Get in touch!
alefebvre@marum.de

Classification of underwater flow-transverse sedimentary bedforms

Alice Lefebvre, University of Bremen, Germany
Robert W. Dalrymple, Queen's University, Canada
Julia Cisneros, Virginia Tech, USA
Leon Scheiber, Leibniz University Hannover, Germany
Suzanne Hulscher, University of Twente, Netherlands
Arnoud Slootman, Colorado School of Mines, USA
Maarten G. Kleinhans, Utrecht University, Netherlands
Elda Miramontes, University of Bremen, Germany

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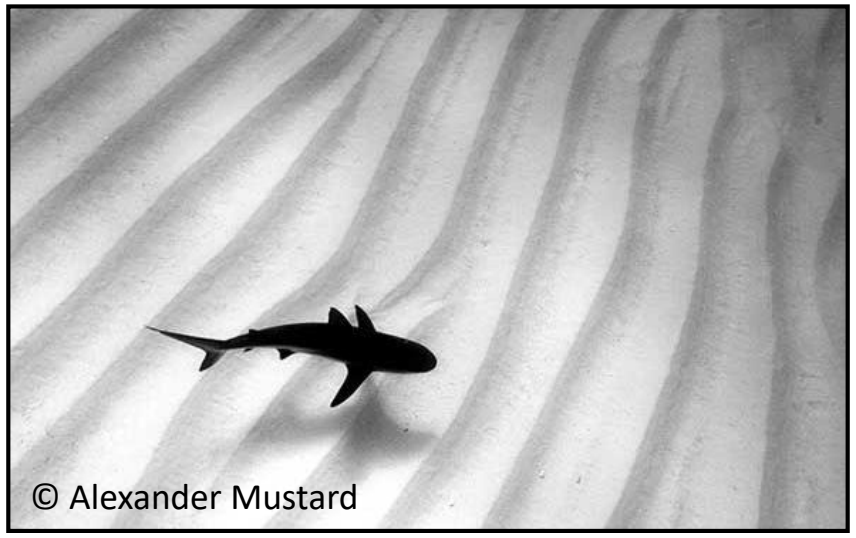
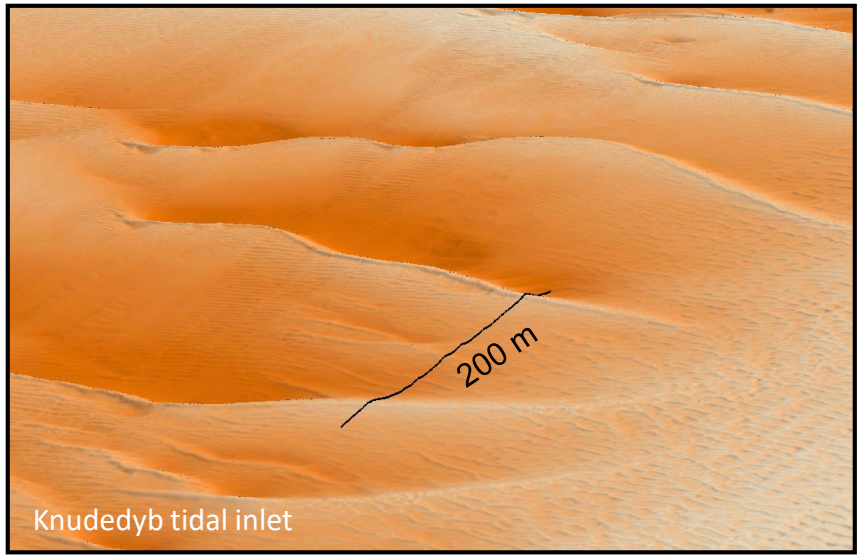
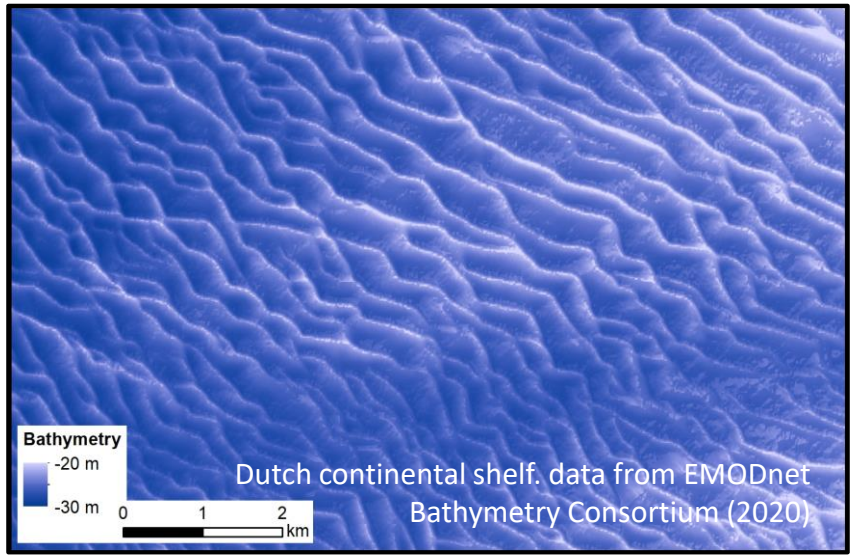
Underwater flow-transverse sedimentary bedforms







