

Editorial

This section of the special volume of E&G Quaternary Science Journal published for the XVIII INQUA congress in Bern 2011 includes four articles dealing with the Quaternary stratigraphy of the Northern Alpine Foreland.

It has to be remembered that the Northern Alpine Foreland played an important role in scientific history of Quaternary research. It was in Switzerland where the theory of Quaternary glaciations was originally developed in the early 19th century by Ignatz Venetz and others, before it got later globally promoted by Louis Agassiz. In Southern Germany, Albrecht Penck and Eduard Brückner set a landmark at the dawn of the 20th century by introducing the first complex stratigraphy of Quaternary glaciations, with the famous subdivision into four glaciations named Günz, Mindel, Riss and Würm, separated by interglacials.

In 1990, the working group on Quaternary Stratigraphy of the Alpine Foreland (AGAQ) was established under the lead of Karl-Albert Habbe (1928–2003). The aim of this group is to improve correlations of stratigraphic schemes in different regions of the Northern Alpine Foreland.

After 20 years of work, the XVIII INQUA congress 2011 in Bern is considered as the most appropriate occasion to present the work of AGAQ to an international audience. The four contributions from Switzerland, Southern Germany (Baden-Württemberg, Bavaria) and Austria review and discuss regional stratigraphic schemes in detail. It has been the aim to present particular field evidences forming the basis of the subdivision of the Quaternary. Authors were given the possibility to present their arguments in detail and argue towards relevant specialities of local Quaternary stratigraphic schemes. It is important to note that all the stratigraphic schemes presented are actually used in the maps of the different Geological Surveys. We thank the referees for the sometimes difficult task of reviewing papers that are beyond the norm usually found in scientific journal, for example with regard to length.

It is a difficult task to decipher the problems of different approaches, assumptions and natural environments in the papers. May the following figures and tables offer some preliminary ideas: Fig. 1 gives an overview of the investigated areas. Fig. 2 displays a section through the investigated areas. Tab. 1 opposes the titles of the presented papers, main targets of the authors and main stratigraphic

approaches. Tab. 2 gives information about important investigated subjects and Tab. 3 summarizes the relation to the scientific work of Albrecht Penck.

We can assume

- that it is a strange idea to divide and investigate the Alpine ice cap along country's frontiers (Fig. 1).
- that during the last glacier maximum the Alpine ice was not equally shared in the Alpine Forelands of Switzerland, Baden-Württemberg, Bavaria and Austria (Fig. 2).
- that details of stratigraphical approaches differ (Tab. 1)
- that glacial, proglacial and periglacial environments are not equally assessed (Tab. 2)
- that axioms are the base of our research (Tab. 3)
- that before the correlation of different stratigraphical results the basic axioms, points of view and the investigated subjects have to be examined.

One of our numerous questions about correlation concerns the outline of the formerly glaciated areas: it is well accepted that major glaciers react more slowly to climate change than small glaciers. Is it meaningful to compare our observations of terminal moraines from the giant foreland glaciers in the west to the small valley glaciers in the east?

Definitely we have to go on with our (working group) discussions...! And the four presented papers offer exiting details about local scientific approaches, scope, chronology, stratigraphy and landscape developments...!

Thank you very much all the colleagues, who supported this volume: Frank Preusser for networking and special advice! Reviewers for many valuable comments! Geozon handled the manuscripts professionally! Helene Pfalz-Schwingschlögl (Universtät für Bodenkultur Wien) designed several drawings! DEUQUA president Margot Böse and the DEUQUA steering committee offered generously to publish in E&G! Members of AGAQ (www.baunat.ac.at) discussed stratigraphy during 20 years.

Last but not least INQUA congress president Christian Schlüchter helped, encouraged and provided (together with his team) the fantastic international audience during INQUA congress 2011 in Berne (Switzerland)! Thank's a lot!

