Multi-segmentation of sonar images using belief function theory

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e.g

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1 Introduction

e.g

2.1 Texture analysis

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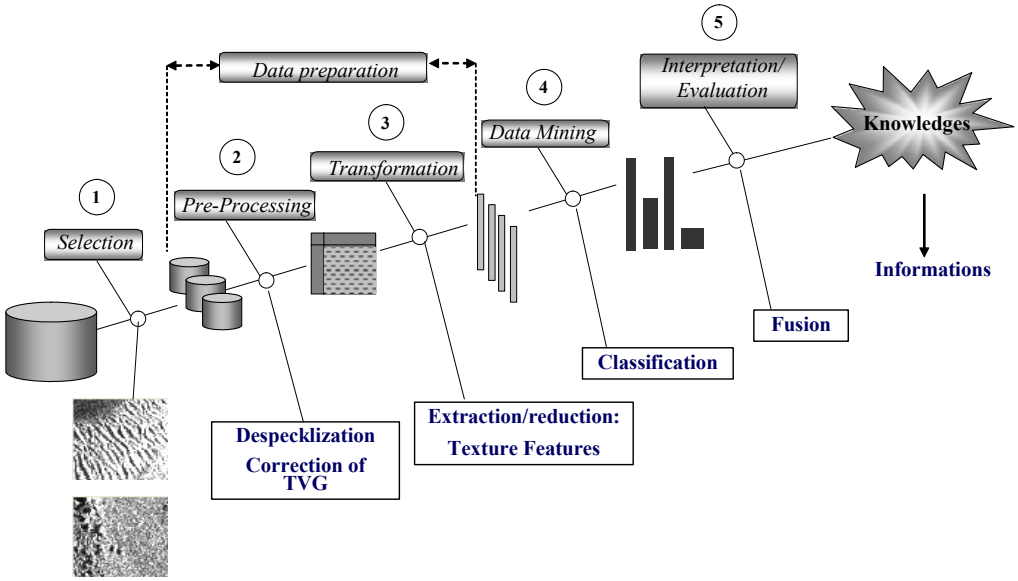
2 Method

$$Homogeneity = \sum_{i=}^{N_g-} \sum_{j=}^{N_g-} P \quad i \;\; j$$

$$Contrast = \sum_{i=}^{N_g-} \sum_{j=}^{N_g-} i - j \quad P \; i \;\; j$$

$$Correlation = \sum_{i=}^{N_g-} \sum_{j=}^{N_g-} \frac{ijP \; i \;\; j \;\; - \mu_x \mu_y}{\sigma_x \sigma_y}$$



$$Entropy = -\sum_{i=}^{N_g -}\sum_{j=}^{N_g -} P\ i\ j \qquad P\ i\ j$$

$$Directivity = \sum_{i=}^{N_g -} P\ i\ i$$

$$Uniformity = \sum_{i=}^{N_g -} P \quad i\ i$$

N_g $P\ i\ j$ i

$j,\ \mu_x\ \mu_y$ P

$\sigma_x\ \sigma_y$

$$\Sigma \qquad \mu_c = \frac{}{n_c}\sum_{k=}^{n_c} x_k$$

3.1 Fusion

3 Classification

D D

$D \quad C \qquad C_n$

m_j

D

$$\sum_{A \subseteq D} m_j\ A\ =$$

$$d_{Mah}\ x\ \mu_c\ =\ x-\mu_c\ \ \Sigma^{-}\ \ x-\mu_c$$

$$\begin{cases} m_j^i(\{C_i\})(x) = \alpha_{ij} R_j p\ q_j\ \ C_i \qquad + R_j p\ q_j\ \ C_i \\ m_j^i(\{C_i\}^c)(x) = \alpha_{ij} \qquad + R_j p\ q_j\ \ C_i \\ m_j^i(D)(x) = \ -\alpha_{ij} \end{cases}$$

q_j j

α_{ij}

j i R_j

$$R_j = \quad {}_{q_j\ i} \quad p\ q_j \quad C_i \quad -$$

$$p\ q_j \quad C_i$$

$$m\ A = \frac{}{-k} \sum_{B \cap B = A \neq} m\ B\ m\ B$$

$k\ m\ \varnothing$

$$betP\ A = \sum_{X \in {}^{D}\ X \neq} \frac{X \cap A}{X} m\ X$$

4 Experimental results

4.1 Sonar image data base

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cf.

