Mapping *Posidonia oceanica* meadows through time
A story of precision, evaluation and fragmentation

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Mediterranean Seagrass Workshop

May 2015

STARESO · Université de Liège · CART'O

Framework

OBJECTIVES: investigate the **fragmentation** of *P. oceanica* meadows through cartographies while keeping in mind **improvements in data acquisition** between maps

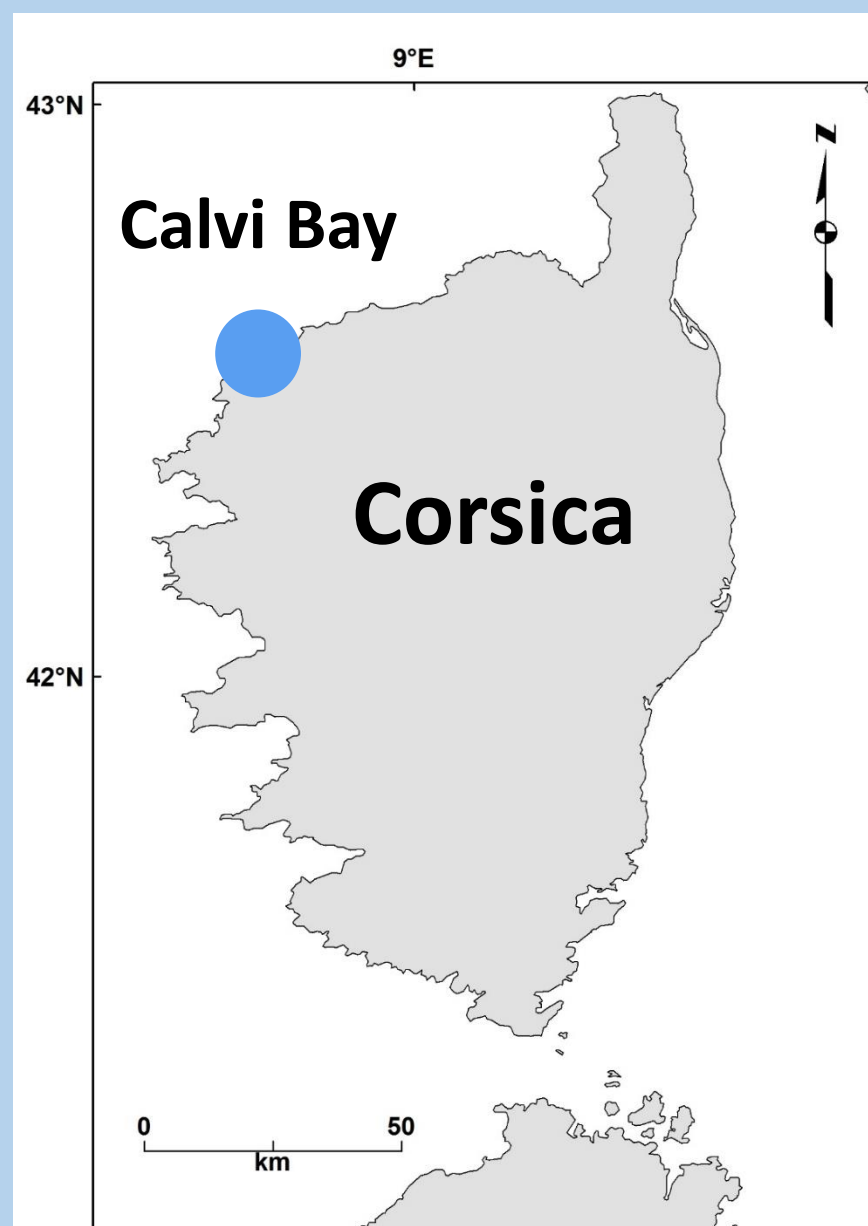**STUDY SITE**: **Calvi Bay** (**Fig. 1**) , Corsica Island (France)

Figure 1: location of the study site

METHOD: aerial photographs, side scan sonar (**Fig. 2**), scuba diving identification, bathymetry, Geographical Information System (GIS), Computer-aided design (CAD)

