



[State estimation with fleeting
data]

> Plan

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Introduction

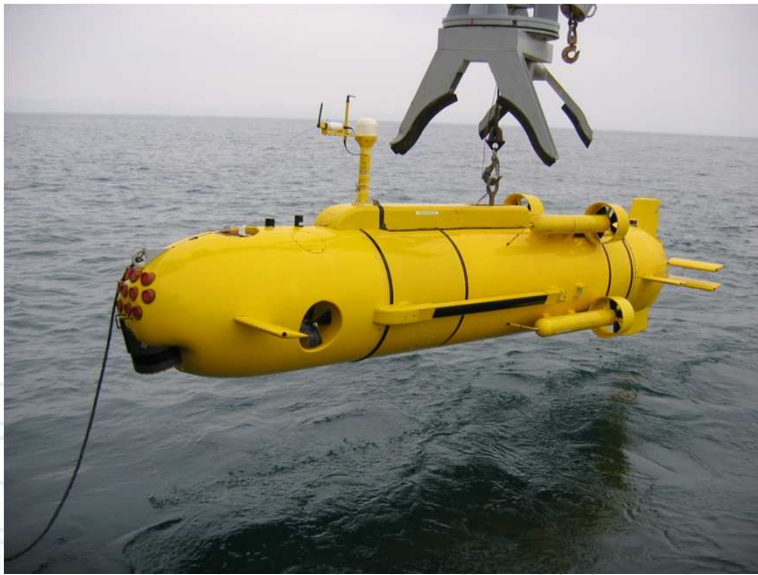
Introduction

- Context: offline SLAM for submarine robots using interval arithmetic and constraint propagation (without outliers)



