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ENGINEERING GEOLOGICAL MODELS
some examples of use for landslide assessments

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Engineering geological models – some examples of use for landslide assessments

The Commission C25 of the International Association for Engineering Geology and the Environment is currently working on “The use of engineering geological models”. (Parry, S., Baynes, F. J., Culshaw, M. G., Eggers, M., Keaton, J. F., Lentfer, K., Novotný, J. & Paul, D. (in press)).

Conceptual model is based on understanding the relationships between engineering geological units, their likely geometry and anticipated distribution. This approach, and the models formed, are based on concepts formulated from knowledge and experience and are not related to real three-dimensional (3D) space or time. Importantly, the model is largely based on consideration of *geological concepts* such as age, stratigraphy, rock type, unconformity and weathering.

Conceptual model is based on concepts formulated from knowledge and experience. Such model is created to anticipate what might be encountered on site and is formed on the basis of existing data.

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Observational model is based on the observed and measured distribution of engineering geological units and processes. These data are related to actual space or time and are constrained by surface or sub-surface observations (e.g. mapping, drilling).

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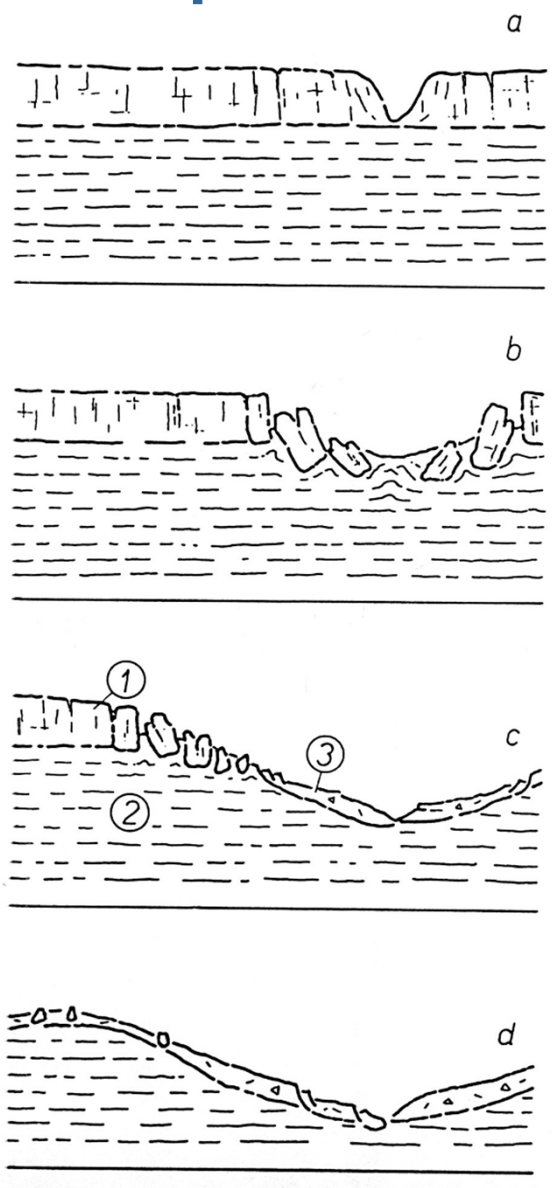
Conceptual model



Development stages of a slope comprising a rigid upper layer and a plastic lower layer (according to Rybář and Nemčok 1968)

1a erosion processes start to cut through the rigid layer.

1b demonstrates that a narrow valley is prone to bulging

1c further deepening and widening of the valley) leads to cambering – block-type movement on plastic underlying rock in the upper part of the valley and to landslides of plastic rocks and derived soils in the lower part of the valley.

1d represents a denudated slope prone to landslides triggered by river erosion at its base.

