

Zeitschrift: Jahresbericht der Naturforschenden Gesellschaft Graubünden
Herausgeber: Naturforschende Gesellschaft Graubünden
Band: 114 (2007)

Artikel: The Err- and Platta-nappes in Central Grisons : a unique place to study how continents break apart and oceans form
Autor: Manatschal, Gianreto
DOI: <https://doi.org/10.5169/seals-595016>

Nutzungsbedingungen

Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. [Mehr erfahren](#)

Conditions d'utilisation

L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. [En savoir plus](#)

Terms of use

The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. [Find out more](#)

Download PDF: 19.03.2026

ETH-Bibliothek Zürich, E-Periodica, <https://www.e-periodica.ch>

The Err- and Platta-nappes in Central Grisons: a unique place to study how continents break apart and oceans form

von Gianreto Manatschal

Adresse:
CGS-EOST
Université Louis Pasteur
1 rue Blessig
F-67084 Strasbourg

Die Err- und Platta-Decken in Mittelbünden:
Ein einzigartiger Platz, um die Prozesse zu
studieren wie Kontinente auseinanderbrechen
und Ozeane sich bilden

Zusammenfassung

Die südpeninischen Platta- und die ostalpinen Err-Decken, im Gebiet zwischen dem Oberhalbstein und dem Engadin, bestehen aus Relikten eines ehemaligen jurassischen Ozean-Kontinent-Übergangs. Der stratigraphische und strukturelle Aufbau dieses Ozeanrandes lässt sich mit heutigen atlantischen Kontinentalrändern vergleichen und erlaubt Wissenschaftlern die Prozesse, die zur Bildung von Ozeanen führen zu studieren.

Schlagworte: Err- und Platta-Decken, Ozean-Kontinent-Übergang, Platten-Tektonik, Alp Flix, Graubünden

The Lower Austroalpine Err- and the South-Pennine Platta-nappes in Central Grisons preserve remnants of the transition between a former continent

(Adria) and the Alpine Tethys Ocean (Fig. 1). This ocean-continent transition was reactivated during Alpine compression and remnants of this transition form today the mountain ridges between Val Surses and the Engadine Valley. The Err- and Platta-nappes preserve one of the world best studied fossil examples of an ocean continent transition and represent therefore a unique geological archive. In present-day oceans the transition between continental and oceanic crusts is located in deep margins, where it is covered by kilometres of sediments and water. Therefore, present-day examples can only be studied either by deep-sea drilling or geophysical surveys, both of which are extremely expensive. The Err- and Platta-nappes constitute therefore a unique natural laboratory to study how continents break apart and oceans form. While the aim of our research is purely academic, the results have direct implications for the survivability of syn- to post-rift petroleum systems in deep margins and have therefore major economic importance. Deep margins represent one of the last frontiers for the hydrocarbon industry. Geologists from all around the world visit the Err- and Platta-nappes to study the rocks and structures that tell us how deep margins formed and continents break apart.

Already in the beginning of the 20th century, Gustav Steinmann concluded that the serpentinites, basalts and gabbros exposed in the Alp Flix area formed remnants of an ancient ocean floor that was covered by radiolarian cherts, interpreted as deep-sea sediments (for more details see BERNOULLI et al. 2003). This pioneering interpretation, also known as the «Steinman trinity» was at the origin of the ophiolite concept. Important contributions came also from CORNELIUS (1932), STÖCKLIN (1949), DIETRICH (1969), FINGER (1978) and TRÜMPY (1975), who mapped, described and interpreted the geology of the Err- and Platta-nappes (see MANATSCHAL and NIEVERGELT 1997

for more details). These studies formed the basis for a research project that was initiated by Niko Froitzheim back in the eighties. FROITZHEIM and EBERLI (1990) were the first to recognize the existence of pre-Alpine, rift related low-angle detachment faults in the Piz Err-Piz Bial area. Since the early nineties, many Master, Ph.D. and Post Doc projects were conducted and financed by the ETH and the Swiss National Science Foundation and, since 2000, by the University of Strasbourg, the French Margins Program and the hydrocarbon industry. The aim of these projects was to study how continents break apart and oceans form. The various studies investigated the

