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PUTTING PORTUGUESE GEOSCIENCES ON THE WEB

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Abstract: During the last five years, some portuguese geologists have made a strong effort in putting Geoscience contents on the web, many of them available now to the general public and scholar population. This effort has been made mostly by isolated persons and does not reflect a whole tendency of the national geological community. In order to congregate these isolated initiatives, a new group of the Portuguese Geological Society has been constituted (GEOTIC). In this paper some of the geology web contents available in Portugal will be presented as well as a few of the most interesting starting points for the search of geological information on the Web. The authors consider that the use of ICT contribute to enhance the geoscience culture of the society, a science that is being kept apart from the general public.

Key-words: internet, geosciences, education, natural sciences.

1. Introduction

Geoscience contents have been available on the internet since the first stages of development of this world network. In fact, it was possible to obtain scientific and educational information before the generalisation of GUI software, namely through ftp, archie and gopher servers, as well as thematic newsgroups and mailing lists ([15], [14], [7], [8]). The development of the HTML language has greatly simplified the search of information on the Web, and also introduced a high potential for dealing with graphical information. Considering that photos, maps and graphical models are an important base for the teaching and research in the geosciences field, it is not surprising that the new possibilities made available by the Web have been immediately taken into account. One of the most relevant examples is the site of the United States Geological Survey, which started in 1993, at the time accessed through the first browser developed for the internet (NCSA Mosaic, released in April). The quality and variety of the information available at that site (<http://www.usgs.gov>) can be evaluated by the actual number of page hits; 13.811.770 in March of 2001, which corresponds to a daily average of 445.560 hits. The National Geophysical Data Center is another example of a useful site which started very early in the internet history, and still represents a reference concerning geophysical information and global change (<http://www.ngdc.noaa.gov>).

2. Geosciences resources on the web

At present time, a huge amount of interesting information is available on the internet for the broad field of geosciences, that can be retrieved for educational, environmental and research purposes; most of this

information is in English. Portuguese contents are unfortunately scarce, constraining the use of the internet for educational purposes at pre-university levels; an effort is being made to change this situation in the short term. The following sections describe some of the best starting points for the search of information at an international level and some examples of Portuguese contents on the Web.

2.1 English contents

We have selected a small number of sites that are good starting points for the search of geosciences information on the Web, specially for educational purposes. At <http://www.geologylink.com> one can find a geosciences portal, where daily geological events are listed (earthquakes, volcanic eruptions), and archives of past events are available together with full explicative articles, images and photos. Reports of the last findings, online courses and virtual field trips can also be found on this site. At <http://personal.cmich.edu/~franc1m/homepage.htm> an extensive list of links is presented by topics, with a special emphasis on education; the selection was made on the basis of scientific and graphical quality. Finally, we suggest the home page of Prof. John Butler, from the University of Houston, a specialist on the use of the internet for educational purposes; it is an exceptional starting point for online educational resources (<http://www.uh.edu/~jbutler/professor/butler.html>).

2.2 Portuguese contents

In Portugal, the first seminar regarding the use of ICT in Geology was held in 2000. During this event, several papers were presented, some of them associated to educational purposes ([1], [6], [10], [11], [12], [13]). Before this initiative, some researchers had already discussed the impact of ICT in Natural Sciences teaching, mainly regarding case studies ([2], [3], [4], [5], [9]).

Geopor site

GEOPOR, acronym for "Geology in Portugal", is a portal for Geosciences in Portugal, daily updated and available at <http://www.geopor.pt>. Users are able to make contact with representatives from the national geological institutions, consult thesis and paper abstracts, learn about recent advances in Geology, read geologic news, obtain information about geological scientific events in Portugal, distribute news and enter into discussions with the mailing-list subscribers. There are web pages specially designed for students and teachers (*Geopor na Escola* - "Geopor in the school") with information about university Geology courses, virtual field trips, simple experiments to carry on during classes, a photograph database of some Portuguese geological features, useful links to other sites and an "ask to scientist" section (*Geocábula*). In the last twelve months the number of hits on Geopor site increased from about 7000 to 23000 (fig. 1).

