Hyperspectral remote sensing and analysis of intertidal zones: A contribution to monitor coastal biodiversity

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Overview:

Hyperspectral remote sensing and analysis of intertidal zones

1. Introduction:
   Research goals
   and study area
2. Data and analysis approach
3. Results:
   Biotope classification
   and data accuracy
4. Perspectives of GIS-RS-based
   environmental monitoring

Study area

7°
9°
54°
54°
North Sea
GERMANY
Helgoland
East Frisian Islands
Bremerhaven
7°
8°
0 km 10 20
Main Study Area
Sources
Basemap: Microsoft Corporation 2004
Airphotos: Buhl Data GmbH 2004
Cartography: B. Hennig

Helgoland Northern Intertidal

Biotopes in the study area

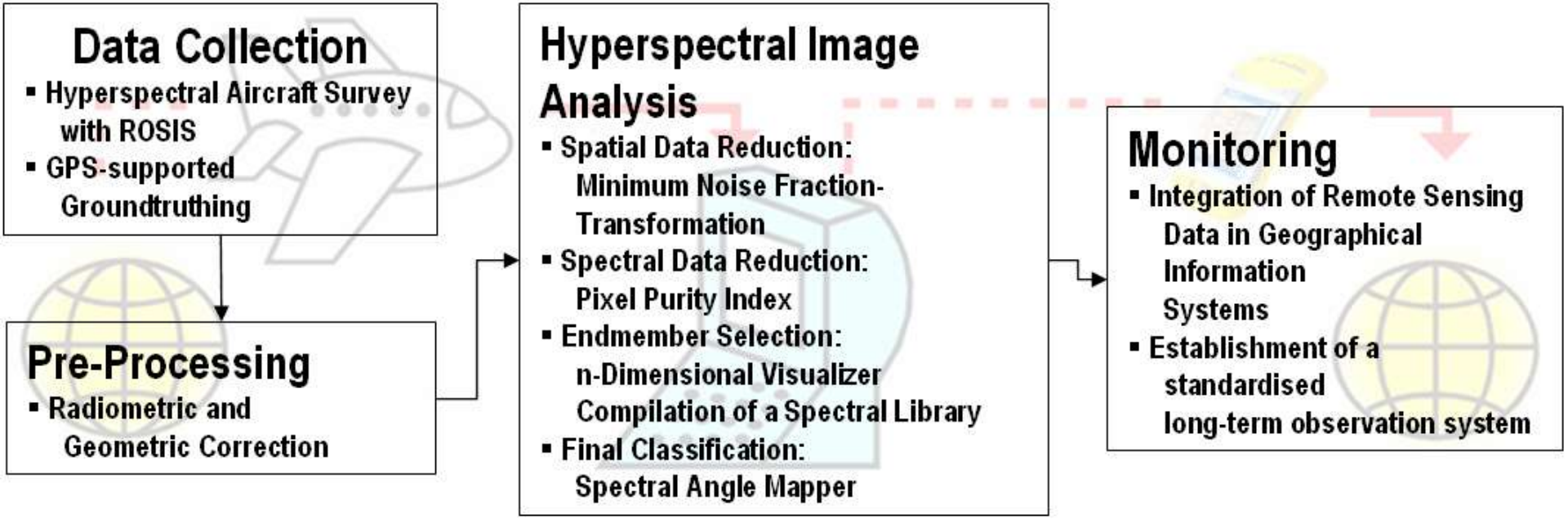
Abrasion platform of the northern intertidal

Red algae area (Mastocarpus)

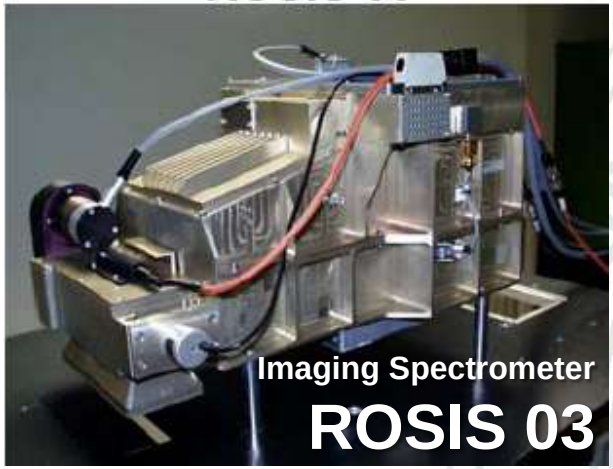
Green algae zone (Enteromorpha)