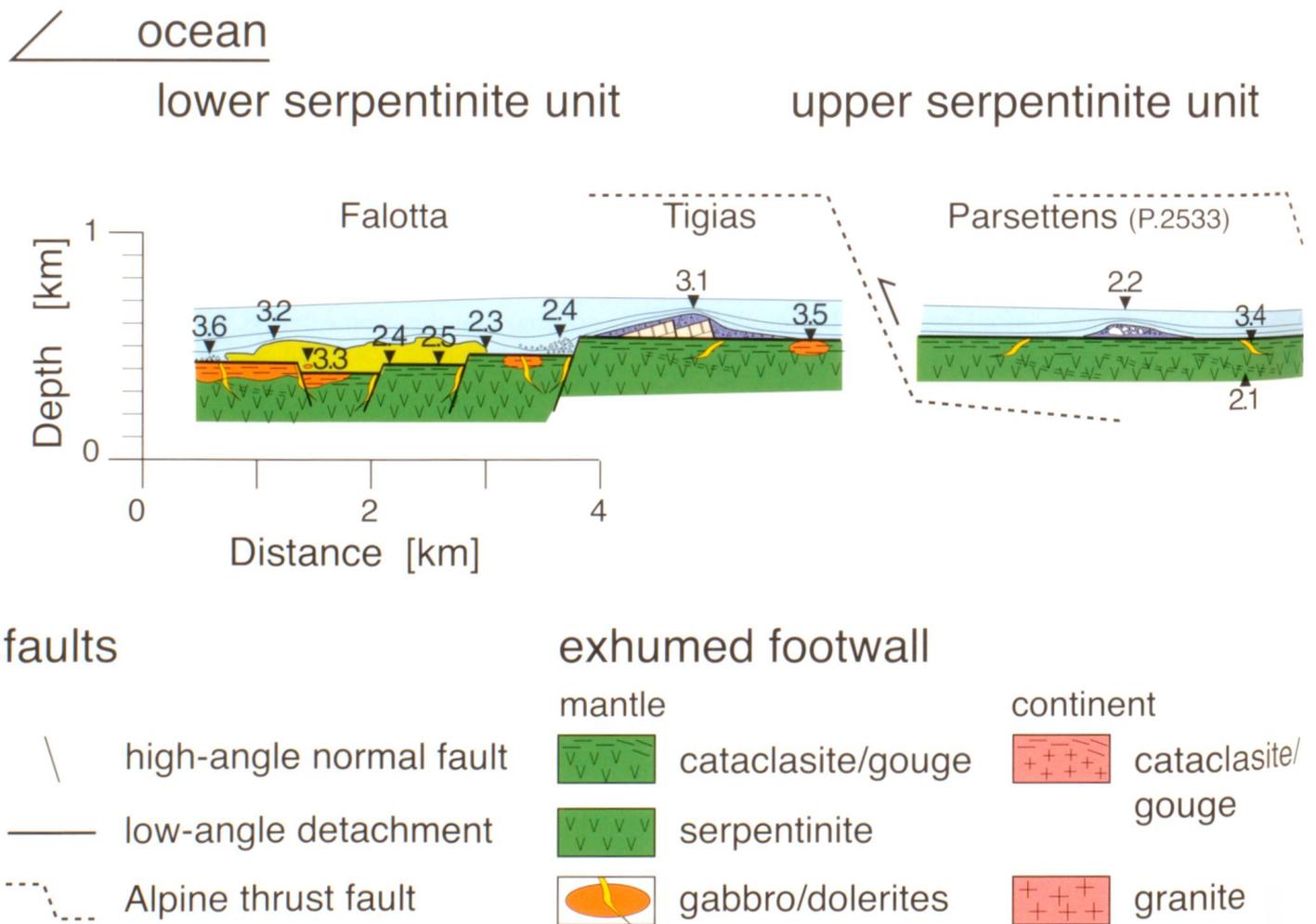
