THE DEEP SEA SPY SYSTEM

Building a marine images annotation database from participative science
OVERVIEW

Introduction

The annotation system – *Deep Sea Spy*

The data management

The query system – *DSS Request*

Perspectives
Introduction

Seafloor observatories

EMS0-Azores 2010-...

Mid-Atlantic Ridge
Tour Eiffel, Lucky Strike (1700 m)

Ocean Networks Canada 2011-...

Juan de Fuca Ridge
Grotto, Main Endeavour (2200 m)

Imagery
2 min/6 hrs/365 days

TEMPO ecological module

Imagery
20 min/4 hrs/365 days
Annotate visible inhabitants

- Pycnogonids
- Whelk
- Tubeworms
- Fish
- Gastropods
- Scale worms
Introduction

Imagery archive

780 video hours/year...

> 5000 video hours (> 10 Tb)

20 work hours to annotate 1 video hour

...more than 11 years to annotate the present whole dataset (which increases every year)!

To proceed such a video archive scientists need the help of citizen
Development of a citizen science project

**Introduction**

- **Image extractions from videos**
- **Real-time video acquisition**
- **Yearly video acquisition**
- **ONC data center**
- **Ifremer server**
- **Online interface: image annotations**
- **Project website**
  - **Online forum**
- **Archiving and management of images annotations and information**
- **Ifremer database**
- **Web-based**
- **Interface for data mining**
  - **Web-based/intranet**
A web-based application to annotate species

- A web-based software for manual image processing that will help gather useful information for scientists
- A fun and engaging interface to raise awareness among the general public to deep-sea ecosystems

- Available online (internet)
- Built as a game
- Tutorial
- Levels (and virtual rewards)
- Data stored in pixels
Development of a citizen science project

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  - Online forum
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Web-based

- Ifremer database
- Ifremer server
- ONC data center
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The data management

Citizen Science & Imagery Data

- **Taxonomy**
  Ifremer/WorMS

- **Parameters**
  SeaDataNet P01 vocabulary library

LGPIXEL1
Length (in digital image) of biological entity specified elsewhere

Ifremer central database
Development of a citizen science project

Image extractions from videos

Real-time video acquisition
Yearly video acquisition

Ifremer server

ONC data center

Online interface: image annotations

Project website
Online forum

Web-based

Ifremer database

Archiving and management of images annotations and information

Web-based/intranet

Interface for data mining

The query system – DSS Request
A web-based application to search DSS data

Selection:
- Mission
- Observatory
- Time
- Species

CSV file export

R import & further statistical analyses

(habitats mapping, ecological studies...)

The query system – DSS Request
• Thanks to the resulting Deep Sea Spy database, help improving the algorithms necessary to produce accurate automated species detection in imagery using a machine learning approach

• Share the system with other Ifremer imagery data types (coastal environment, fisheries...)

• Take advantage of Elasticsearch features to enhance searching and exploring the Deep Sea Spy dataset (through DSS Request)

• Aim at later uptake of imagery data by an international data infrastructure?
Thank you to all the colleagues who contributed to this project...

... and thank you all for your attention!