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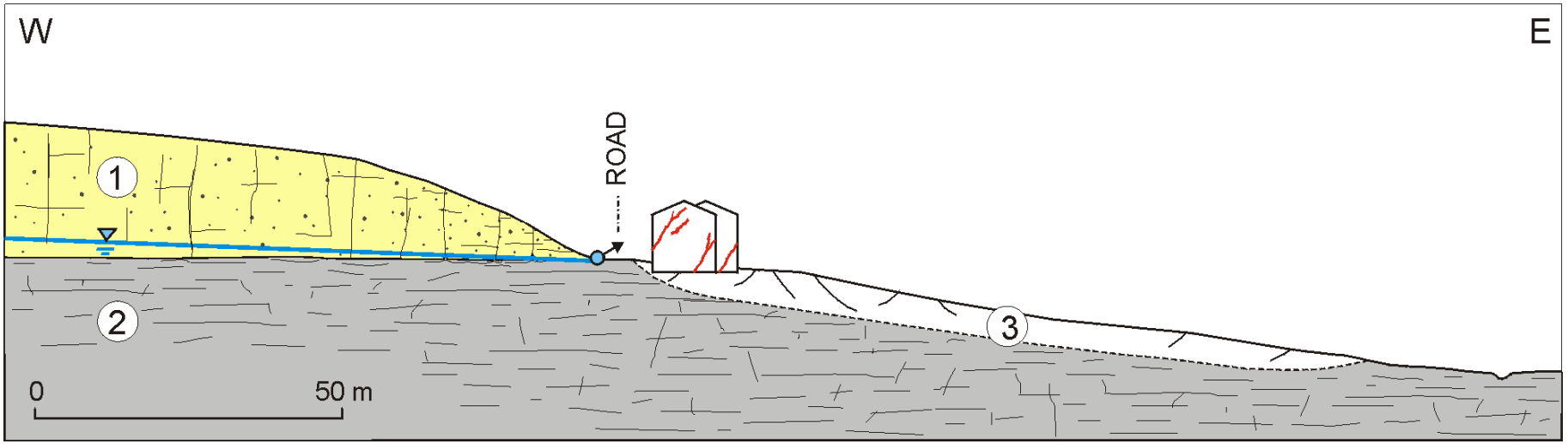
Conceptual model of a slope in Hrubá Skála. 1 – Cretaceous sandstones, 2 – Cretaceous claystones, 3 – landslide



After Novotný 2009, Novotný in press

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Reactivation of dormant landslides

Hrubá Skála

Photo: J. Novotný

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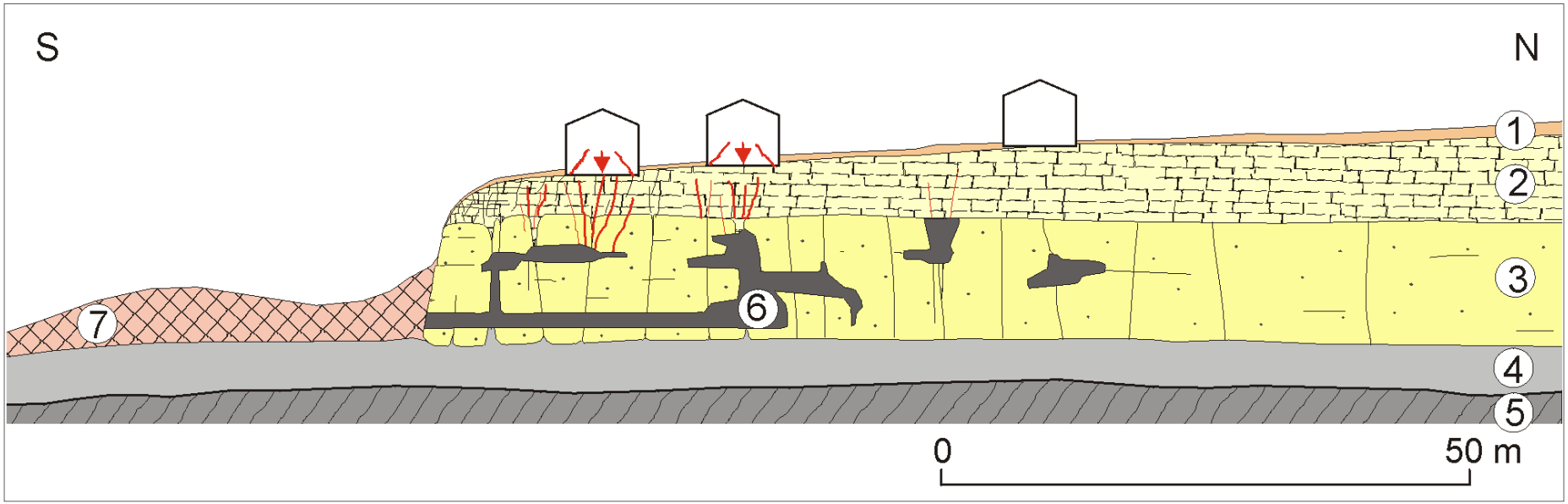
Conceptual model of the edge of the Czech Cretaceous Formation in Prosek (after Pašek 2000 and Lešner 2004 in Novotný 2009).