MARKUS FIEBIG
Chair of the AGAQ community

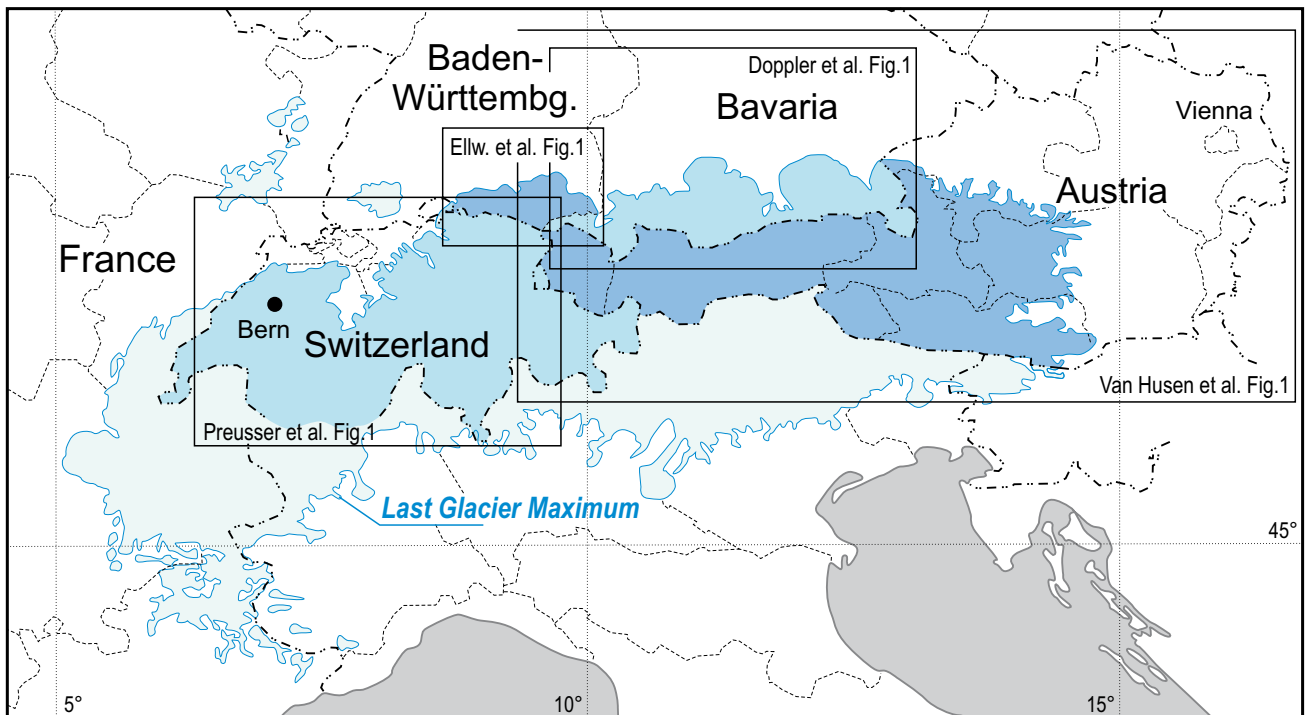


Fig. 1: Contemplating the Alpine ice cap, we notice that Switzerland was almost entirely covered by ice during the last glacier maximum (in light blue). PREUSSER et al. focused on the northern part of Switzerland in their contribution. In Austria the last glacier maximum covered only the western, inner alpine part of the country (dark blue). Baden-Württemberg and Bavaria were covered by ice only in their southern most parts. The investigated Rhine glacier area (Fig. 1 of ELLWANGER et al.) is in comparison to the other formerly four glaciated and investigated areas smaller. However, all countries intersect in the Rhine glacier area. It is the transition zone between Rhenish drainage to the west (and north) and Danubian drainage to the east.

Abb. 1: Beim Betrachten der alpine Eiskappe (während der letzten Eiszeit) fällt zunächst auf, dass die Schweiz annähernd komplett vergletschert war (in hellblau dargestellt). Der Artikel von PREUSSER et al. beschäftigt sich hauptsächlich mit dem ehemaligen Nordrand dieser Vergletscherung. In Österreich bedeckten die Gletscher während des letzten Maximalstands vor allem westliche und inneralpine Landesteile (in dunkelblau dargestellt). Baden-Württemberg und Bayern waren nur in den südlichsten Anteilen eisbedeckt. Das Rheingletschergebiet (vgl. Abb. 1, ELLWANGER et al.) ist deutlich kleiner als die anderen untersuchten Gebiete. Aber gerade in diesem kleineren Untersuchungsgebiet treffen die vier untersuchten Länder zusammen. Dieses Gebiet ist gleichzeitig auch der Übergangsbereich zwischen der Rheinischen Entwässerung nach Westen (und Norden) und der Danubischen Entwässerung nach Osten.

