Tectonic maps in areas of deposition of exotic olistolithes – application to the Northern Calcareous Alps of Austria

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A tectonic map shows the architecture of the upper portion of the earth's crust, and thus depicts the geometric relationship of tectonic units. Tectonic units are fault-bounded and transported relative to each other. In most cases, tectonic units are separated by faults. However, it gets more complicated in cases when deformation and deposition are contemporaneous. This is the case on continental margins. Many continental margins are subject to gravitative deformation, resulting in small- and large scale slumping and sliding. When “exotic”, (i.e. material derived from another unit as compared to the unit on which it comes to rest), and large (mountain-sized) slides are emplaced, and these slides are buried by sediments, the order of tectonic units in maps gets confusing.

In most cases, exotic olistoliths are interpreted to originate from another paleogeographic unit, however the sediments covering the olistoliths are part of the sedimentary succession of the underlying unit. To avoid confusion, slide planes at the bases of olistoliths should be distinguished from the top surfaces of olistoliths, that are unconformities after burial. Therefore I suggest to introduce a new type of tectonic boundary: (angular) unconformities between tectonic units. These are distinguished from “common” angular unconformities that may occur within tectonic units.

This new way of depicting tectonic contacts is applied to the central sector of the Northern Calcareous Alps of Austria. During the Early Upper Jurassic, huge olistoliths were mobilized on this deep-water continental margin. Middle to Upper Triassic pelagic limestones deposited on different parts of the continental slope, and platform limestones interfingering with pelagic limestones did slide onto the more internal part of the continental margin, creating a morphology that persisted into the Late Jurassic and was successively buried und thus unconformably overlain by Upper Jurassic and younger deposits.

Direct evidence of Upper Jurassic wrench faulting that could contribute to the mobilization of olistoliths is given by growth strata in Upper Jurassic deposits adjacent to a transpressive E-W fault in the area (Ortner, 2017).

References:

Ortner, 2017. Geometry of growth strata in wrench-dominated transpression: 3D-model of the Upper Jurassic Trattberg rise, Northern Calcareous Alps, Austria. Geophysical Research Abstracts, 19, EGU2017-9222.