1 – Quaternary loess soils, 2 – Turonian marls and marlstones, 3 – Cenomanian sandstones, 4 – Cenomanian claystones, 5 – Ordovician shales, 6 – mining cavities, 7 – mounds)

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Prosek ground instability – northern part of Prague, Czech Republic

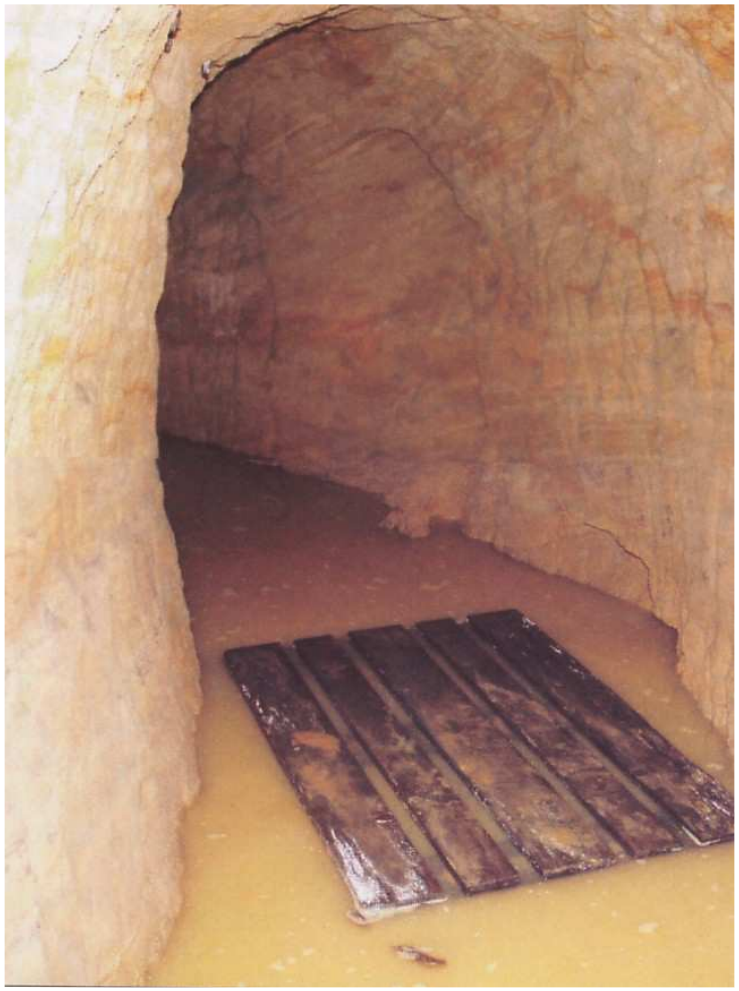

Photo: J. Lešner

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Prosek ground instability – northern part of Prague, Czech Republic