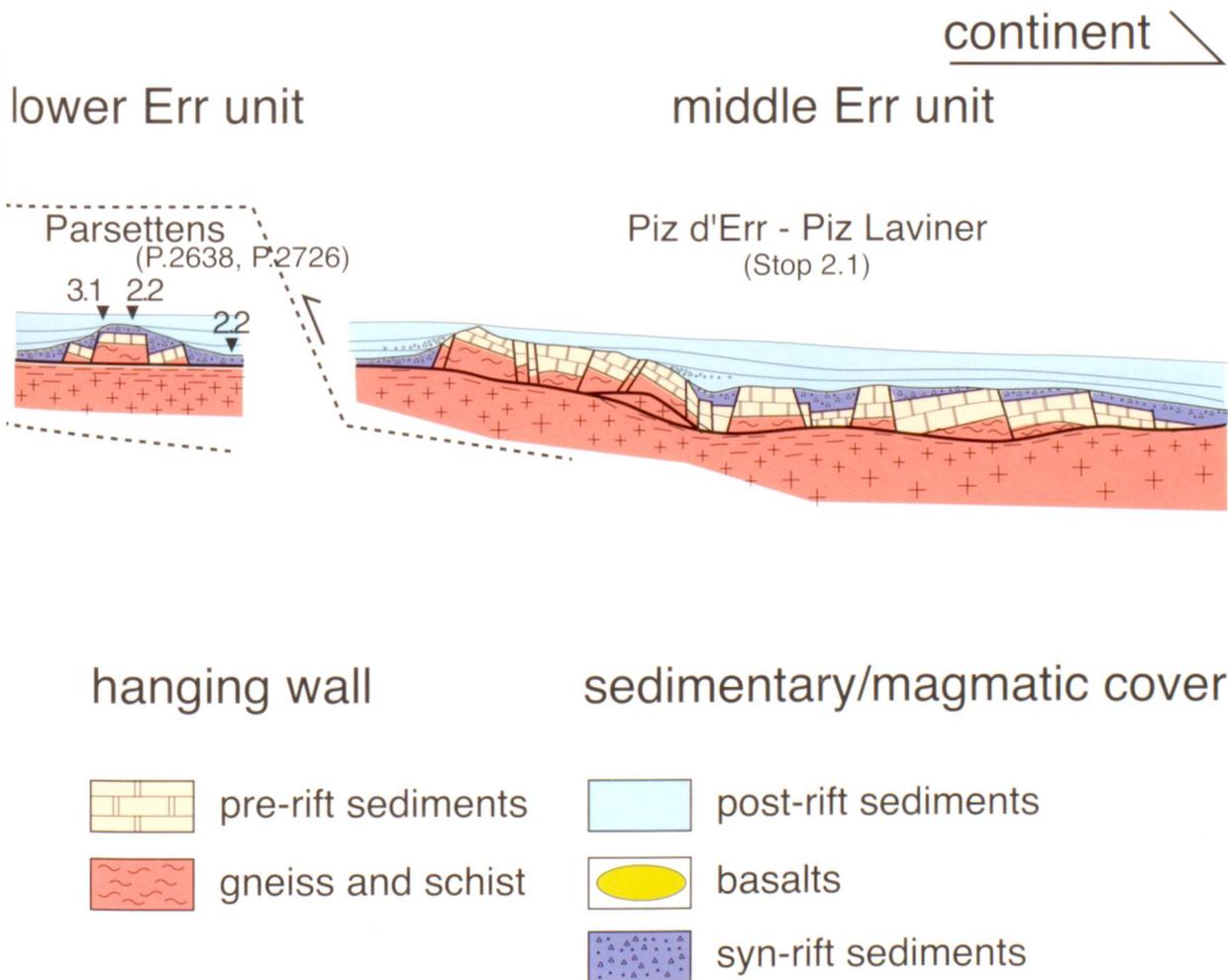