Introduction

- Redermor and Daurade, submarine robots of the GESMA

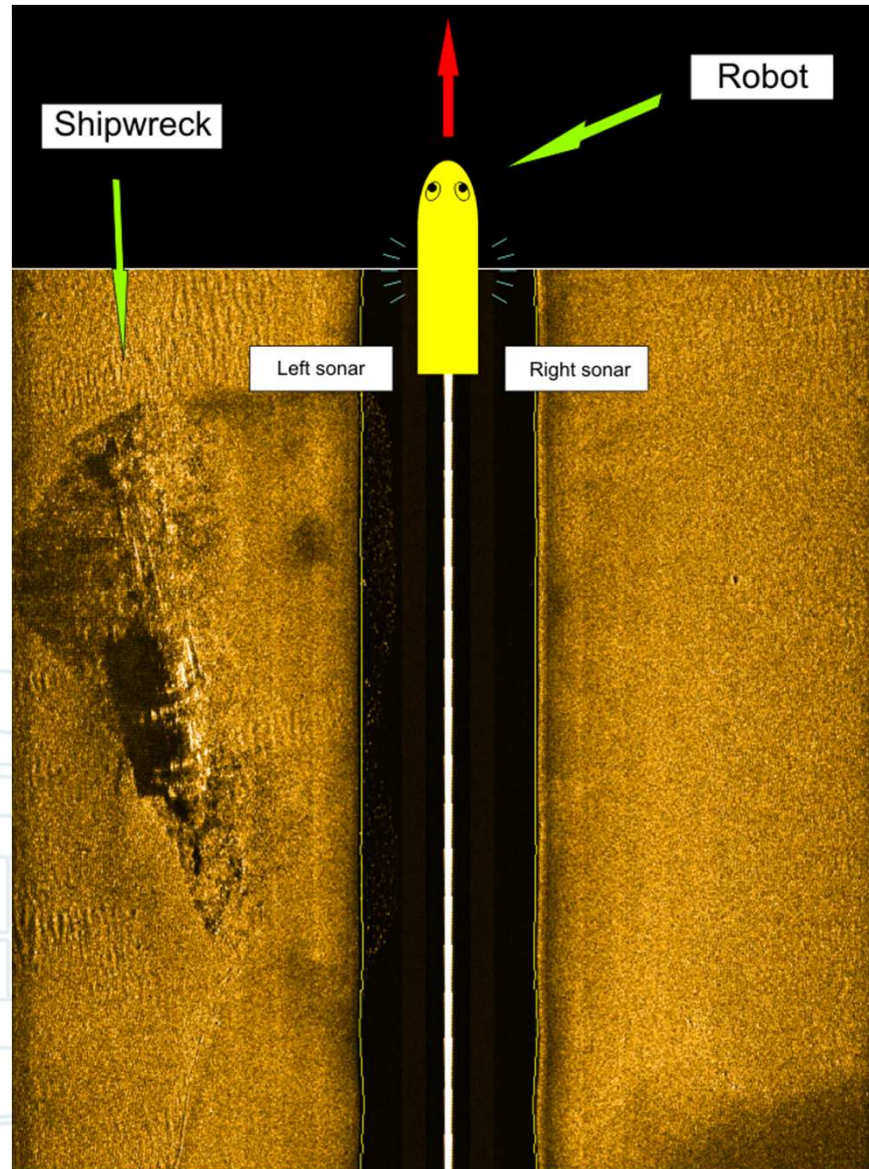


Introduction

- Sensors of the submarines :
 - GPS (position at the surface)
 - DVL (speed and altitude)
 - IMU (Euler angles and rotating speeds)
 - Pressure sensor (depth)
 - Lateral sonar