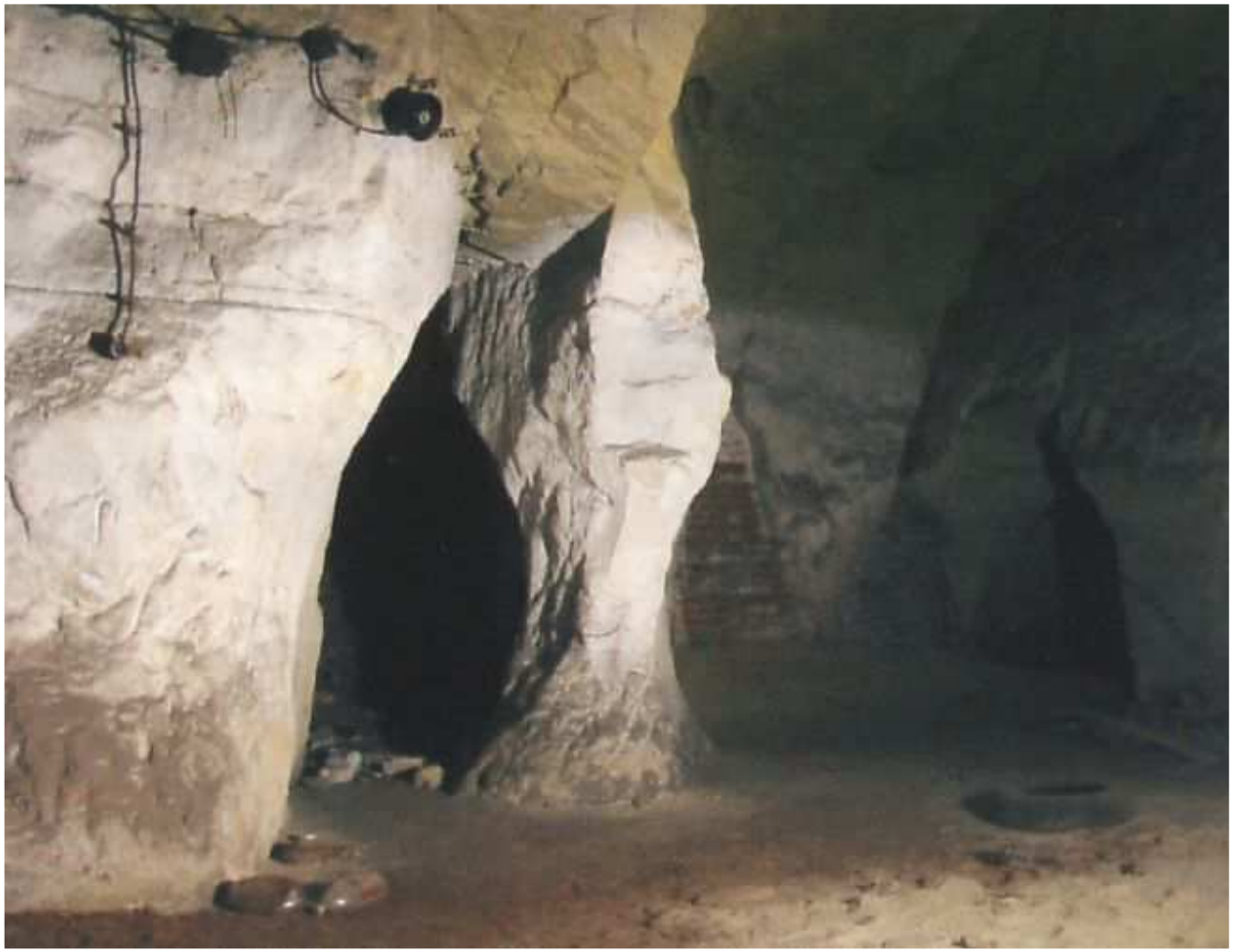

Photo: J. Lešner

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