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Several classifications

Journal of Sedimentary Research (1990) 60 (1): 160–172.
https://doi.org/10.2110/jsr.60.160 Article history

Classification of large-scale subaqueous bedforms; a new look at an old problem

Gail M. Ashley

Panel members: G.M. Ashley, J.C. Boothroyd, J.S. Bridge, H.E. Clifton, R.W. Dalrymple, T. Elliott., B.W. Flemming, J.C. Harms, P.T. Harris, R.E. Hunter, R.D. Kreisa, N. Lancaster, G.V. Middleton, C. Paola, D.M. Rubin, J.D. Smith, J. B. Southard, J.H.J. Terwindt and D.C. Twitchell, Jr.

Definitions may differ depending on
- Environment (fluvial, coastal or deep-marine)
- Disciplines (sedimentology, engineering, oceanography)
- Traditions (country, working groups)

➔ Misinterpretations & difficult communication
➔ hindering progress & cross-disciplinary collaborations

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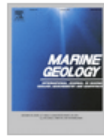
Marine Geology
Volume 371, 1 January 2016, Pages 130-148



Large-scale sediment waves and scours on the modern seafloor and their implications for the prevalence of supercritical flows

William O. Symons [a], Esther J. Sumner [a], Peter J. Talling [b], Matthieu J.B. Cartigny [b], Michael A. Clare [b]

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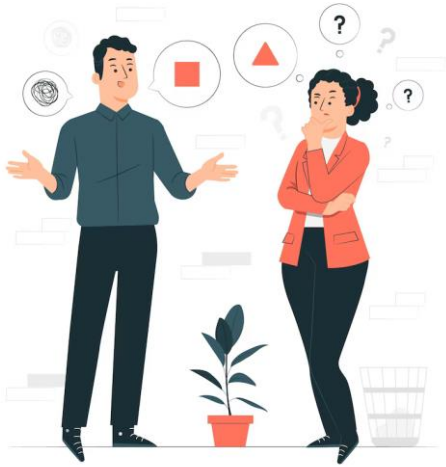
Marine Geology
Volume 192, Issues 1–3, 15 December 2002, Pages 7-22

Classification and characterisation of deep-water sediment waves

Russell B. Wynn, Dorrik A.V. Stow



Aims

bring together researchers working on many environments and disciplines

to discuss and define the different types of flow-transverse sedimentary bedforms