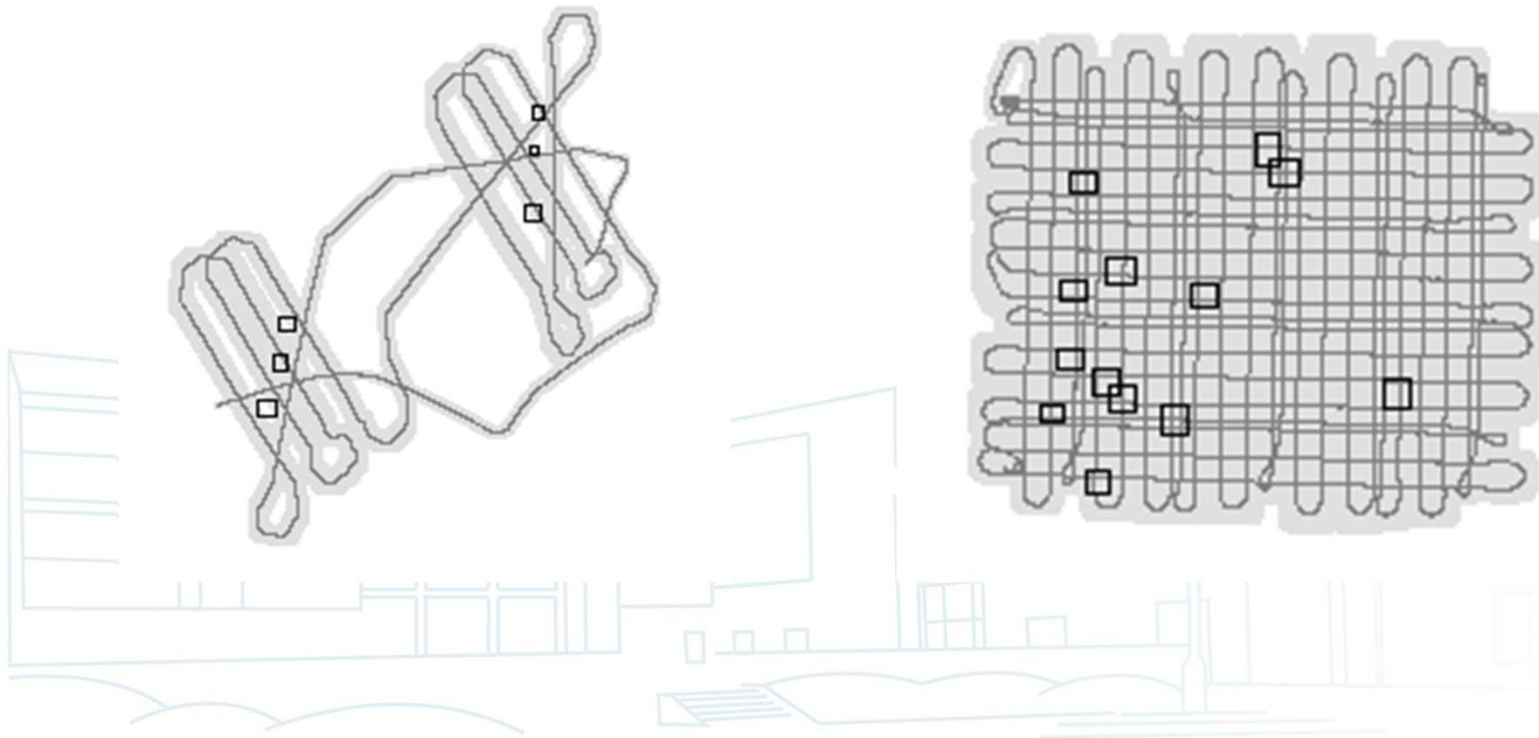


Introduction



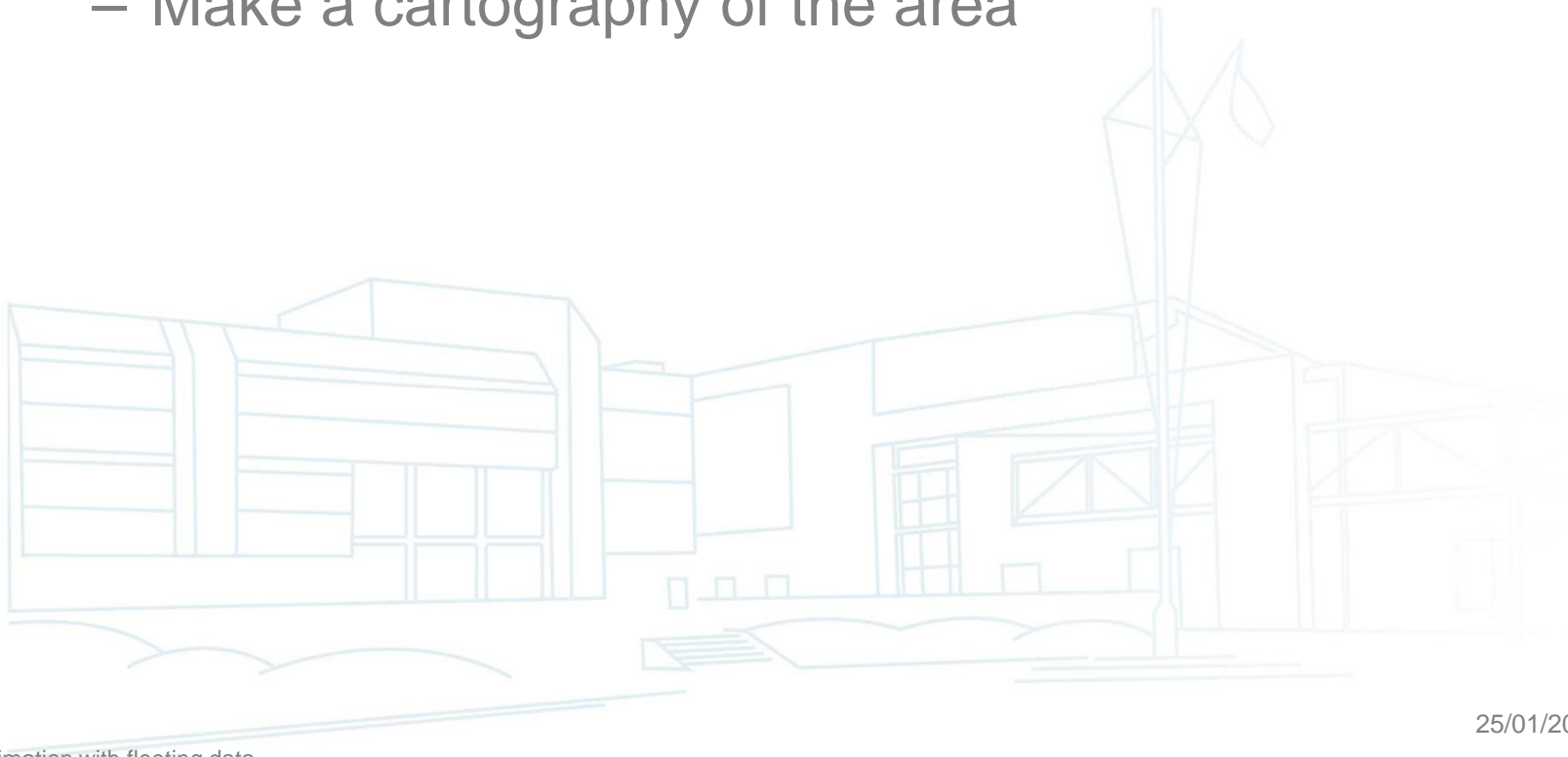
Introduction

- Experiments with marks in the sea



Introduction

- Goals:
 - Get an envelope for the trajectory of the robot
 - Compute sets which contain marks
 - Make a cartography of the area