la Grande Vaille

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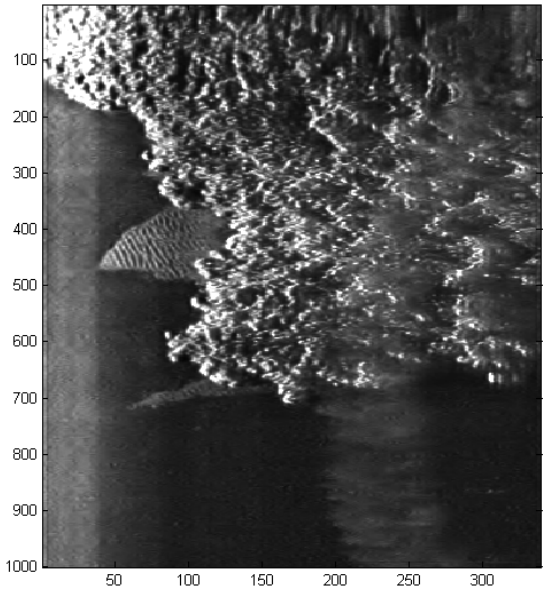
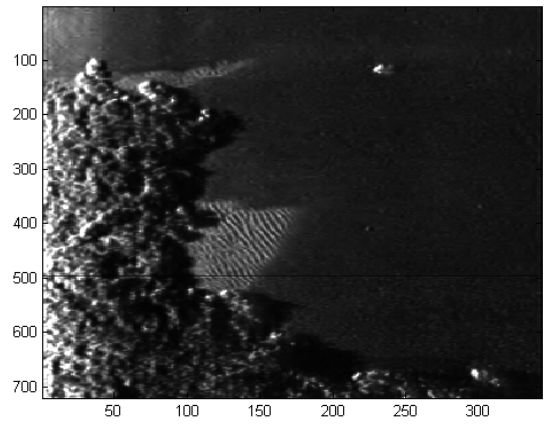
cartographie de la couverture du fond marin par fusion multi capteurs