and produce an updated and extended classification scheme

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Description table

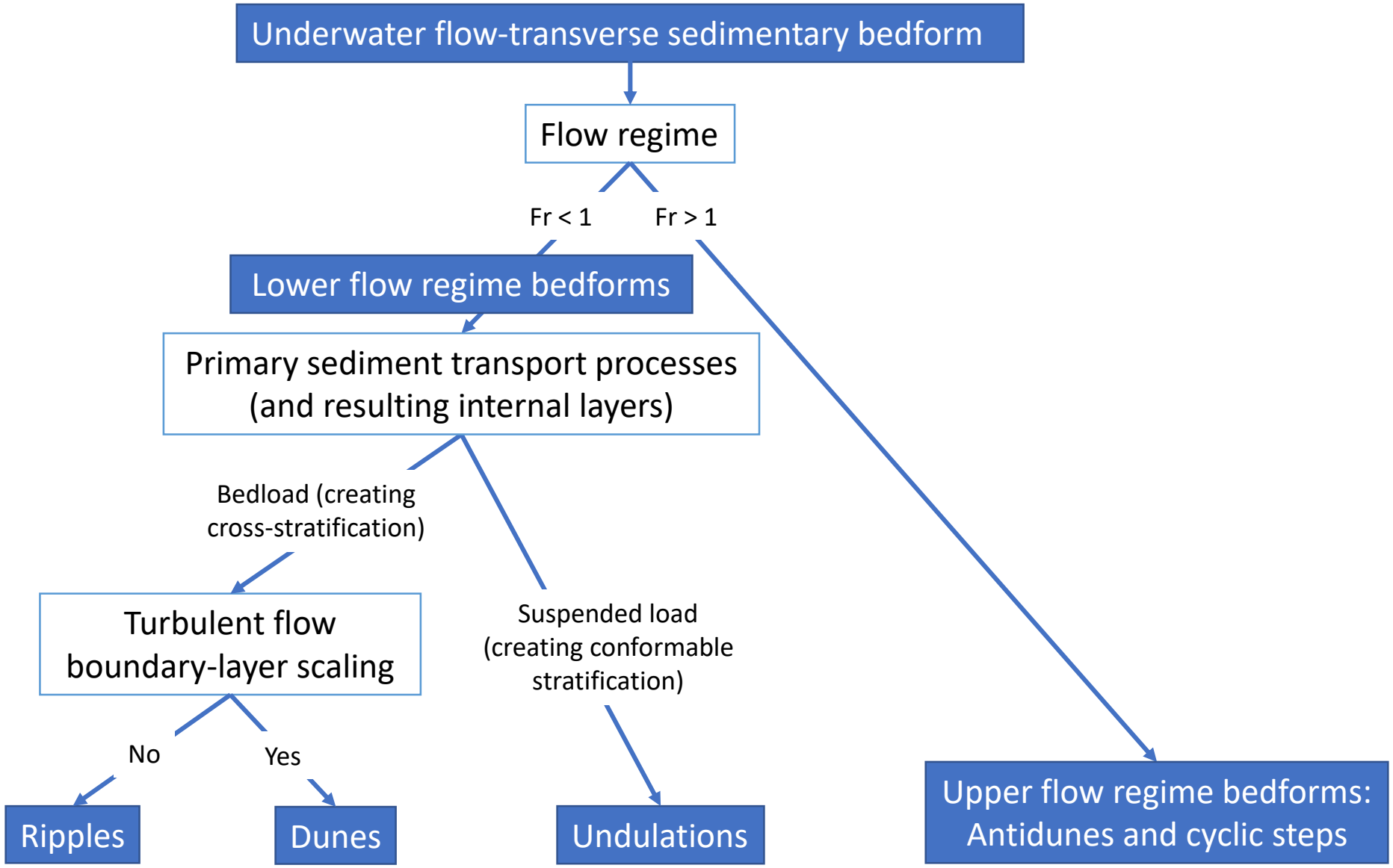
Standard, comprehensive description of bedforms and their environmental setting prior to classifying them

Used independently of bedform type and classification

Aim: help communication

Morphology	Size, coverage, 2D and 3D shapes, hierarchy, orientation compared to flow, dynamics
Sediment	Characteristics, availability, internal architecture
Hydrodynamics	Main hydrodynamics, flow structure and variation, non-dimensional numbers
Environment	Water depth, large-scale bed topography, anthropogenic context, biota

Process-based classification



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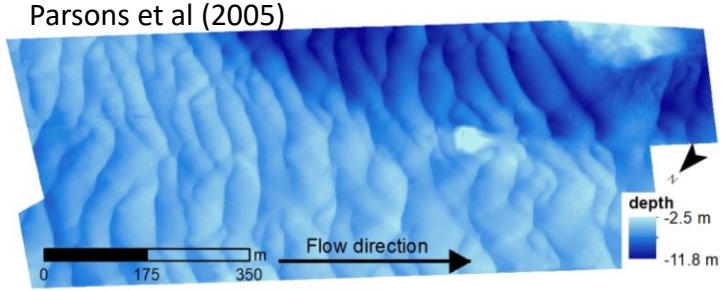
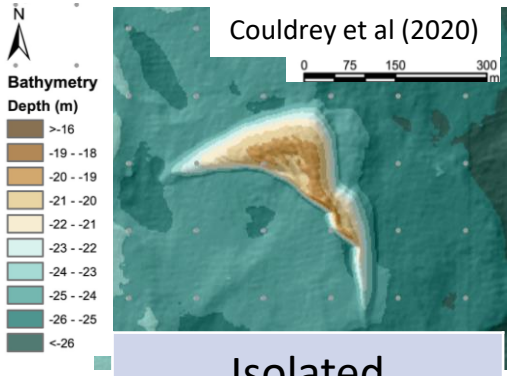
Morphological and environmental classification