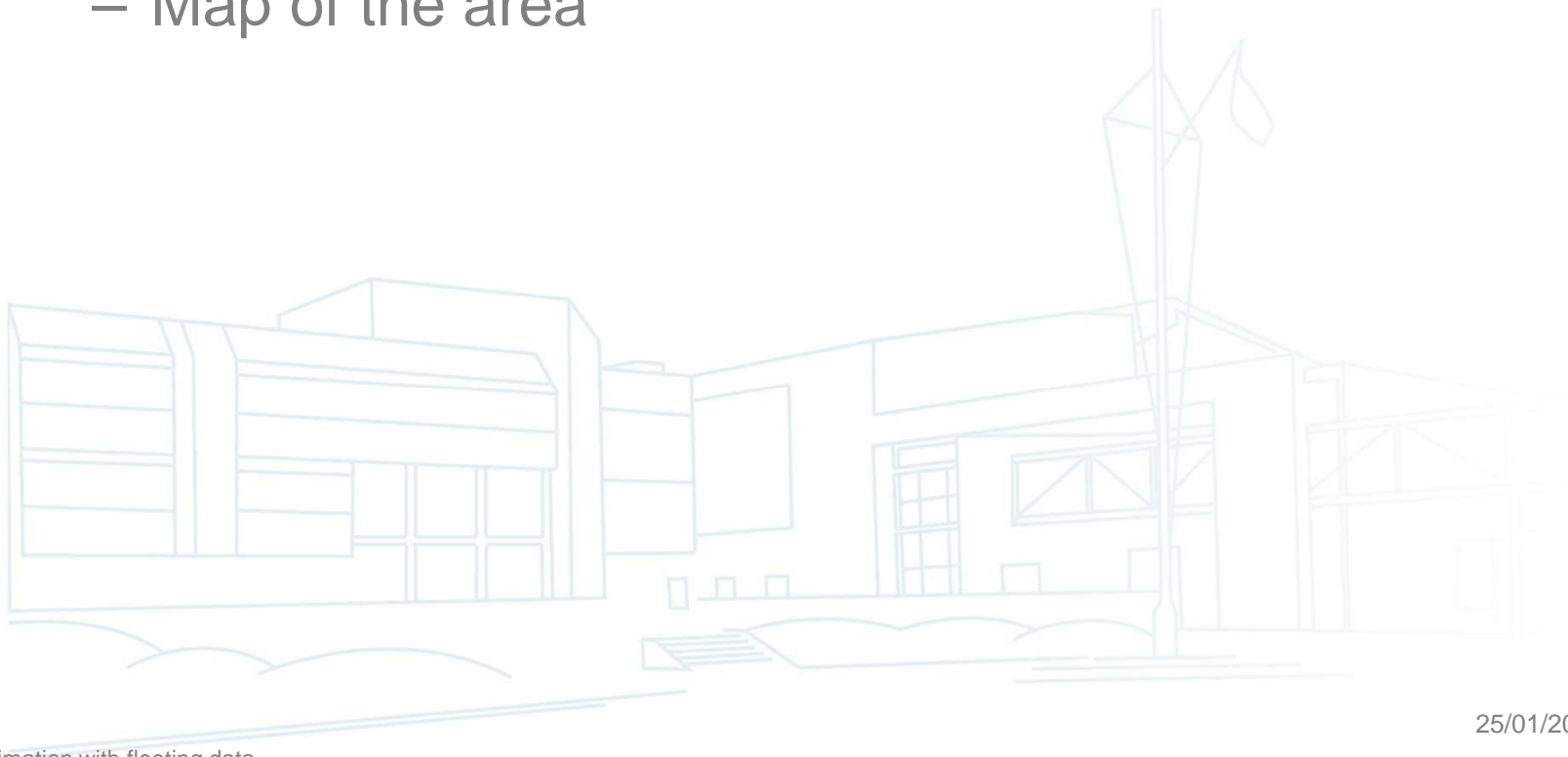
Introduction

- Input:
 - Navigation data of the submarine (Euler angles, depth, altitude, speed, some GPS positions)
 - Marks detections on the sonar image (distance)
 - Raw sonar image
 - Time and max error for each data



