



# Mission planning for an AUV with a practical example

## Ocean Infinity - The search of MH370

NOELE Elodie

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# Overview

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# The Flight MH370

## The MH370 disappearance

- Malaysia Airlines international flight from Kuala Lumpur to Beijing
- Boeing 777-200ER carrying 239 people
- Reported missing since March 8, 2014
- Initial hypothesis of the Malaysian authorities : disappearance in the south of the Indian Ocean



FIGURE – Boeing 777-200ER of Malaysia Airlines (Wikipédia.fr)

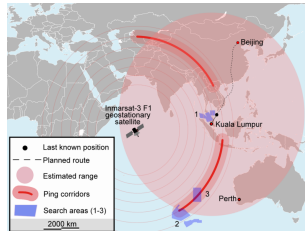


FIGURE – Surveying area for the flight MH370 (Wikipédia.fr)

# Ocean Infinity

## The Ocean Infinity Company

- American Seabed Exploration Company
- Active participation in the search for the missing flight from January to June at the request of the Malaysian government
- Deployment of 8 AUVs to explore nearly 120,000 square meters of seabed
- Use of a super cargo ship *Seabed Constructor* including a maintenance room to repair defective robots



FIGURE – Ocean Infinity



FIGURE – Ocean Infinity AUV Deployment Cargo *Seabed Constructor*

# Hugin AUV Sensors

## Presentation of the AUV sensors

- Turbidity sensor.
- Supports a depth between 0 and 6000 meters
- Maximum speed of 5 knots
- Five sonars : two lateral, two front and one very low frequency sonar (sub-bottom profiler) to probe the different layers of the seabed
- Multi-beam echosounder
- Possibility of using these sensors at low frequency and low depth or at high frequency and high depth
- HD camera
- CTD sensor
- Self-compensating Magnetometer



FIGURE – Hugin AUV



FIGURE – Map of the sea bed

# Search areas

## Search areas

- Breakdown of the search area into 4 sub-areas
- Exploration of each area over an average of 1 to 2 weeks
- Deployment of 4 to 8 AUVs depending on the size of the area
- Complexity of exploring certain areas due to the terrain

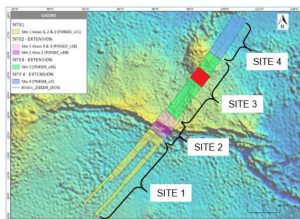


FIGURE – Global search area

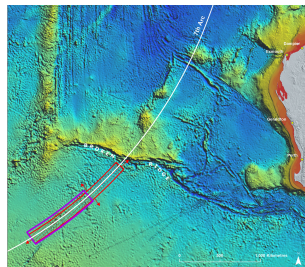


FIGURE – Breakdown of the global search area into sub-areas

# AUV deployment

## AUV deployment

- Deployment of each AUV in a given area and depth.
- Exploration of each area over an average of 1 to 2 weeks
- Deployment of 4 to 8 AUVs depending on the size of the area
- Complexity of exploring certain areas due to the terrain

# Mission for each AUV

## Mission for each AUV

- Exploring a predefined area for AUV
- No human action on AUV, mission carried out autonomously.
- At the end of its mission, the AUV resurfaces near the cargo ship to be recovered



# Results processing

## Results processing

- Real-time data recovery via satellite communication.
- Definition of ROI (Region Of Interest) thanks to photographs taken by AUVs.
- Study of these ROIs to determine their nature, generally of a geological type

# Search results

## Mission result

- After three months of searching, the result was unsuccessful. nearly 120,000 square meters of seabed mapping have been donated free of charge to the international scientific community

# Conclusion

## Conclusion

- Mission with significant resources
- Implementation of several AUVs at the same time
- Possibility of applying some AUV pipes to Kopadia's pipe

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