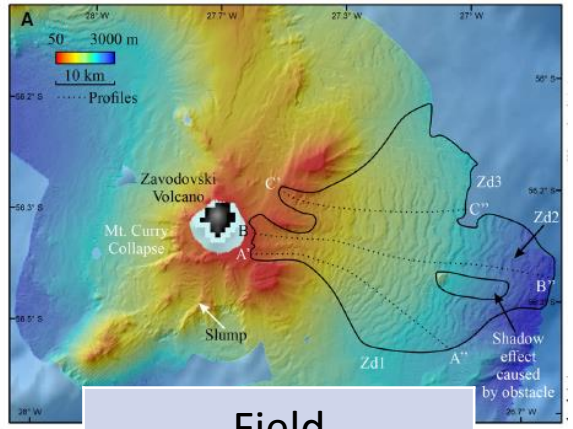
Parsons et al (2005)





Couldrey et al (2020)

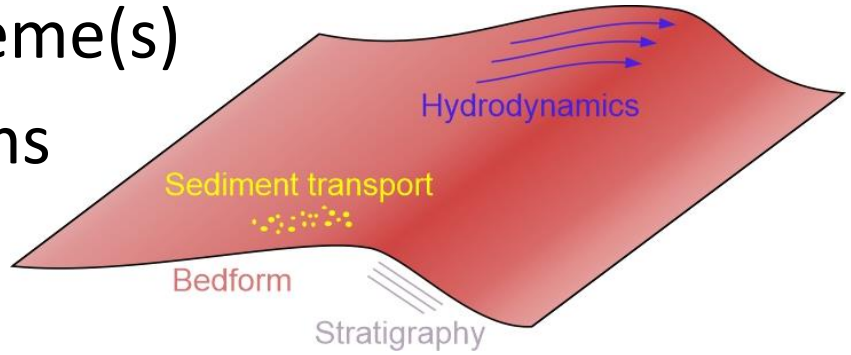
Casalbore et al (2021)



Coverage	Field	Isolated	Field
Water depth	shallow water	shallow water	deep water
Size	large	very large	very large
Hierarchy	primary	primary	
Three-dimensionality	3D	3D	
Plan shape	sinuous	barchan	
Steepness	low-angle	high-angle	
Symmetry	asymmetric	asymmetric	asymmetric
Crest shape	round-crested	round-crested	sharp-crested
Environment	alluvial	marine	marine
Sediment	sand	sand	
Bedform type	dunes	dune	sediment waves

Conclusions

Produce an updated and extended classification scheme(s) for underwater flow-transverse sedimentary bedforms



➔ Description table

➔ Process-based classification

➔ Morphological classification

Morphology	Size, coverage, 2D and 3D shapes, hierarchy, orientation compared to flow, dynamics
Sediment	Characteristics, availability, internal architecture
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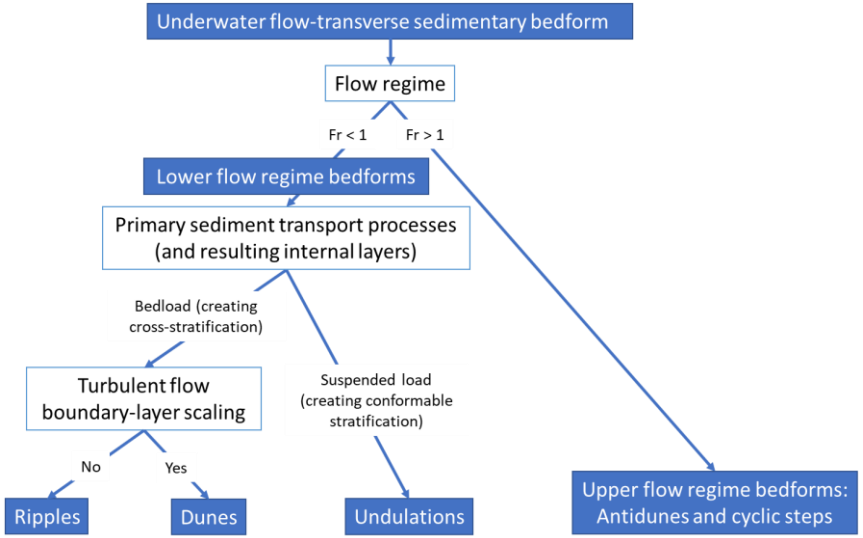

Coverage
Water depth
Size
Hierarchy
Three-dimensionality
Plan shape
Steepness
Symmetry
Crest shape
Environment
Sediment
Bedform type

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