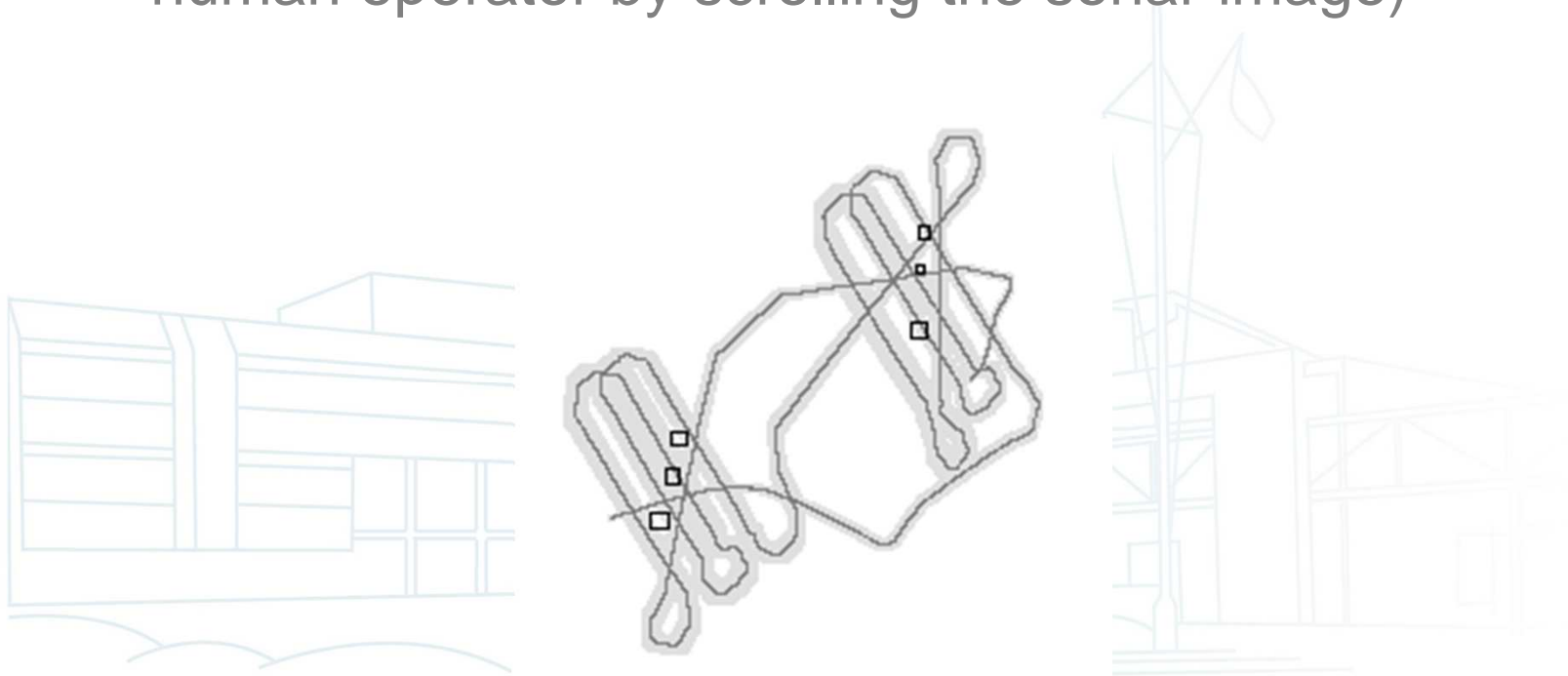
Introduction

- Output:
 - Trajectory (envelope and center)
 - Position of marks in the sea (envelope and center)
 - Map of the area



Introduction

- What has already been done:
 - Compute an envelope for the trajectory of the robot
 - Compute sets which contain marks (detected by a human operator by scrolling the sonar image)