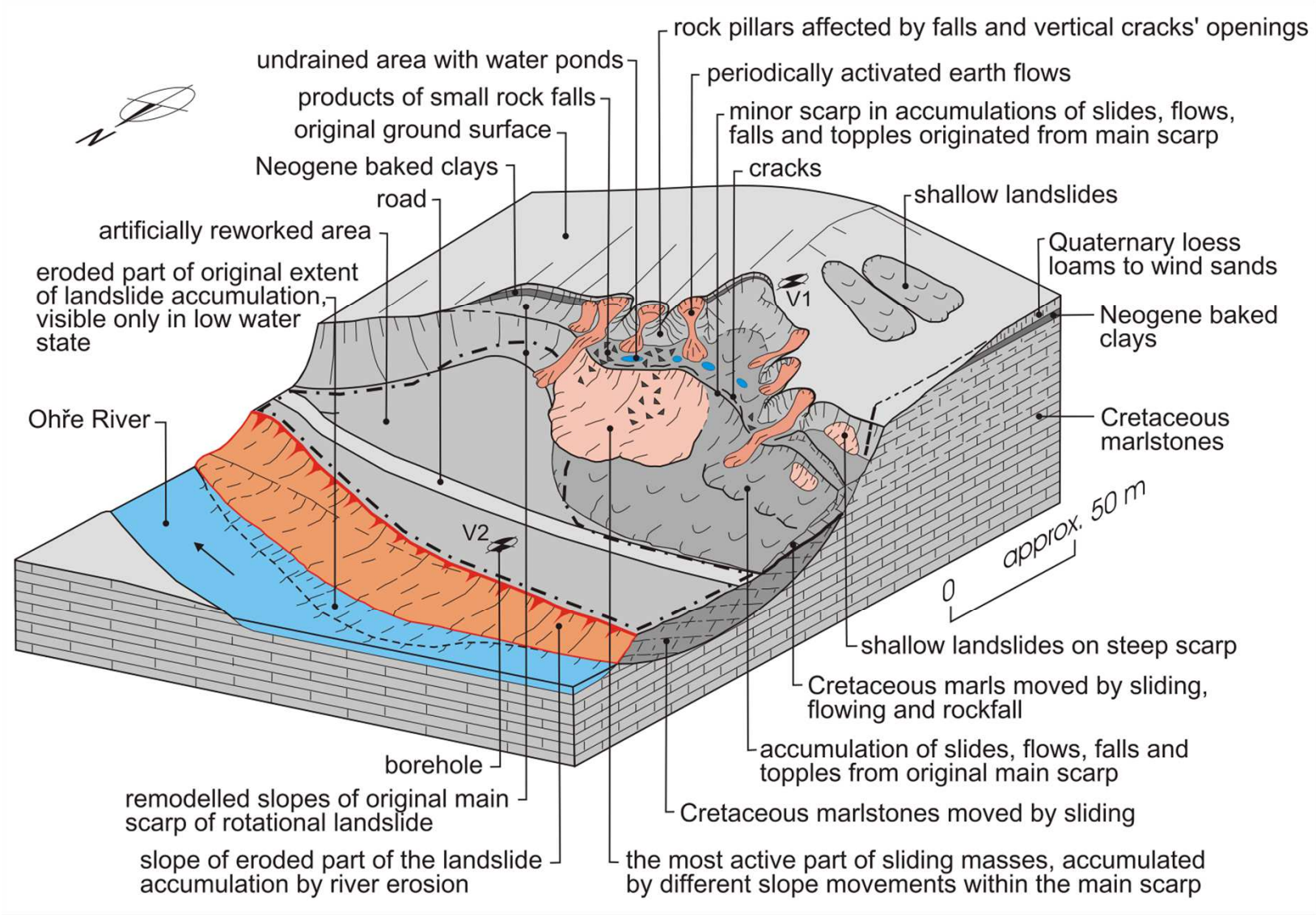
Observational model