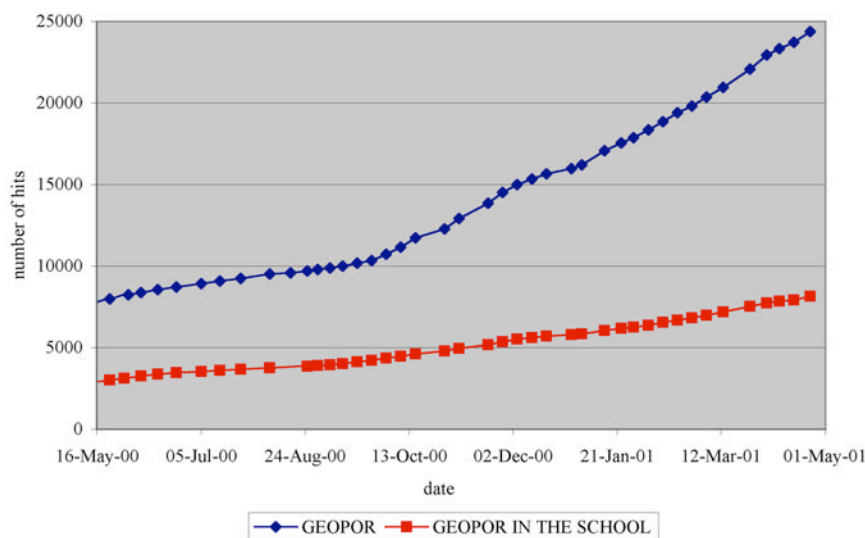


Fig. 1 -Hits on the first page of GEOPOR in the last 12 months.

Visitors can find what they are looking for by using a search engine available on the site. Statistic data (fig. 2) shows that the main interests are on igneous, metamorphic and sedimentary rocks (including classification and geocronology), dinosaurs tracks (Pedreira do Galinha is a remarkable portuguese occurrence), mineralogy, earthquakes, geomorphology and natural hazards (slumps).



Fig. 2 - Frequent key-words used on the GEOPOR search engine.

IGM site

IGM, acronym for "Geological and Mining Institute of Portugal" is the governmental agency responsible for geological issues usually associated to any geological survey. The *IGM* website (<http://www.igm.pt>) provides information about the activities of the Institute. Statistics of mineral and ground water exploitation and related activities can be consulted. Scientific and technical information products (Geologic Maps, Mines Bulletin, Geological Special Papers, Prospecting and Mining Special Papers, Monographic texts) can be found and purchased by an on-line ordering system (the products are sent with a respective invoice by regular mail to a Post Office near the user). GeoAlmanaque is an informal interactive section where geologic pictures, sent and explained by other users, can be observed. There are also on-line pedagogical and scientific articles related to the Earth Sciences.

Electronic publications

In order to congregate individual efforts, a new group inside the Portuguese Geological Society was formed by the end of 1998. This group, called GEOTIC (the acronym for Geology and ICT in Portuguese language) has three main aims:

- i) to enhance the use of ICT in the teaching/learning and diffusion of Earth Sciences;
- ii) to promote the collaboration between other national institutions in order to: a) change experiences and information; b) organise meetings, conferences and seminars; c) develop projects to enhance the production of multimedia contents;

iii) establish contacts with foreign institutions related with ICT.

One of the GEOTIC initiatives was the setting up of a new geosciences journal – e-Terra – only available on the internet. e-Terra is an electronic scientific journal which aims to timely publish research papers on the broad field of Earth Sciences. The new publication is available since the end of 2000 in a new domain (<http://www.e-terra.pt>) and with the ISBN registration number 1645-0388. Concerning copyright, GEOTIC decided that authors are the legitimate owners. Therefore, requests for total or partial reproduction of papers must be arranged directly with the authors, regarding that the proper citation to e-Terra is guaranteed. The scientific character is assured by scientific editors which have the responsibility to submit the manuscripts to referees in order to obtain the final decision about the acceptance for publication. The executive editors, together with GEOTIC leaders, make the proper diffusion among the potential authors and produce the on-line edition.