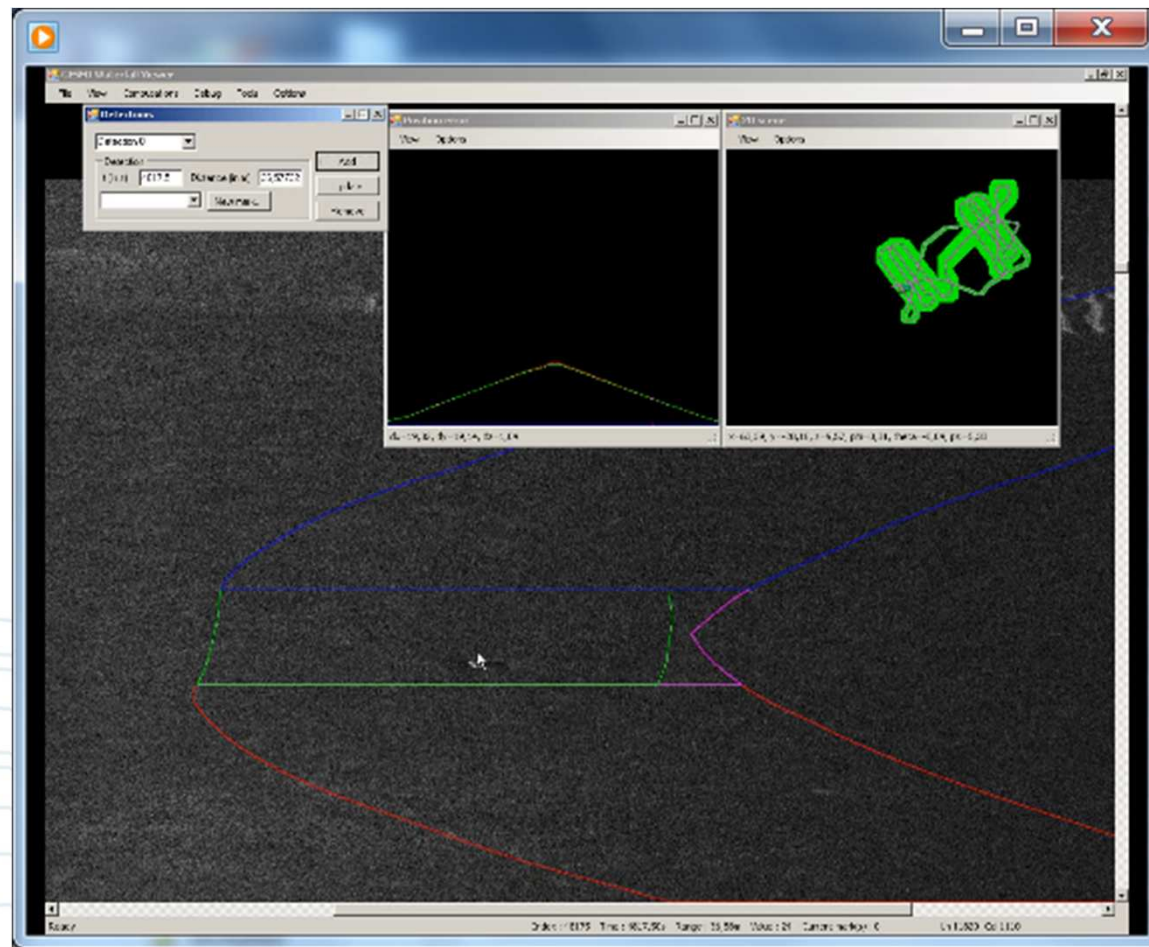


Introduction

- What has already been done:
 - Generate a reconstitution of the sonar image showing the estimated position of the marks on it (predicted stain)
 - Help the human operator for the detection/identification of the marks
 - Check the consistency of input data