Figure 2: side scan sonar

Precision

A great improvement of images resolution in a short time (**Fig. 3**). **1.6 X better within 5 years** for aerial photographs and **6 X better within 8 years** for side scan sonar images

a) Year: 2002 Pixel size: 0.8 m
b) Year: 2007 Pixel size: 0.5 m
c) Year: 2002 Pixel size: 3 m
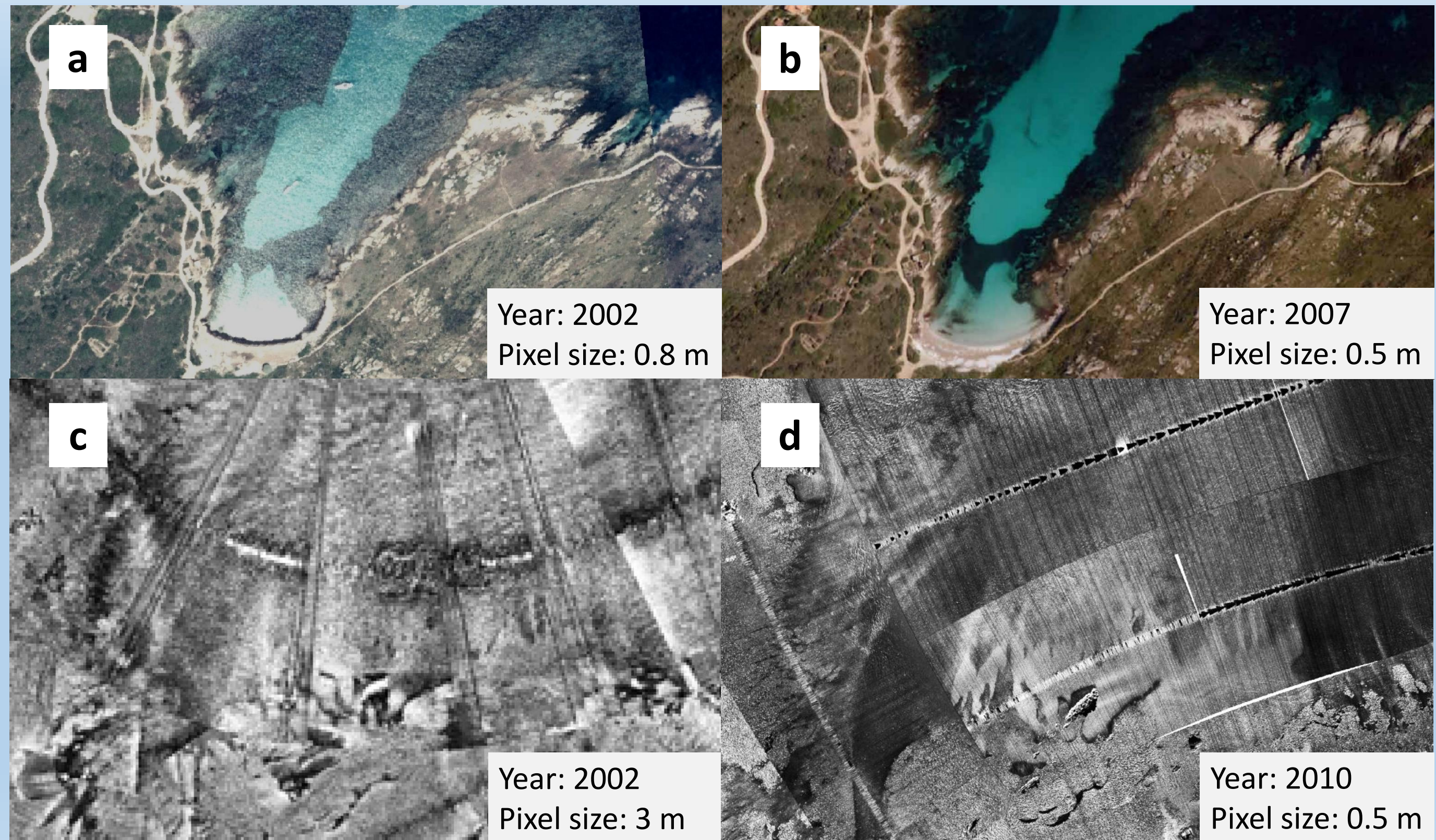d) Year: 2010 Pixel size: 0.5 m

Figure 3: **a)** and **b)** improvement of aerial photographs resolution from Alga Bay (Western part of Calvi Bay); **c)** and **d)** improvement of side scan sonar images from the Western part of Calvi Bay