In Portugal, the edition of geological journals has been undertaken by some universities and professional institutions. Only five of them have some *on-line* information, namely table of contents and abstracts of the latest issues:

“Ciências da Terra” edited by the Universidade Nova de Lisboa

(http://www.dct.fct.unl.pt/Ciencias_da_Terra/RevDCT.html)

“Gaia” published by Universidade de Lisboa

(<http://www.naturae.pt/gaia/archive.html>)

“Memórias e Notícias” edited by the Universidade de Coimbra:

(<http://www.ci.uc.pt/cienterra/memnot/memnot.html>)

“Comunicações do IGM” edited by the Instituto Geológico e Mineiro

(<http://www.igm.pt/document/edicoes.asp>)

“Quaternary Studies” the Journal of the Portuguese Association for Quaternary Research”

(<http://www.terravista.pt/nazare/1167/estquat.htm>)

The editors of these journals are concerned with the high publication costs leading to great difficulties in publishing on a regular basis. e-Terra has some peculiar characteristics what clearly distinguishes it from any paper edition:

- i) Free on-line access – promotes a generalised access to scientific literature;
- ii) Rapid publication – the electronic edition can be much more expedite than the traditional one, making possible the paper to be available just after the acceptance by the scientific editors;
- iii) Peer reviewed - the evaluation of submitted papers follows regular peer review procedures in order to guarantee a high scientific level;
- iv) Multimedia contents – the on-line edition can be much more appropriate for the publication of certain papers allowing: limitless number of colour photographs, integration of animations, sounds and movies, etc.;
- v) PDF downloads – in order to facilitate the paper download, all the published papers will be available in PDF format, easily read and printed with the free Adobe Acrobat Reader software. This PDF version is a true copy of the on-line paper, except for the multimedia contents;
- vi) CD-ROM edition – all the published papers will be distributed by libraries, universities and other institutions in one yearly CD-ROM.

An electronic edition allows the establishment of several other features in order to make scientific publication more dynamic. For instance, after the paper publication the authors can not make any modifications. Nevertheless, the authors can propose new references or give new informations concerning further developments of their research. The authors can also make available scientific data, for instance, results of chemical analysis in ASCII files.

Virtual field trips

The utility of virtual field trips, either for students or general public, is testified by the existence of numerous examples all over the internet. In the Portuguese web, several proposals are available regarding the characterisation of particular areas in order to promote the realisation of real field trips.

Some of the available sites are related to Natural Parks. This is the case of the Peneda-Gerês National Park (<http://www.geira.pt/pnpg>) and Alvão Natural Park (<http://www.utad.geira.pt/pnal/>) Other examples result from local initiatives such as the Virtual Field Trip to the Mirandela Depression (<http://www.dct.uminho.pt/mirandela>) and the Virtual Field Trip to the Setúbal Peninsula (<http://www.dct.fct.unl.pt/CEGUNLP/Cienciaviva.html>).

3. Concluding remarks

Geosciences are well established on the internet since the early years of the Web; many well produced educational and scientific contents can be found in the field of geosciences in English language. Portuguese contents are still scarce, and are due to the isolated work of a few enthusiasts; it is expected that the situation will change in the near future, as a result of a more organised approach through a group of the Geological Society of Portugal, which congregates members from the main Portuguese universities, geosciences institutes and schools.

