

Current and future development of BASEMENT software

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Recent Progress

BASEMENT Version 4

- latest version: bugfix release 4.1, June 14th, 2024
- BASEHPC: mixed-size sediment transport ✓
- BASEHPC: temperature model ✓

Recent Progress

BASEMENT Version 4

unified workflow:

- open issues
 - workflow integration BASEmesh/BASEchange
 - > json output for stringdefs and cross section order -> version 4.2
 - unified output concept -> later this year

Instructions and application of new version in graduate courses:

at ETH Zurich:

- Experimental and Computer Laboratory I
- River Morphodynamic Modelling

at University of Trento:

- Integrated River Morphodynamics (since 2023)

Recent Progress

Application-oriented concepts (AOC)

1D	1	2	3
Example	River Widenings	Alpine River	Dam Removal
Focus	change in channel width and longitudinal grain sorting	bed stability under steep and degraded conditions	limitation of local erosion at sills and ramps
Key aspects	longterm evolution, dynamic equilibrium, effect of tributaries	mixed-sized sediment, limitations of Hirano model	impact of non-erodible bed on sediment transport and grain sorting

2D	1	2	3
Example	Alternate Bars	Bend Flow	Multiple Channels and Lateral Erosion
Focus	Formation of forced steady and free migrating alternate bars	formation of point bars in river bends	transition from single to multi channel pattern
Key aspects	basic concept for morphodynamic 2D model calibration - step 1	basic concept for morphodynamic 2D model calibration - step 2	basic concept for morphodynamic 2D model calibration - step 3

Continuation

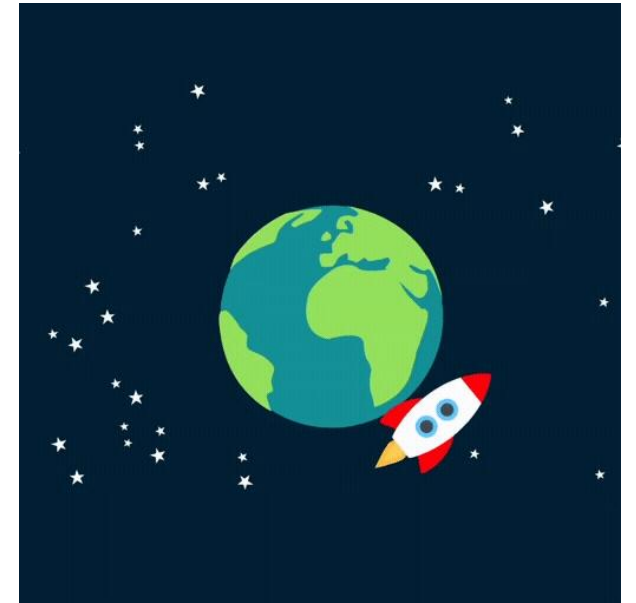
- Software development is funded via research projects and financial support of FOEN (federal office for the environment)
- FOEN support period renewed by mid 2024 (with reduced budget)
- Adapted focus for further collaboration with FOEN:

Development concept <i>BASEMENT</i> 24 - 28		
Knowledge transfer		20%
Application-oriented concepts		30%
Further development & maintenance		50%
Focus State-of-the-Art	software technique	

Continuation

upcoming knowledge transfer:

- video tutorials, revision of website
- continuation with AoC
- online manual with GUI integration

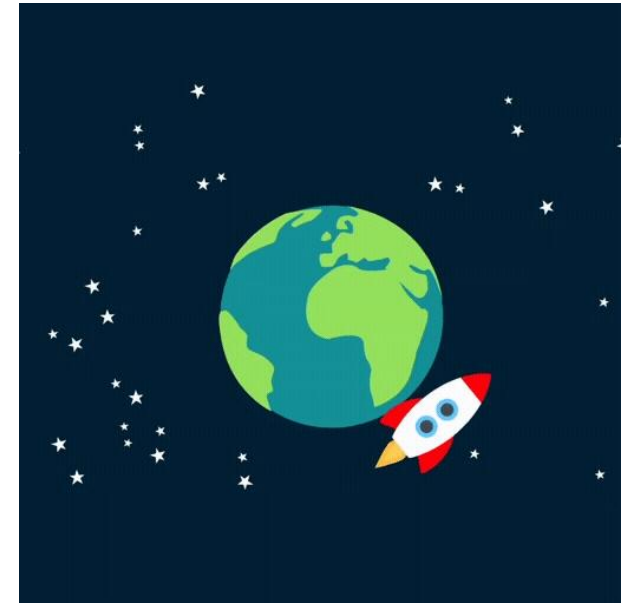


<https://pixabay.com/gifs/rocket-space-earth-launch-3972/>

Continuation

upcoming features:

- infiltration and storage (surface runoff)
- 1D: simplified approach to consider bed level changes
- bi-modal sediment transport
- sub-grid-scale models, porosity model
(start not before 2026)

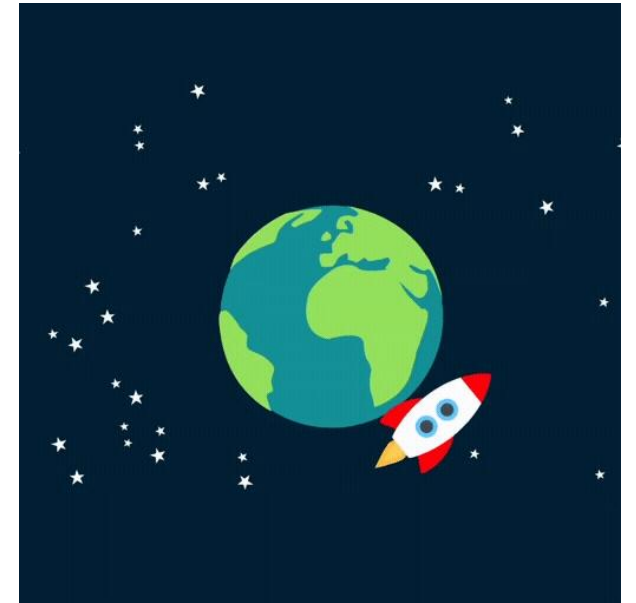


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Continuation

upcoming technical extensions:

- support for raster data
- going open source
- interface/API for integration of 3rd party models
(deterministic and data-driven)



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Roadmap 2024 (main features only)

Version	Date	Comments
4.2	Q1 2025	Lagrangian tracers
4.3	Q2 2025	Infiltration and Storage
Revision of website	Q3 2025	Reorganization, success stories
Video tutorials	Q4 2025	First clips
POC bed load (1D)	Q4 2025	release