Musselbed with brown algae (Mytilus and Fucus)

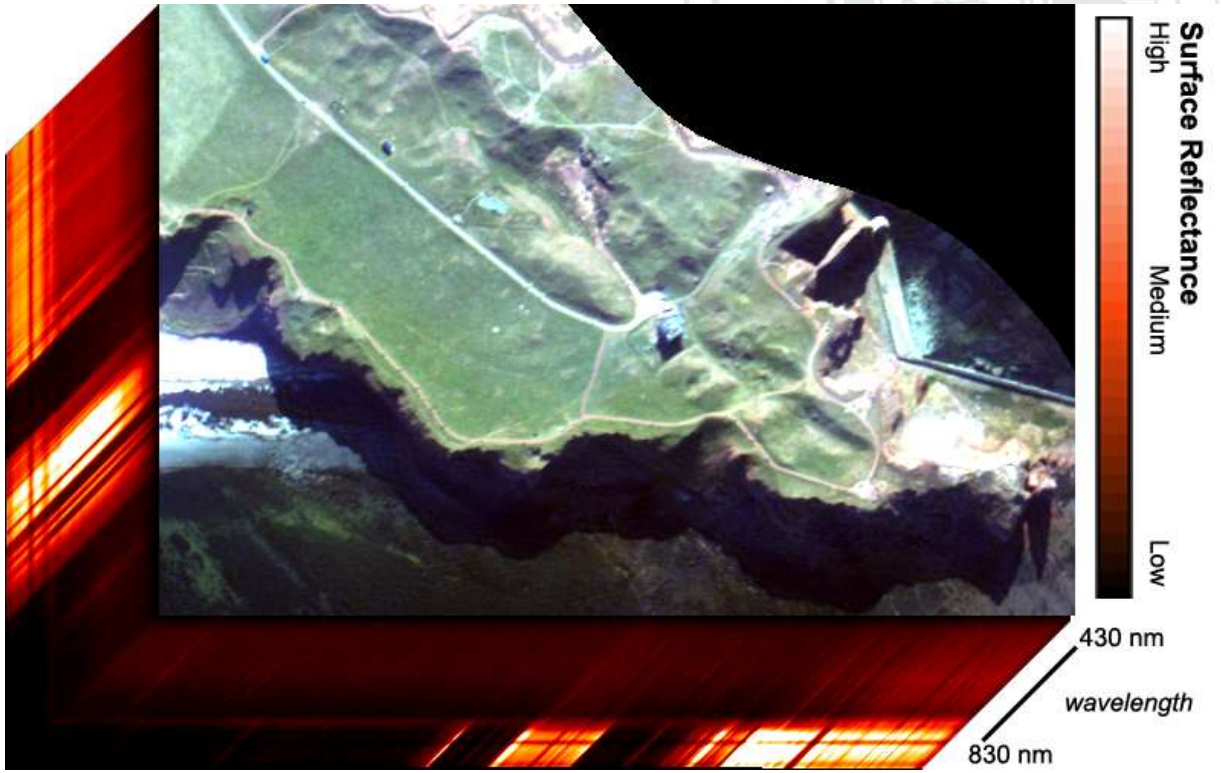
Working scheme

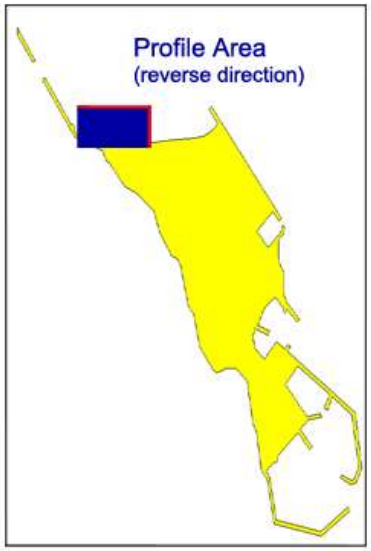


Data

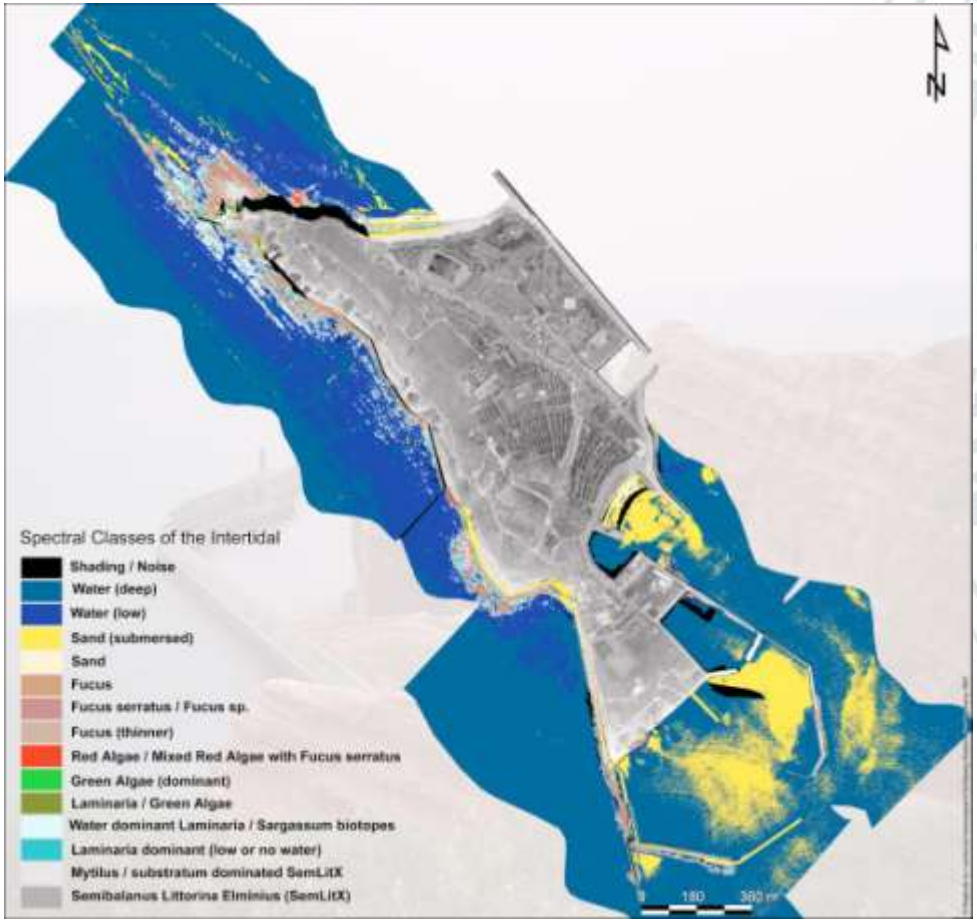


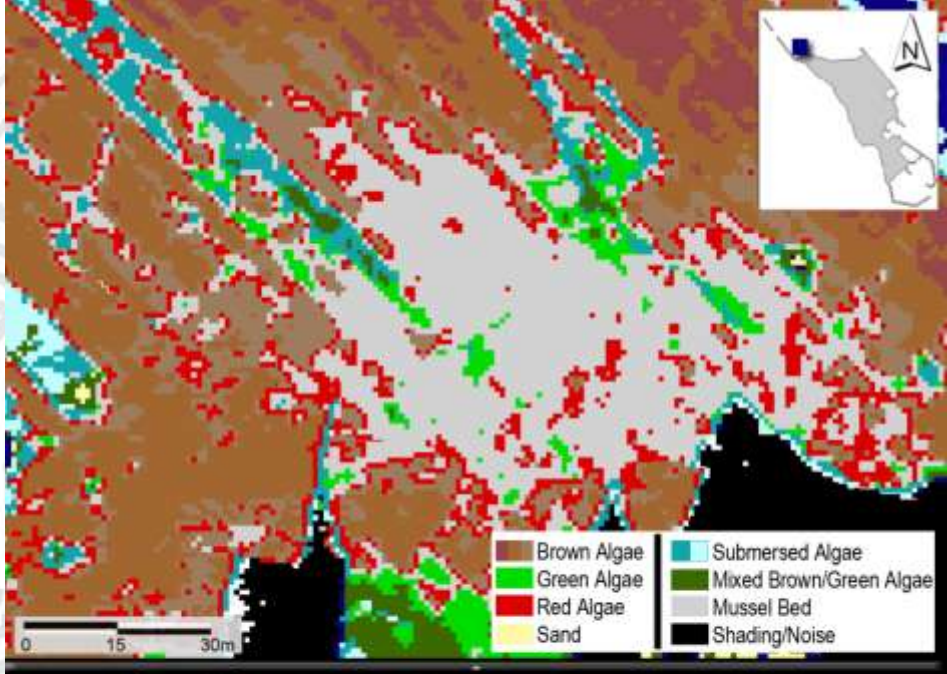
Scanning	Pushbroom
Spect. Coverage	0,43 - 0,86 µm
Bandwidth	4,0 nm
FOV	±8°
IFOV	0,56 mrad
Px / Line	512
No. of Bands	115
Scan Frequ.	88 Hz
Digitisation	14 Bit
Calibration	Int. Spec. Calibr.
Operated since	1992/1999