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References

- [1] Barroso F., Kullberg J.C., “Exemplos de ferramentas de media utilizados nas TIC em Geologia *Projecto GeoMedia*”. *Ciências da Terra*, volume especial IV, 2000, 51-57. (<http://www.geopor.pt/geotic/papers/geomedia.html>)
- [2] Brilha J., Legoinha P., “A Internet e as Ciências da Terra em Portugal - o Geopor como auxiliar da acção educativa”, *Resumos do “VI Encontro Nacional de Docentes - Educação em Ciências da Natureza”*, Universidade de Évora, Évora, 1997. (<http://www.dct.uminho.pt/papers/geopor.html>)
- [3] Brilha J., Legoinha P., “Internet: uma nova estratégia para o Ensino das Ciências da Terra”, *Comunicações do Instituto Geológico e Mineiro*, tomo 84, fasc. 2, 1998, H8-H11. (http://www.dct.uminho.pt/papers/cng_net.html)
- [4] Brilha J., Dias G.T., Mendes A.C., Henriques R., Azevedo I.C., Pereira R., “The geological heritage of the Peneda-Gerês National Park (NW Portugal) and its electronic divulgation”, *Towards the balanced management and conservation of the geological heritage in the new millenium*. D. Barantino, M. Vallejo & E. Gallego (Eds.). Sociedad Geológica de España, 1999, 315-318. (<http://www.dct.uminho.pt/papers/madrid.html>)
- [5] Brilha J., Legoinha P.A., Gomes A., Rodrigues L., “A integração das TIC no ensino - perspectiva actual no domínio das Ciências Naturais”, *Actas da I Conferência Internacional Challenges'99*, Centro de Competência Nónio Século XXI, Braga, 1999, 117-125. (<http://www.dct.uminho.pt/papers/challenges.html>)
- [6] Brilha J., Henriques R.F., “Desenvolvimento de aplicações educativas em Geologia — um exemplo”, *Ciências da Terra*, volume especial IV, 2000, 37-42. (<http://www.geopor.pt/geotic/papers/brilha.html>)
- [7] Buchanan N.L., “Library resources on the Internet”, *Computers & Geosciences*, 21, 1995, 791-798.
- [8] Butler J.C., “An introduction to geoscience education resources on the Internet”, *Computers & Geosciences*, 21, 1995, 817-824.

- [9] Gomes P.A., Brilha J., Dias G.T., Mendes A.C., Azevedo I.C., “Aplicação de novos recursos educativos nas Ciências Naturais - o exemplo do PNPG”, *Resumos da Conferência Nacional “A Ciência nas Escolas e na Vida”*, Instituto Superior Técnico, Lisboa, 1998. (<http://www.dct.uminho.pt/papers/pnpg.html>)
- [10] Henriques C., Ferreira H., Pereira P., Carvalho V., Ferreira N., Pereira E., Futuro A., Leite A., “Os multimédia no ensino da geodinâmica Portuguesa - Projecto PETRA: um recurso em construção”, *Ciências da Terra*, volume especial IV, 2000, 31-36. (<http://www.geopor.pt/geotic/papers/petra.html>)
- [11] Legoinha P., Brilha J., Neves L., “Geologia e Internet em Portugal”, *Ciências da Terra*, volume especial IV, 2000, 9-16. (<http://www.geopor.pt/geotic/papers/legoinha.html>)
- [12] Pereira D.I., Brilha J., “Virtual field trip in the Mirandela region (NE Portugal) - an example of how to enhance Geosciences education”, *Ciências da Terra*, volume especial IV, 2000, 59-61. (<http://www.geopor.pt/geotic/papers/pereira.html>)
- [13] Pereira R., Brilha J., Dias G.T., “Percurso virtuais no Parque Nacional da Peneda-Gerês. Um contributo para o Ensino das Ciências da Terra”, *Ciências da Terra*, volume especial IV, 2000, 43-50. (<http://www.geopor.pt/geotic/papers/rosa.html>)
- [14] Ramshaw R.S., “Geoscience listservers and newsgroups”, *Computers & Geosciences*, 21, 1995, 787-790.
- [15] Thoen B., “Internet resources for the geosciences, with an emphasis on GIS and mapping”, *Computers & Geosciences*, 21, 1995, 779-786.