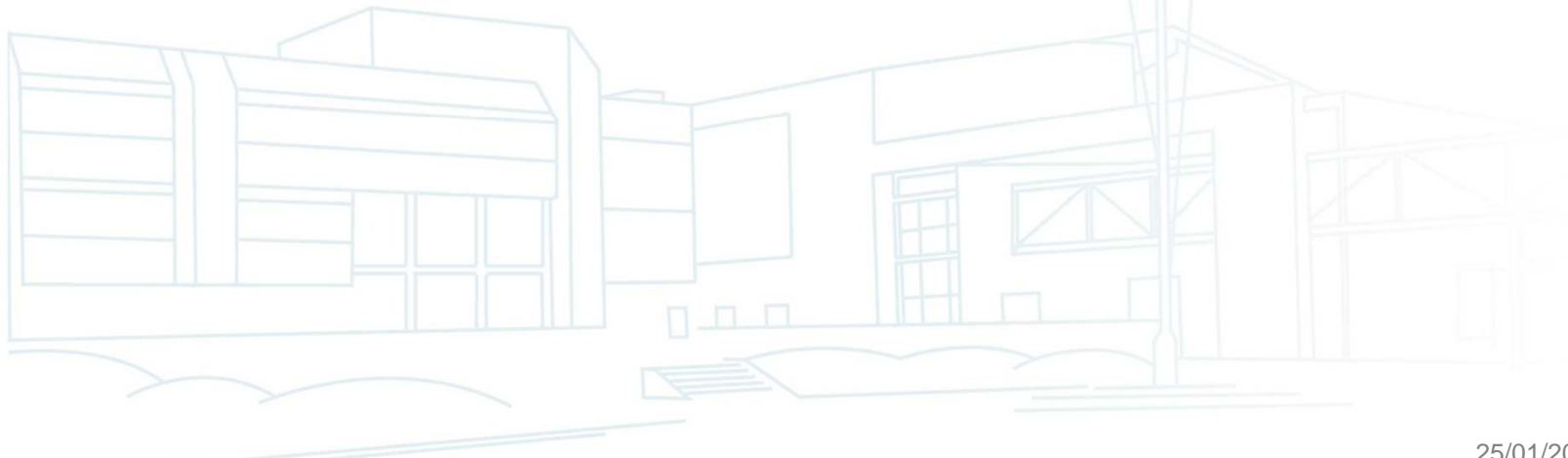


Introduction

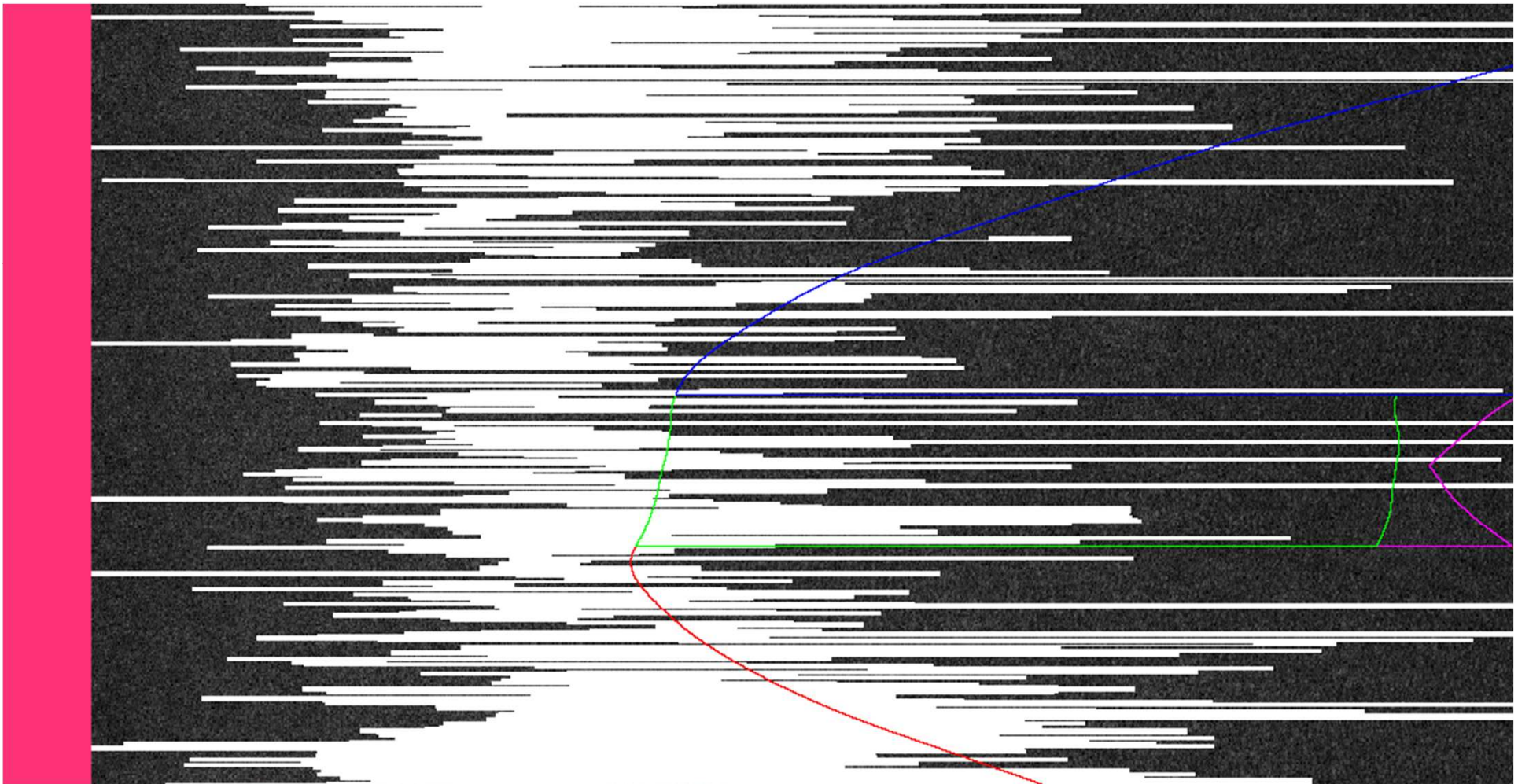


Introduction

- What could be done:
 - Use a little bit more the sonar image to eliminate zones where we are sure there is no object (no bright points)
 - Should improve the precision of the positions estimation
 - Could help the user to see which parts of the sonar data might contain objects



