure 4 shows the path chosen by an orienteer class M45A (male, 45 years or older, very experienced) to complete all the 85 controls of the Permanent Sprint Orienteering Training Camp Capitain Salomão da Rocha (*Pista Permanente de Orientação Sprint Capitão Salomão da Rocha*), in Curitiba-PR, Brazil (the total distance was 14.5 km in 2 hours and 31 minutes). For fitness GPS models, (3) additional information such as speed, direction, heart rate and others can be viewed (as instantaneous values, graphs, statistics, maps and animations) directly in programs like Garmin Training Center and Garmin Connect.

A POTC can also be exploited wherever orienteering, cartography and navigation are essential tools for carrying out field works safely. For example, Geography, Geology, Agronomy, Biology and several courses in Engineering are obvious examples, but other disciplines in Humanities and Health Sciences can, to some extent, benefit from a POTC in classes or other activities.

Figura 4 — POTC Capitão Salomão da Rocha in Google Earthand a full tour on the training camp
Source: PIVETTA, 2011b (map) &, GOOGLE EARTH, 2011 (images)



9. CONCLUSIONS

The first POTC made in partnership between UTFPR and the Brazilian Army was prepared during the first half of 2011, in Curitiba - PR (see figura 4), on the barraks of the 5th Self-Propelled Field Artillery Group (5º GAC AP / *5º Grupo de Artilharia de Campanha Autopropulsado*). During the second half of 2011 work began on three others: two at the School of the Sergeants of the Arms (*Escola de Sargentos das Armas*), in Três Corações, Minas Gerais state and one at the Headquarters of the 5th Military Region — 5th Army Division (*QG 5ªRM-5ªDE / Quartel General da 5ª Região Militar — 5ª Divisão de Exército)*, also in Curitiba. For the second half of 2012 and for 2013, six other are scheduled.

The partnerships and the work necessary for the installation of a POTC contribute to a joint action of institutions, in general public, that results in concrete actions in the areas of Education, Sports and Citizenship. And these actions also can be an effective instrument of social communication to the host institution.

A permanent orienteering training camp provides conditions for collecting data systematically and to organize historical series that can support research projects in the areas of Orienteering, Physical Education, Cartography and Education. For example, it is certain that a POTC contribute to the teaching, but

quantifying such contribution in a Brazilian school (military or civilian), comparing the data and results of different schools and monitoring the number of students who continue to practice orienteering on a regular basis are research works that remain to be done. The POTCs provide technical conditions for these projects.

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