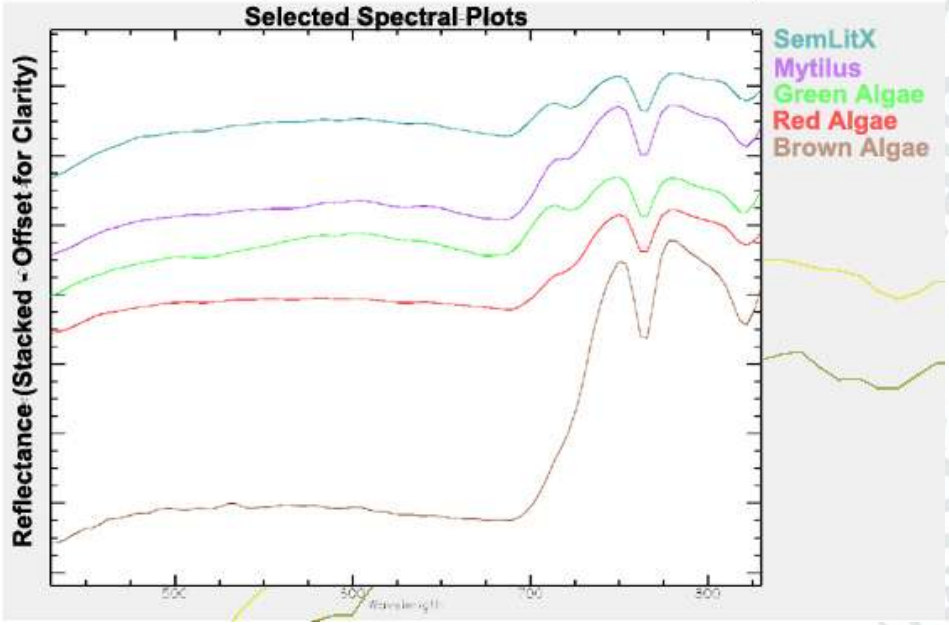


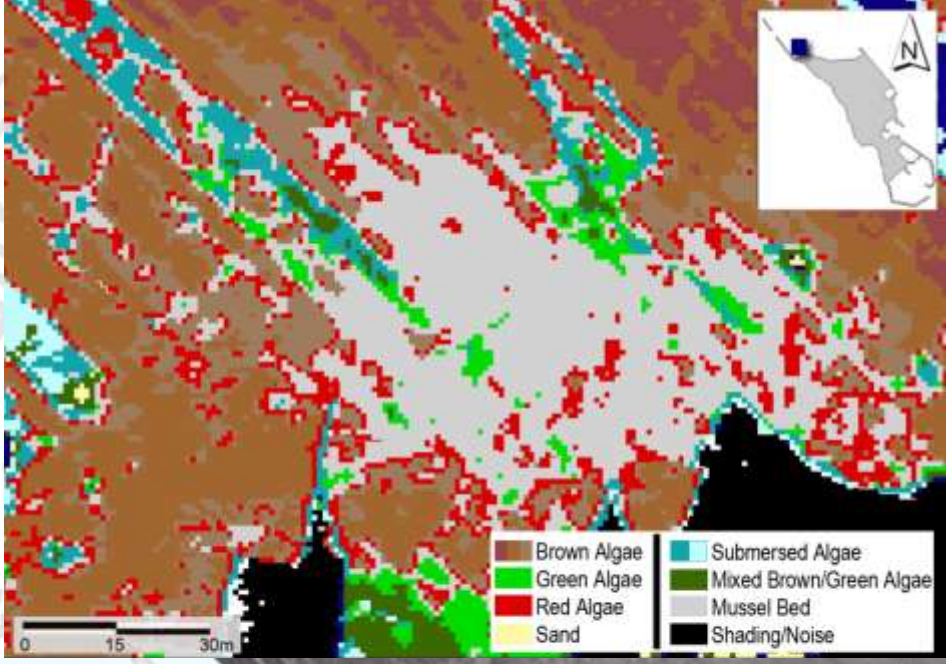
Biotope classification

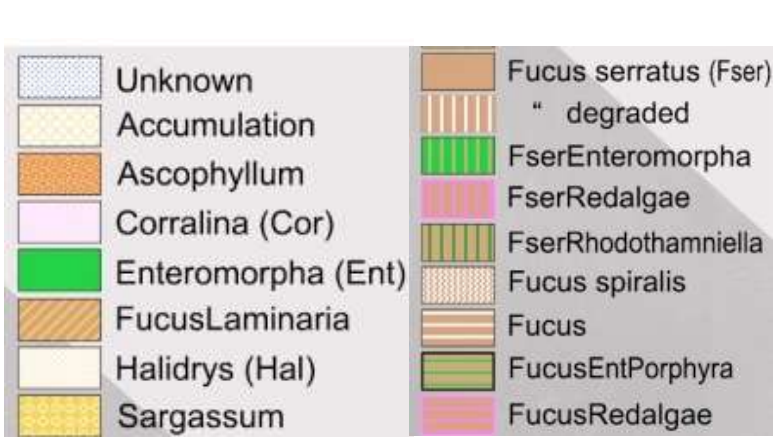




Biotope classification



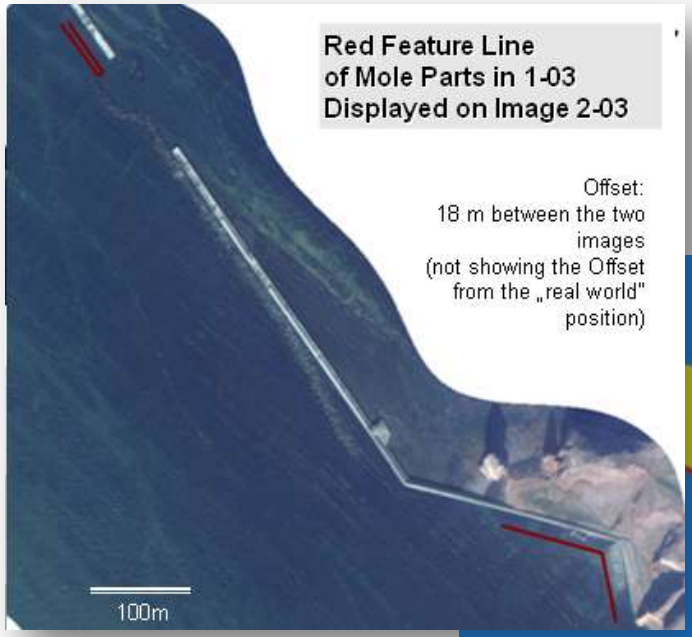


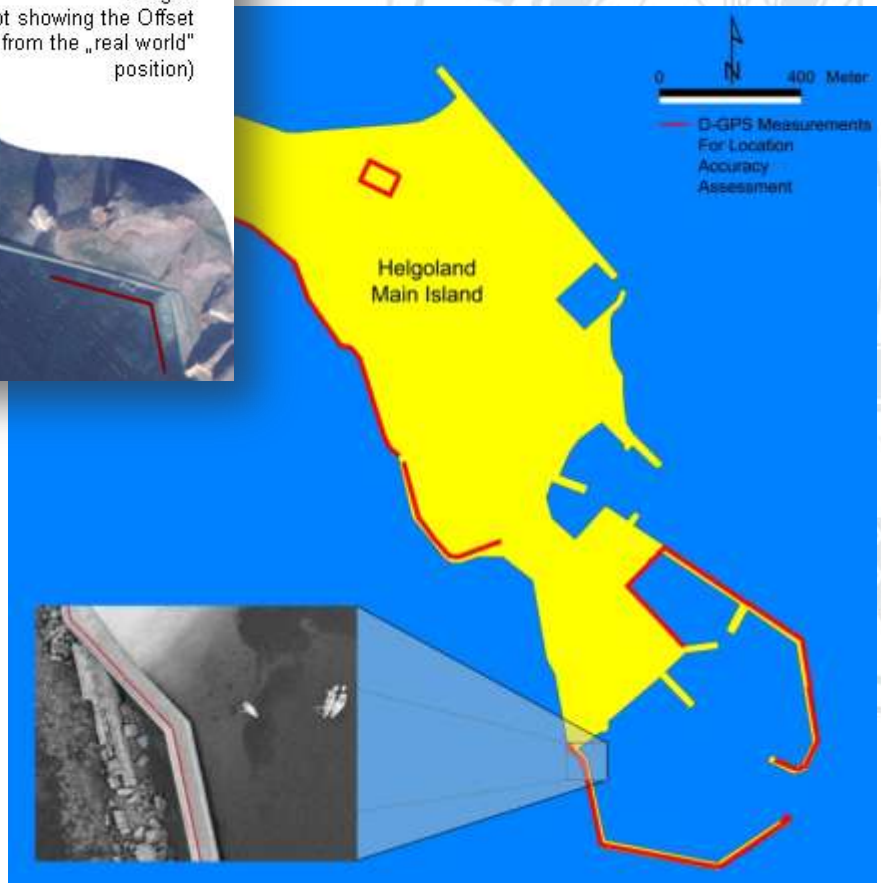


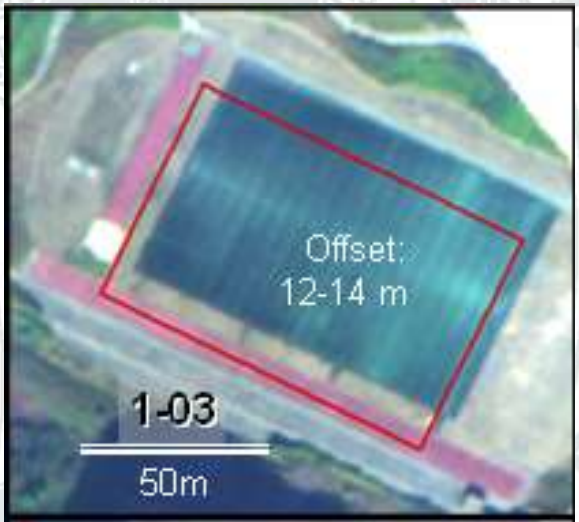
Thematic accuracy

Classified Data	Reference Data: No Vegetation	Brown Algae	Dense Brown Algae	Red Algae	Green Algae	Kelp	Vegetated Channels	Mussel bed	Barnacles	Total	User´s Accuracy %
No Veget.	9						6			15	60
Brown Algae		19		9			4			32	59,4
Dense Brown Algae			38	4						42	90,5
Red Algae				24			2			26	92,3
Green Algae					18					18	100
Kelp					3	17	8			28	60,7
Vegetated Channels					1	3	20			24	83,3
Mussel bed								27	9	36	75
Barnacles	3							12	30	45	66,7
Total	12	19	38	37	22	20	40	39	39	266	76,4
Producer's accuracy %	75	100	100	64,9	81,8	85	50	69,2	76,9	78,1	**75,9**