Introduction



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 - Use a little bit more the sonar image to eliminate zones where we are sure there is no object (no bright points)
 - Should improve the precision of the positions estimation
 - Could help the user to see which parts of the sonar data might contain objects
 - Generate a cartography of the area using sonar data





Approach used: fleeting data and tubes

Demo

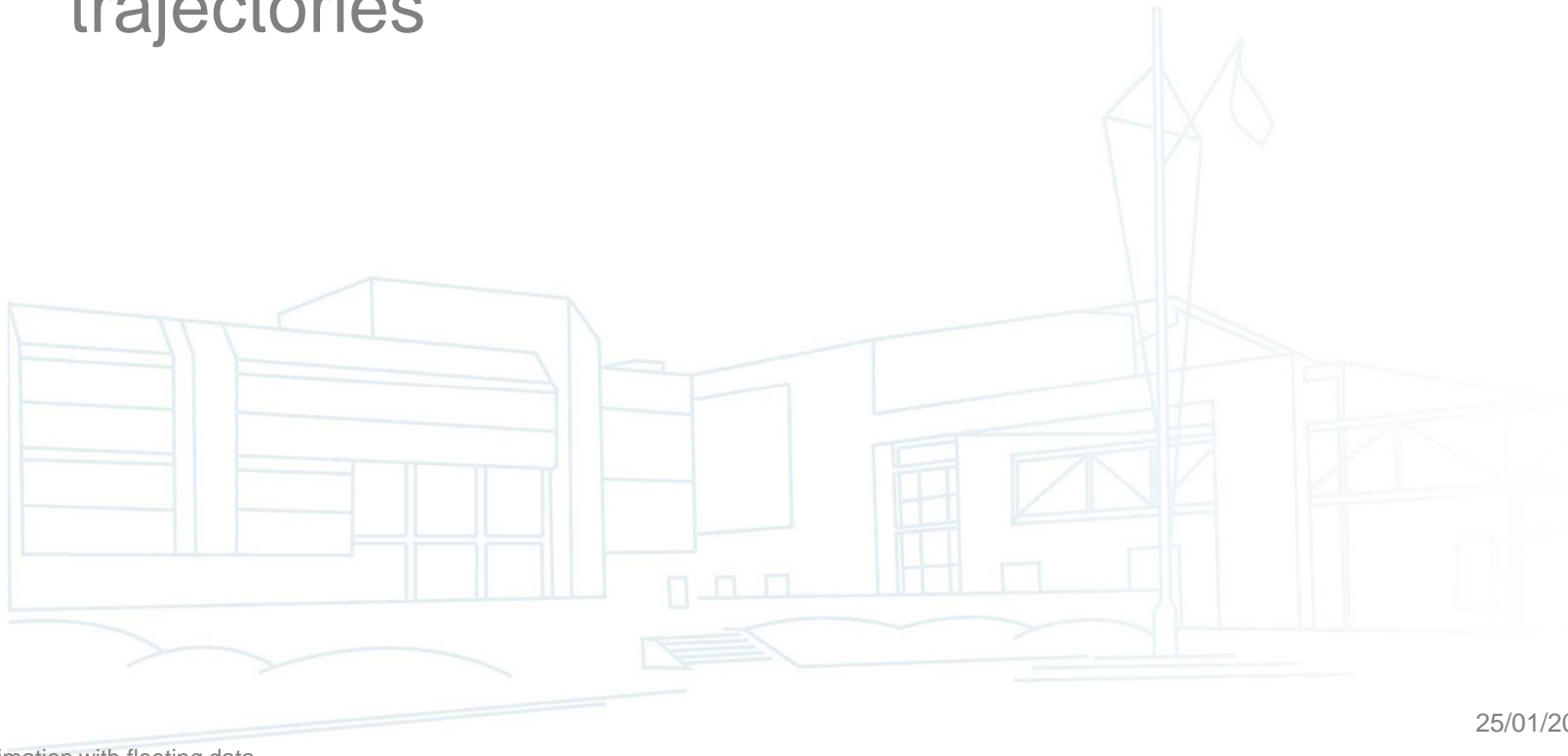


Conclusion



Conclusion

- We can use the sonar/telemetric data to improve the estimation of the trajectory
- Tubes are well suited to deal with estimation of trajectories



Conclusion

- Prospects :
 - Do SLAM instead of localization
 - Apply the method on real sonar data of submarines