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Rock fall

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Topples

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Earth flow

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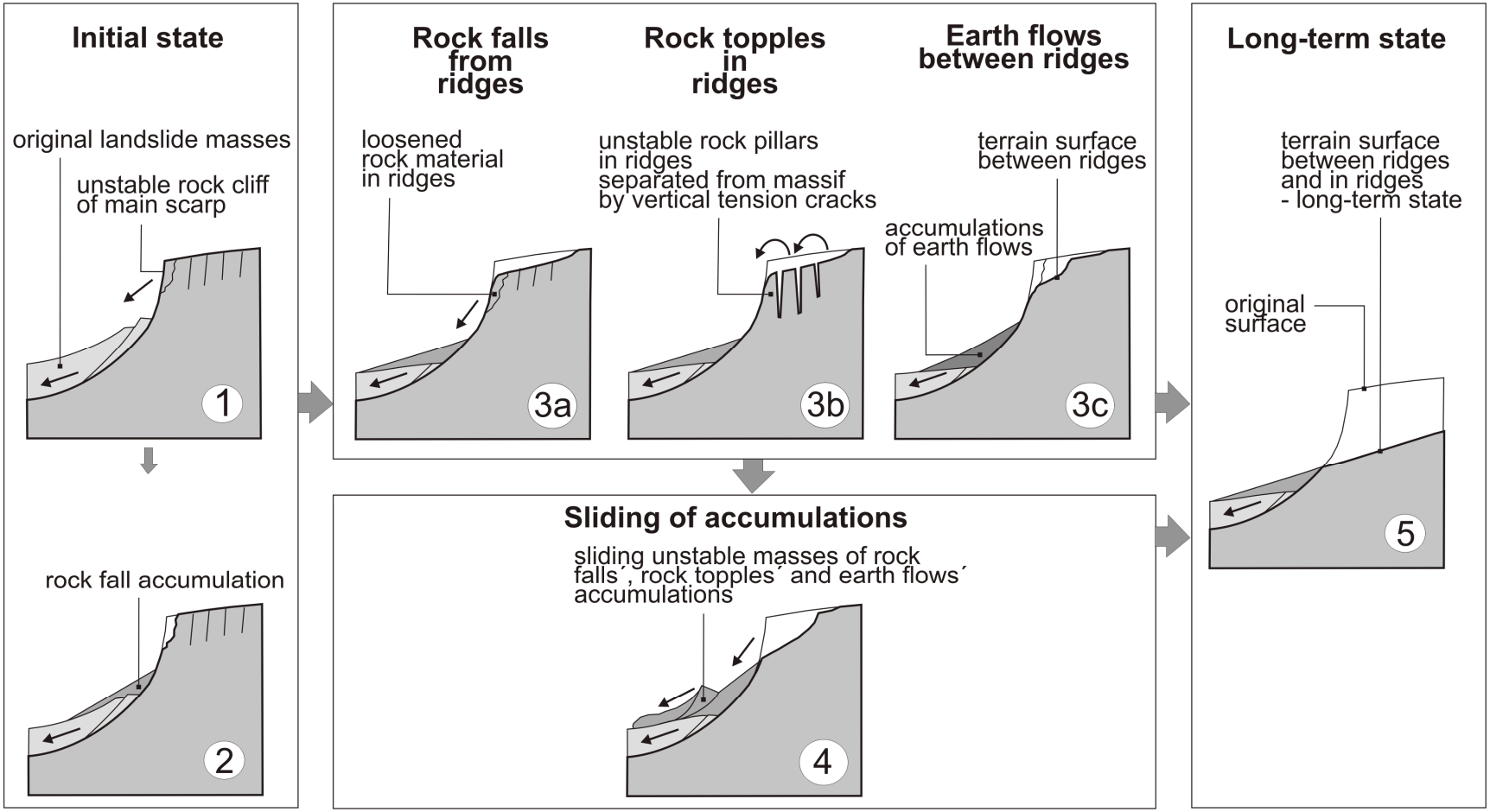
Conceptual model



After Novotný in press