

Accepted Manuscript

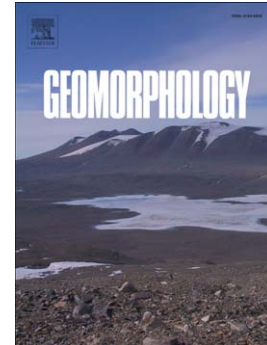
Residual flow, bedforms and sediment transport in a tidal channel modelled with variable bed roughness

A.G. Davies, P.E. Robins

PII: S0169-555X(17)30333-1
DOI: doi:[10.1016/j.geomorph.2017.08.029](https://doi.org/10.1016/j.geomorph.2017.08.029)
Reference: GEOMOR 6124

To appear in: *Geomorphology*

Received date: 20 January 2017
Revised date: 9 August 2017
Accepted date: 10 August 2017



Please cite this article as: Davies, A.G., Robins, P.E., Residual flow, bedforms and sediment transport in a tidal channel modelled with variable bed roughness, *Geomorphology* (2017), doi:[10.1016/j.geomorph.2017.08.029](https://doi.org/10.1016/j.geomorph.2017.08.029)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Residual flow, bedforms and sediment transport in a tidal channel modelled with variable bed roughness

A.G. Davies* and P.E. Robins

Centre for Applied Marine Sciences, School of Ocean Sciences, Bangor University, Menai Bridge, Anglesey LL59 5AB U.K.

* Corresponding author: Email: a.g.davies@bangor.ac.uk; Tel +44 (0)1248 383933

Abstract

The frictional influence of the seabed on the tidal flow in shelf seas and estuaries is usually modelled via a prescribed, spatially/temporally invariant drag coefficient. In practice, the seabed exhibits considerable variability, particularly spatially, that should in principle be included in simulations. Local variations in the seabed roughness (k_s) alter the flow strength and, hence, local sediment transport rates. The effect of using a spatially/temporally varying k_s is assessed here with reference to a tidal channel (Menai Strait, N. Wales) in which the variability of the bedforms has been monitored using multi-beam surveying. The channel not only exhibits strong tidal flow, but also a residual induced flow that is used here as diagnostic to assess various bed roughness formulations tested in a Telemac model. Tidal simulations have been carried out with both constant and temporally/spatially variable k_s , and the predicted residual flow is shown to be sensitive to these representations. For a mean spring-neap (SN) cycle with variable k_s , the average residual flow is calculated to be $525 \text{ m}^3 \text{ s}^{-1}$, consistent with observations. This residual flow can be recovered using imposed, constant values of k_s in the range 0.15 m to 0.3 m. The results suggest that the overall, effective roughness of the seabed is less than half of the maximum local roughness due to the dunes in mid-channel, but more than the spatially-averaged k_s value in the channel as a whole by about 50%. Simulations carried out with an M_2 -alone tide using variable k_s produce a somewhat smaller (by 7%) residual flow of $491 \text{ m}^3 \text{ s}^{-1}$. The use of an 'equivalent

Download English Version:

<https://daneshyari.com/en/article/5780799>

Download Persian Version:

<https://daneshyari.com/article/5780799>

[Daneshyari.com](https://daneshyari.com)