Nearshore remote sensing with emphasis on video monitoring

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the Argus programme

- automated video camera systems
- data collected every hour for years
- initiated in 1992 by Prof. Holman at OSU
- Netherlands involved since 1995



science and/or management







Goldcoast, Australia

Argus data collection



Data types:

- 1. Standard images
 - a) Snapshot ("photograph")
 - b) Time exposure (10-minute average)
 - c) Variance
 - d) Maximum intensity
- 2. Pixels, pixel arrays and time stacks







Relation between world and image coordinates



Rectification

Required:

- (x,y,z) of the cameras: known from surveys
- known points in the image (u,v) and in real world (x,y,z)
- Ground Control Points

Problem:

- (u,v) is two-dimensional, (x,y,z) is three-dimensional
- underdetermined
- in practice: specify z (measured tidal level)

Finally:

• solve for focal length, roll, tilt and azimuth

• = geometry



Pixel resolution at an ARGUS station Cross-shore pixel resolution (m) 40 m Cross-shore x (m) 0.1 400 30 m 200 20 m 10 m 0 0 500 1000 -500 -1000 1500 -1500 0 Alongshore pixel resolution (m) 40 m Cross-shore x (m) 400 30 m 15 5 200 20 m 10 m 0 1500 1000 500 -500 -1000 -1500 0 Alongshore position y (m)

Applications

1. Behaviour of subtidal sandbars and shoreface nourishments

2. New ideas

Gold Coast movie





















Conclusions

- 1. Nearshore is replete with <u>visible signatures</u> that can be imaged by cameras and analyzed to make highresolution, long-term measurements
 - Sandbar positions
 - Bathymetry
 - Much more

2. Video systems have become <u>standard tools</u> in coastal research and are seriously considered as useful tools in coastal management problems

Conclusions

- 3. Future work
 - New scientific fields (e.g., aeolian research)
 - Merging with other remote-sensing techniques (Xband, terrestrial LIDAR, ...)
 - Merging with numerical models (data assimilation)