Evaluation

Table 1: advantages and drawbacks of computer-aided design and geospatial imagery analysis software for the mapping of marine habitats

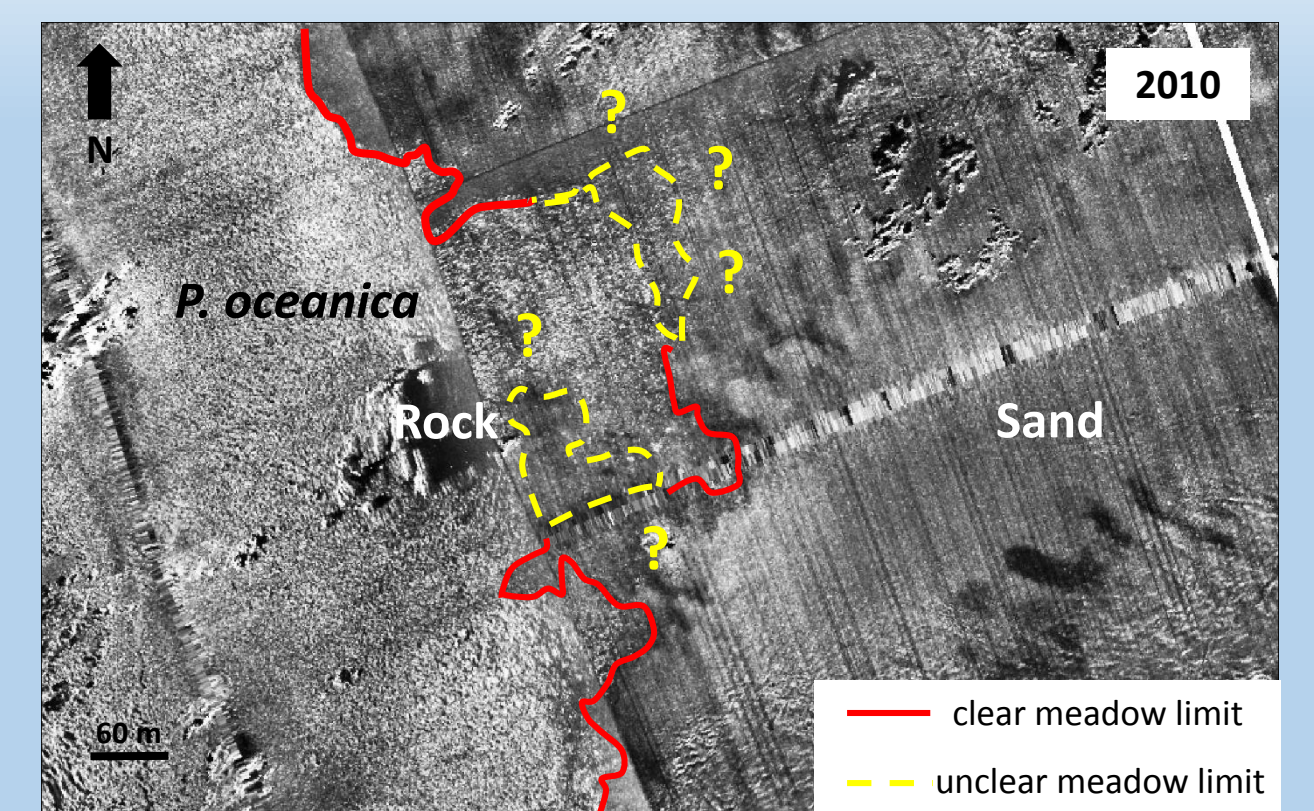| Method	Advantages	Drawbacks
Computer-aided design (CAD)	• Simultaneous consideration of several layers of information • Consideration of the geomorphological environment • Great analysis precision • Quick manual modifications	• Requires a lot of time in time frameworks • Subjective method
Geospatial imagery analysis software	• Saving in objectivity • Very efficient for some classes of habitat	• Manual corrections are still required • Complex to configure when numerous classes of habitat • No simultaneous consideration of several layers of information

The final maps of *P. oceanica* meadows obtained are strongly linked to the **method of interpretation** (**Fig. 4** and **Tab. 1**)

Figure 4: issues in side scan sonar images interpretation and identifying meadow limits via CAD