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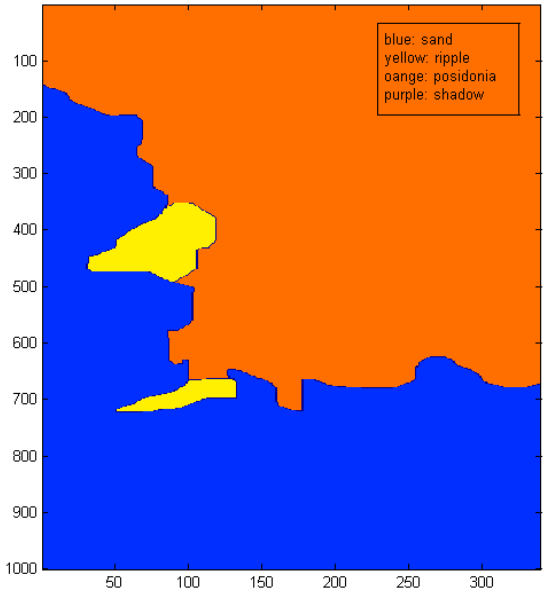
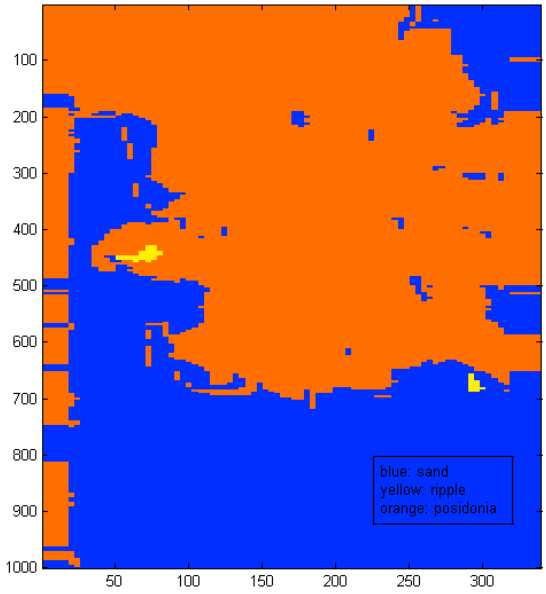
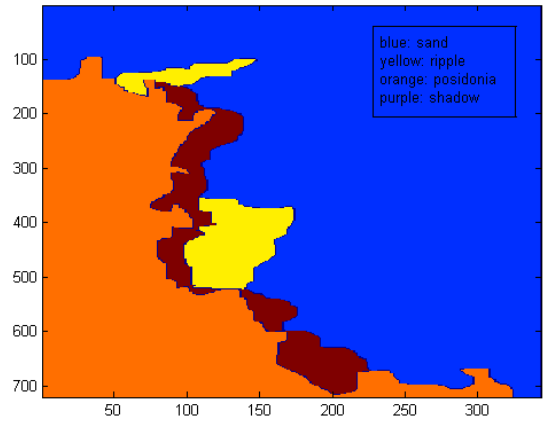
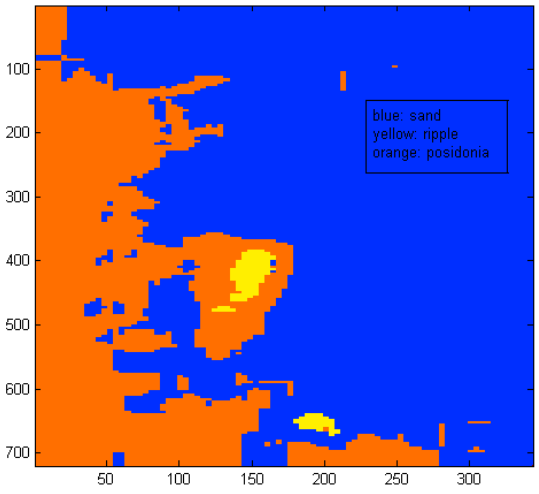
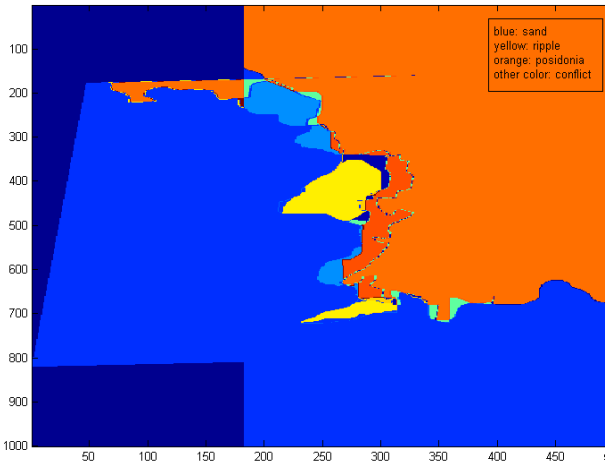
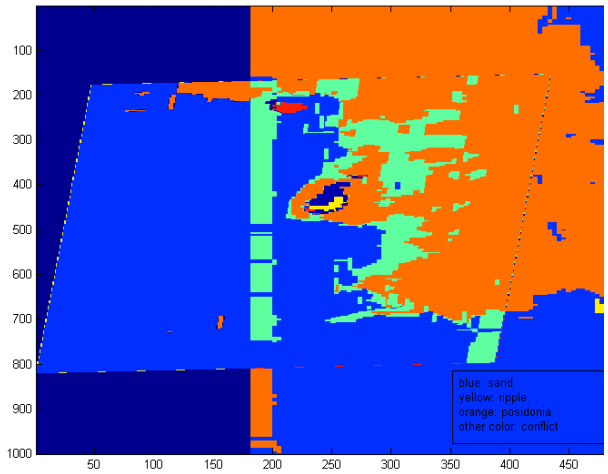

blue: sand
yellow: ripple
oange: posidonia
purple: shadow

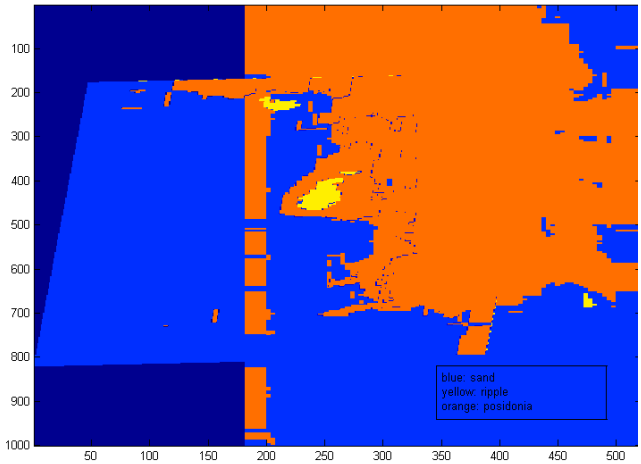

blue: sand
yellow: ripple
orange: posidonia


blue: sand
yellow: ripple
orange: posidonia
purple: shadow


blue: sand
yellow: ripple
orange: posidonia


blue: sand
yellow: ripple
orange: posidonia
other color: conflict





5 Conclusion

References