

Adrien GOUJARD, FOURT M.

GIS Posidonie, OSU Pythéas, Aix Marseille Université, Campus de Luminy, TPR1, case 901, 13288, Marseille, France.

E-mail: adrien.goujard@univ-amu.fr

**THE INFORMATION SYSTEM ZOODEX,
A TOOL FOR THE TREATMENT OF IMAGE DATA**

Abstract

The exploration of dark deepwater zones has until recently been mainly undertaken on the basis of blind sample collection (grabs, dredges, trawls, etc.). Since the sixties, direct observation by diving saucer or submarine has been developed in the Mediterranean. Currently, relatively inaccessible deepwater zones down to 1 000 m depth are increasingly being explored by Remotely Operated Vehicles (ROV) or submarines and the recording of images of the explored sea bottom has become widespread. But processing the data and correlating them is often complex and takes up a great deal of storage space. During the MedSeaCan and CorSeaCan campaigns, carried out by the “Agence des aires marines protégées”, the information system ZOODEX (ZOOlogical Data Exploitation system) was developed for the purpose of optimising biological analysis on images in a systematic and homogeneous way, banking all the data, facilitating their interconnection, consulting and retrieving the information.

Key-words: database, data storage, imagery, submarine canyons, Mediterranean Sea.

Introduction

The exploration campaigns MedSeaCan and CorSeaCan (2008-2012), carried out by the “Agence des aires marines protégées” (French MPA Agency), generated a large amount of heterogeneous and complementary data: low and high definition videos, low and high definition photographs, observation records, samples, GIS (Geographic Information System) layers, geophysical data. The aim of the data processing is to enable biological and ecological analysis and to provide the means to extract from them the selected data. To achieve that, the ZOODEX information system (Fourt & Goujard, 2013) was developed by GIS Posidonie.

Materials and methods

The ZOODEX system was originally designed to process the underwater images from the MedSeaCan and CorSeaCan campaigns. At the core of the system, an Access data base (Microsoft Office 2010) was designed for the purpose of integrating, processing, consulting and extracting information. The system is coupled with a GIS to allow the geolocalisation of the observations (Fourt & Goujard, 2012). The exploration campaigns involved 287 dives, or 550 hours of LD video footage, 18 hours of HD video footage, 21 900 photos and 18 850 events observed in real time. During the derushing of the footage, unique events containing various variables are created chronologically. These variables concern the identification of a species, the number of individuals, the nature of the substrate, the presence of a particular facies, qualification of the bioturbation, of the biodiversity, the presence of waste, of plankton, of euphausiaceans, the collection of a sample, comments, traces left by trawling, etc., and also the time, depth and GPS position of the event. By means of the interconnection of the data, each event is linked to a dive, a video sequence and one or several photographs (where available), which offers the possibility of illustrating the events. A data input form has been specially designed to make the derushing process more user-friendly (Fig. 1).

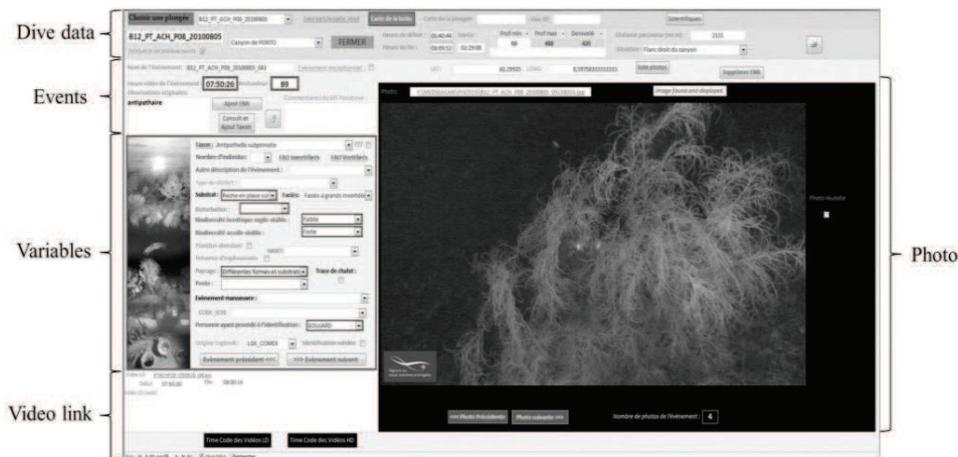


Fig. 1 : ZOODEX tool: input form for the treatment of image data (Fourt & Goujard, 2013).

Results

At the end of processing, 26 500 events had been created. From the database, unique events were catalogued in a logbook, that is a chronological listing of all the events of a dive. Each event is characterised by its variables and its GPS position, which provides a basis for mapping them along the dive route. In addition, on the basis of species identification, performed with the support of specialists and the samples collected, an image database of deepwater species was developed. Finally, several inputs are possible at several scales for extraction or consultation of the data: by taxon, by geographical localisation (dive, canyon), by depth, etc.

Discussion and conclusions

The ZOODEX information system is designed for the systematic and homogeneous processing of image data, in particular along a dive route, the banking of the full set of data, the consultation and retrieval of the information. In addition, it is a tool that facilitates the reference state and the monitoring of a site, enabling temporal and spatial comparisons. Finally, the architecture of the database is modifiable according to the specific requirements of the study and may be adapted for different explorations and biological monitoring operations.

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