The effect of sediment transport models on simulating river dune dynamics: Model data and processing

Metadata

This data entry contains all files needed to reconstruct the data related to the model presented in Lokin et al. (2023).

# The model

The link to the github repository is: <https://github.com/LiekeLokin/DUDE> for the latest version of the software. the code is work in progress and contains legacy code from previous research projects. Please contact the author before working with the model.

All model configuration and runs were done in the Cygwin64 terminal, <https://www.cygwin.com/install.html>.

# Model input and output

The Zip files each contain a set of model runs. The naming is refers to the domain length of the model setup (either 80, 100 or 120 m) and the used transport model (EH, MPM, MPM-LRE or NT). Within the L100 set also calculations with the increased critical shear stress are included this is indicated by the high\_tauc added in the name.

Each of these zipped folders contains folders with the model input and output for the different discharges as presented in Lokin et al. (2023, Table 1). The naming is consistent with the discharge range for which that simulation is run. The table below describes the filenames and their contents:

|  |  |  |  |
| --- | --- | --- | --- |
| Filename | Description | Data header | Additional info |
| Config.cfg | Example config file |  |  |
| out\_bottom1.txt | Bed elevation in m | Time (s),  Flow separation on (True/False),  number of flow separation zones,  specific discharge (m2/s),  water depth (m),  domain length (m),  [] (m) | The rounded timesteps are the bed elevation and the timestep+0.1 s is the level of the flow separation zone as described by Paarlberg et al. 2009  Npx: is the number of grid cells in the horizontal direction |
| out\_bss1.txt | Bed shear stress | Time (s),  [] (N/m2) | The rounded timesteps are the bedshearstress and the timestep+0.1 s is the shearstress along the separation zone as described by Paarlberg et al. 2009 |
| out\_config.txt | File describing the input parameters for this specific run |  |  |
| out\_flux1.txt | Sediment flux in m2/s | Time (s),  [] (m2/s) |  |
| out\_zeta1.txt | Water level variations in m+Water depth | Time (s),  [] (m+water depth) |  |

# Postprocessing

Reading the model output can be done with the script Dude.py. The input for this script is the location of the folder with the model output and it can return all relevant output parameters in numpy arrays.

# References

Lokin, L. R., Warmink, J. J., & Hulscher, S. J. M. H. (2023). *The effect of sediment transport models on simulating river dune dynamics*. Submitted to Water Resources Research.

Paarlberg, A. J., Dohmen-Janssen, C. M., Hulscher, S. J. M. H., & Termes, P. (2009). Modeling river dune evolution using a parameterization of flow separation. *Journal of Geophysical Research: Earth Surface*, *114*(1). https://doi.org/10.1029/2007JF000910