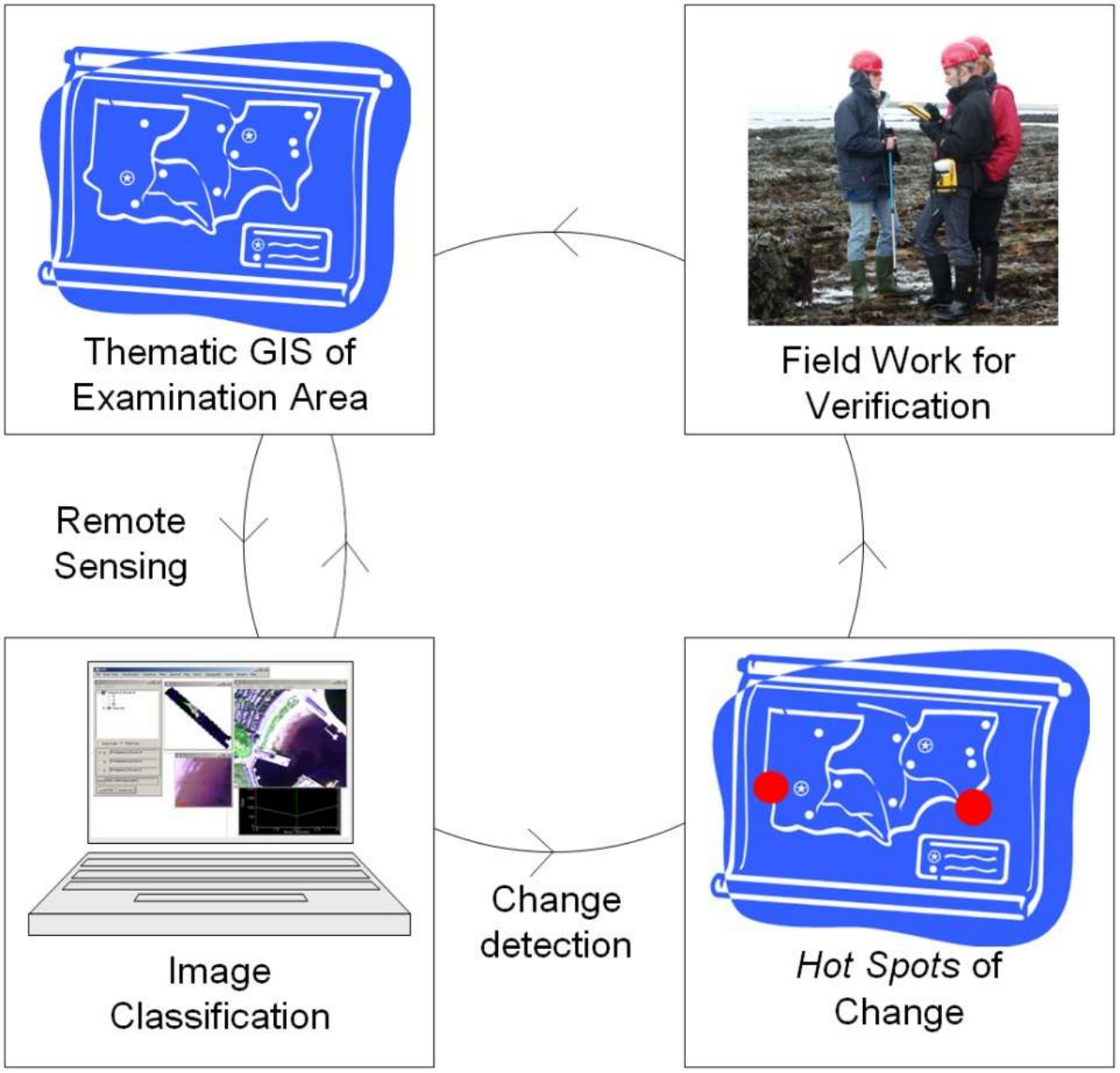
Location accuracy



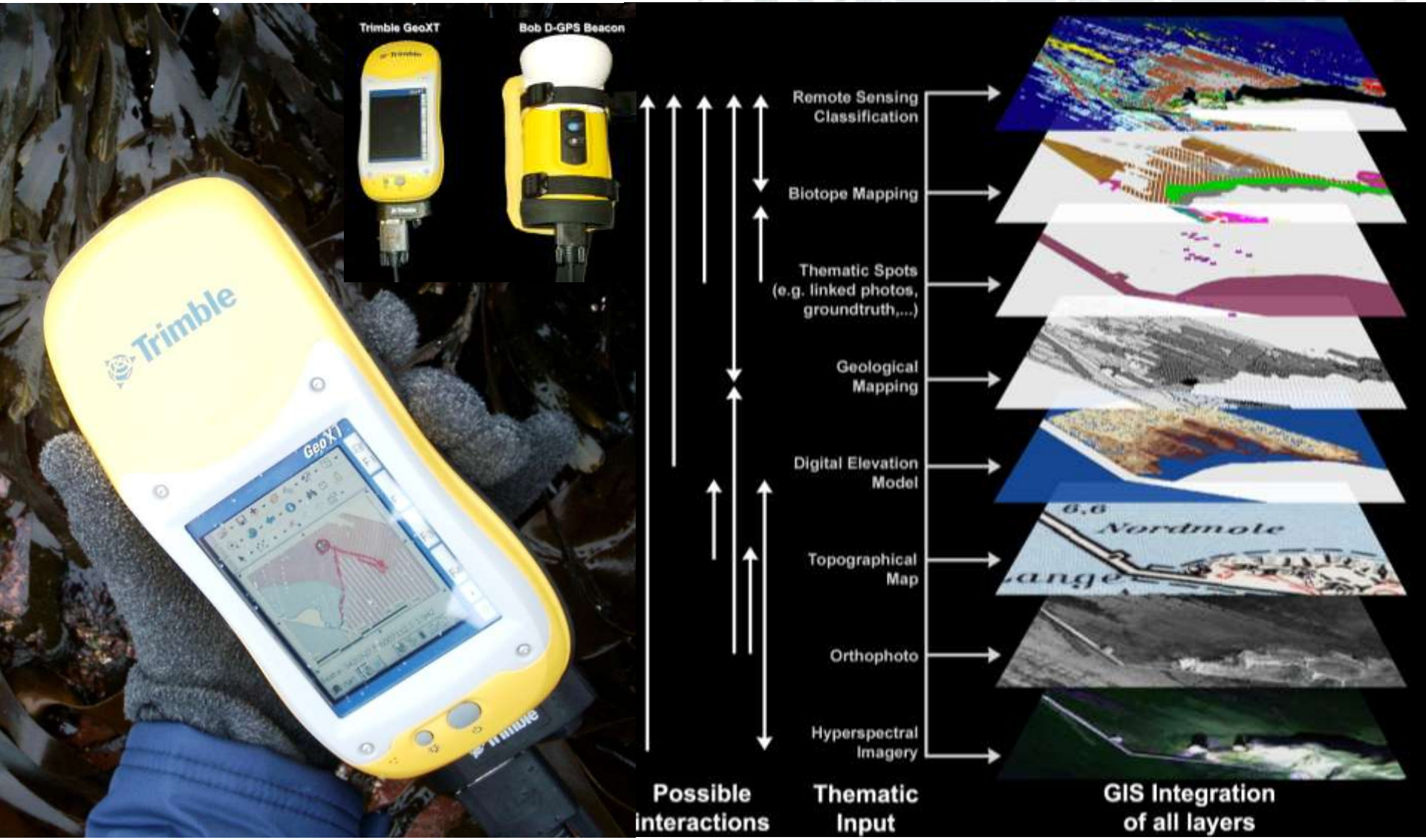




Field work


Thematic GIS of Examination Area
Field Work for Verification
Remote Sensing
Image Classification
Change detection
Hot Spots of Change

Integrated GIS-RS-analysis approaches



The presented study has been performed at the Alfred-Wegener-Institute for Polar and Marine Research (AWI Bremerhaven) for a Diploma Thesis at the University of Cologne, Department of Geography

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Thanks for your attention!