Fig. 1: Palinspastic reconstruction of the Err-Platta ocean-continent transition. Numbers in the figure refer to stops described in a field guide published by MANATSCHAL et al. (2003) (see reference).

petrographic, structural and sedimentological evolution of final rifting and early seafloor spreading. These research projects were carried out in close relationship with studies conducted in the Atlantic Ocean (Ocean Drilling Program) (WHITMARSH et al. 2001) and with numerical modelers (LAVIER and MANATSCHAL 2006). These studies made that the Err- and Platta nappes are at present the best described analogues of an ocean continent transition exposed on land. This explains the large international interest, as well as the many international meetings and excursions by scientists and industry people in the last years, as well as a large number of scientific publications

(for references see MANATSCHAL 2004 and web sites referred below). At present, the research in the Err- and Platta-nappes enters an important phase of major development as indicated by the initiation of three Master and two PhD theses in the last three years. Although the aim of these studies is to understand how continents break apart and oceans form, the results of these projects will result in a better understanding of the regional geology of the Err- and Platta-nappes and ultimately contribute to the understanding of the variability of the bedrock, soil and topography that preconditions the development and variability of the plants and animals in the Alp Flix area.



1. Literature

- BERNOULLI, D.; MANATSCHAL, G.; DESMURS, L.; MÜNTENER, O. (2003): Where did Gustav Steinmann see the trinity? Back to the roots of an Alpine ophiolite concept. In Dilek, Y. and Newcomb, S., eds. *Ophiolite concept and the evolution of geological thought*: Boulder, Colorado, Geological Society of America Special Paper 373, 93–110.
- CORNELIUS, H.P. (1932): Geologische Karte der Err-Julier-Gruppe 1:25 000, in zwei Blättern, Westblatt. Schweiz. geol. Komm.
- DIETRICH, V. (1969): Die Ophiolithe des Oberhalbsteins (Graubünden) und das Ophiolithmaterial der ostschweizerischen Molasseablagerungen, ein petrographischer Vergleich. Bern, Verlag Herbert Lang, pp. 179.
- FINGER, W. (1978): Die Zone von Samaden (Unterostalpine Decken, Graubünden) und ihre jurassischen Brekzien. Mitt. geol. Inst. ETH und Univ. Zürich, NF 224, pp.139.
- FROITZHEIM, N.; EBERLI, G.P. (1990): Extensional detachment faulting in the evolution of a Tethys passive continental margin, eastern Alps, Switzerland. *Geol. Soc. Am. Bull.* 102:1297–1308.
- LAVIER, L.L.; MANATSCHAL, G. (2006): A mechanism to thin the continental lithosphere at magma-poor margins. *Nature* 440: 324–328.
- MANATSCHAL, G.; NIEVERGELT, P. (1997): A continent-ocean transition recorded in the Err- and Platta-nappes (eastern Switzerland). *Eclogae Geol. Helv.* 90:3–27.
- MANATSCHAL, G.; MÜNTENER, O.; DESMURS, L.; BERNOULLI, D. (2003): An ancient ocean-continent transition in the Alps: the Totalp, Err-Platta, and Malenco units in the eastern Central Alps (Graubünden and northern Italy). *Eclogae geol. Helv.*, 96, 131–146.
- MANATSCHAL, G. (2004): New models for evolution of magma-poor rifted margins based on a review of data and concepts from West Iberia and the Alps. *International Journal of Earth Sciences* 93:432–466.
- STÖCKLIN, J. (1949): Zur Geologie der nördlichen Errgruppe zwischen Val d'Err und Weissenstein (Graubünden). Ph. D. thesis ETH Zürich, pp. 105.
- TRÜMPY, R. (1975): Penninic-Austroalpine boundary in the Swiss Alps: a presumed former continental margin and its problems. *Amer. J. Sci.* 275, 209–238.
- WHITMARSH, R.B.; MANATSCHAL, G.; MINSHULL, T.A. (2001): Evolution of magma-poor continental margins from rifting to sea-floor spreading. *Nature* 413:150–154.

2. Links

- Die Erdölforscher im Engadin (video)
www.sf.tv/sf1/einstein/index.php?docid=20071018
- IODP International Workshop: Investigating Continental Breakup and Sedimentary Basin Formation. Pontresina, Switzerland, September 15–18, 2006
www.iodp.org/continental-breakup
- InterMARGINS Workshop: «Modeling the Extensional Deformation of the Lithosphere» (IMEDL 2004), Pontresina, Switzerland. July 11–16, 2004
www.intermargins.org/workshop/workshop2004.php

Die Veröffentlichungsreihe «Jahresbericht der Naturforschenden Gesellschaft Graubünden» ist ein Forum für die naturwissenschaftliche Forschung in und über Graubünden. Neben der aktuellen Information dient sie auch der Dokumentation von Forschungsarbeiten. Diese Ausgabe enthält neben 14 Arbeiten über die Biodiversitätsforschung auf der Alp Flix (Gemeinde Sur, Graubünden) auch je einen vegetationskundlichen, ornithologischen und erdwissenschaftlichen Beitrag.