Fragmentation

A clear **regression** of *P. oceanica* meadows is observed in the bay (**Fig. 5**) and especially near the **lower limit** (**Tab. 2**). **The extent of fragmentation** within such a short period cannot be explained by natural or anthropogenic phenomenon given the **low intensity** of human activities in the bay

Table 2: Percentage of *P. oceanica* meadows coverage according to the maps and bathymetric sections

Year	0-10 m	11-20 m	21-30 m	31-40 m
1994/1996	20.8	54.8	85.7	53.5
2002	22.1	54.6	76.3	24.4
2007/2010	19.6	50.4	61.5	14.3

a) 6.7 km² — 1994/1996
b) 5.97 km² — 2002
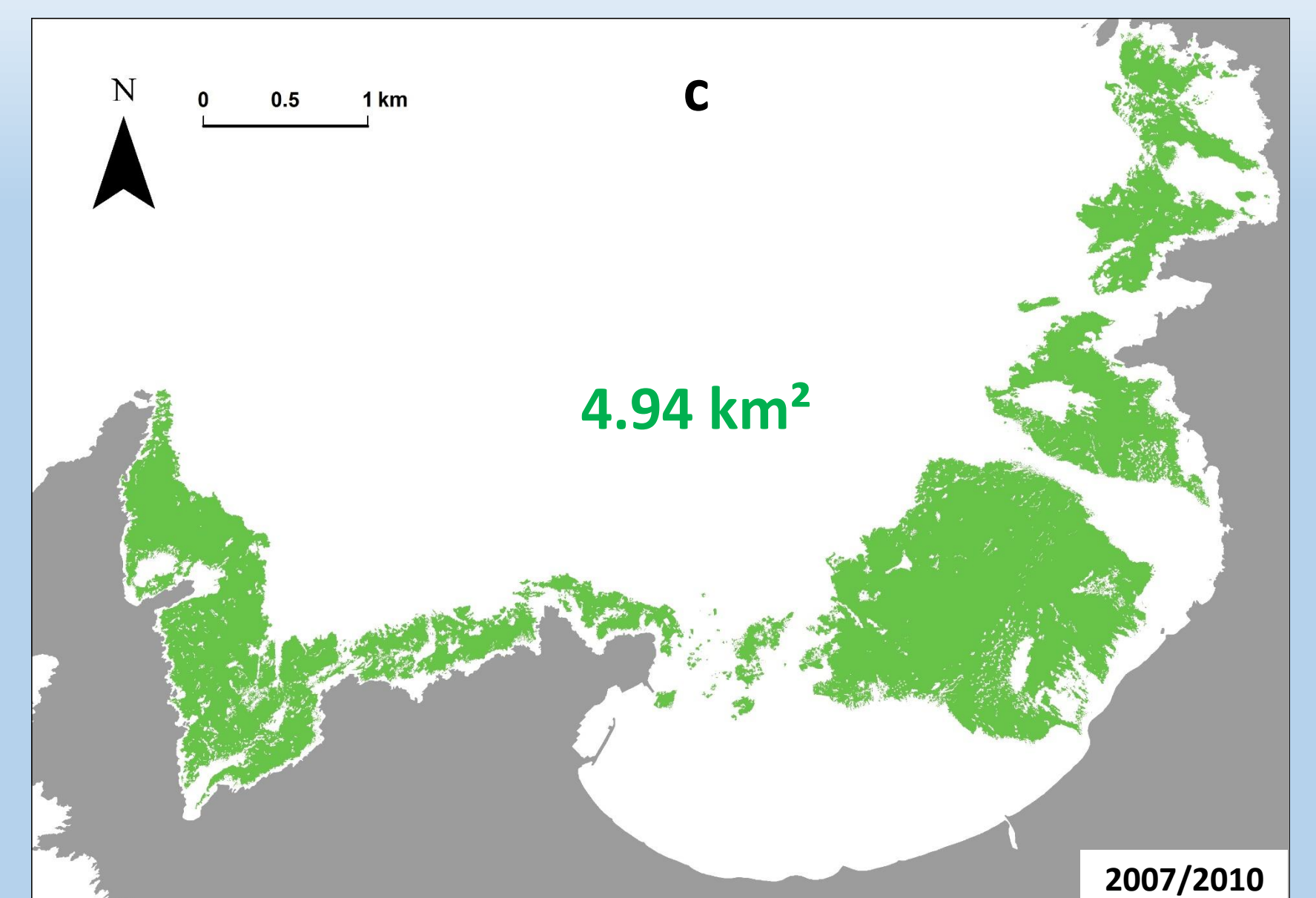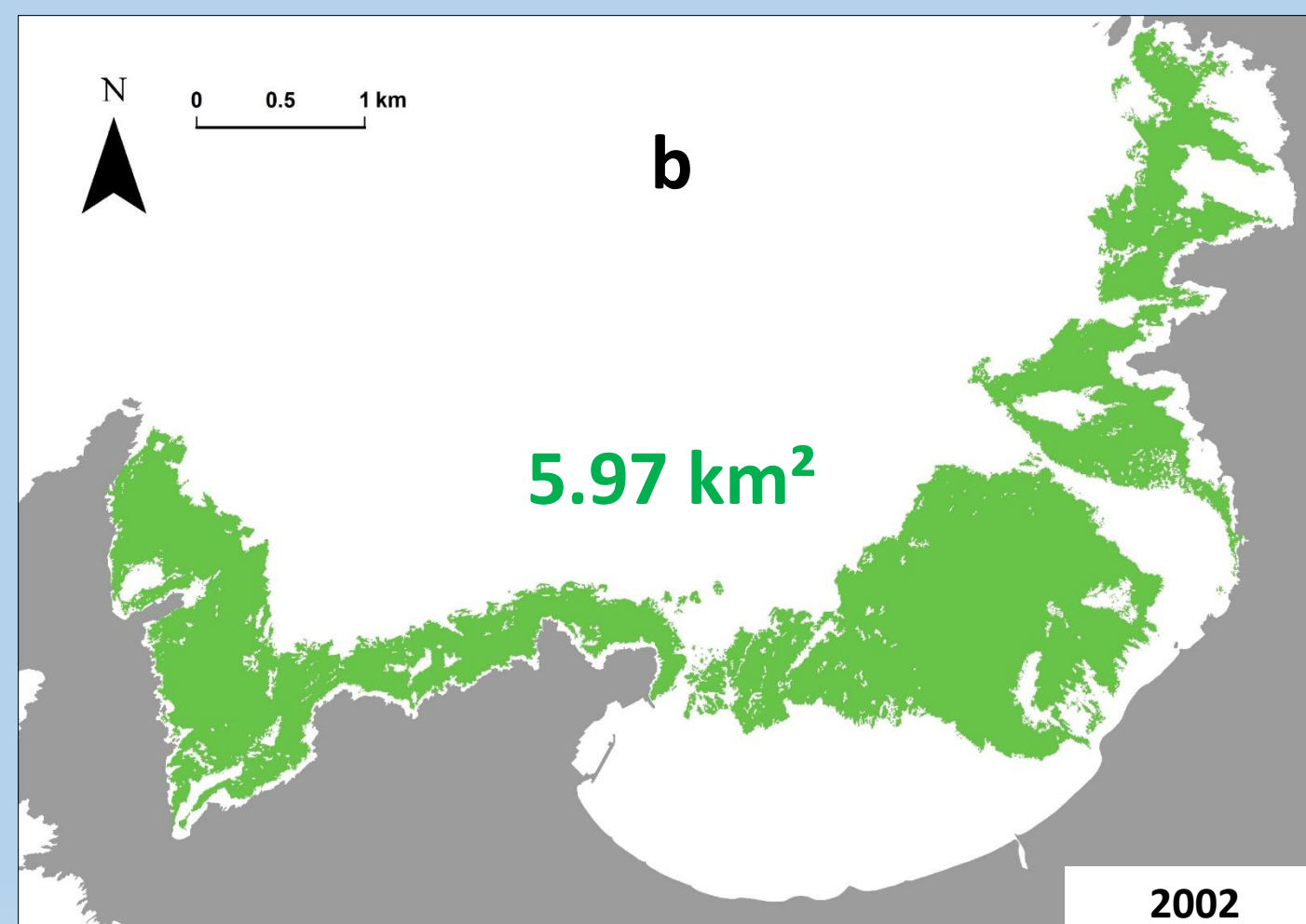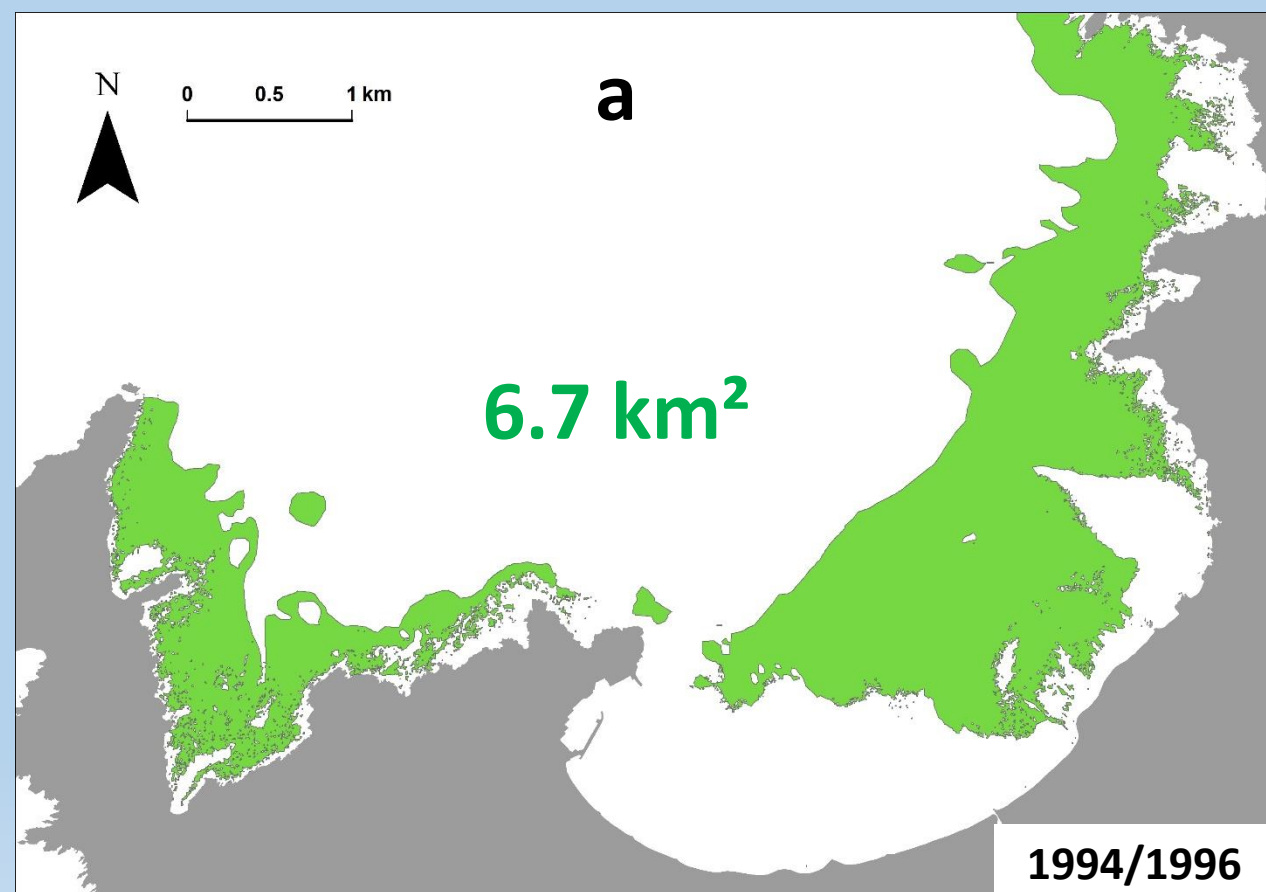c) 4.94 km² — 2007/2010

Figure 5: maps of *Posidonia oceanica* meadows and their area in Calvi Bay; **a)** 1994/1996 (source: Pasqualini, 1997); **b)** 2002; **c)** 2007/2010

Conclusion

1. Issues in **assessing the real fragmentation** of the meadows through time are linked with the **method** as well as a strong and quick **increase in quality** of the data required to built *P. oceanica* maps

2. The **high resolution** of the last *P. oceanica* meadow maps allows to study other aspects than fragmentation, like their **structure and function**

→ **Seascape ecology**

Acknowledgement

Reference cited
Pasqualini (1997) Caracterisation des peuplements et types de fonds le long du littoral Corse (Mediterranée, France). PhD thesis of the University of Corsica, France.189 p