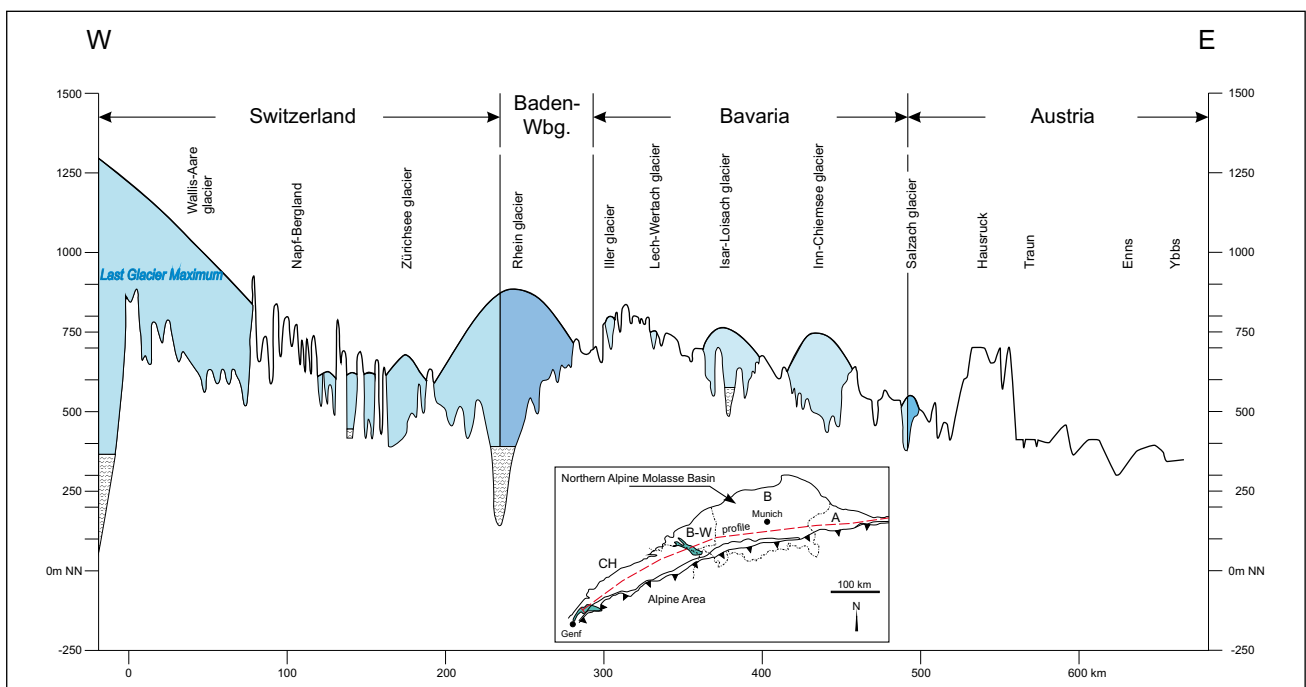


Fig. 2: A section through the Alpine Foreland in front of the tectonic Alpine border during the last glacier maximum. The section displays the thick ice cover in the western Rhenish part. The foreland ice thins out to the east. This difference of ice extent seems to be controlled by Alpine topography and precipitation and it is an open question if stratigraphic correlations between the eastern and western Alpine Foreland are straightforward.

Abb. 2: Ein Schnitt durch das Alpenvorland vor der Front der tektonischen Alpenstirn während des letzten Gletschermaximalstands. Der Schnitt zeigt die mächtige Eisbedeckung im westlichen rheinisch entwässernden Teil. Nach Osten dünnt das Vorlandeis aus. Dieser Unterschied in der Eisbedeckung dürfte durch die alpine Gebirgstopographie und die Niederschlagsverteilung ausgelöst worden sein und wirft die Frage auf, ob einfache Korrelationen zwischen dem westlichen und dem östlichen Teil möglich sind.

Tab. 1: A comparison of title, main target and main stratigraphic systems **based on the authors own assessment in the abstracts**. To study abstracts and titles is naturally a first approach to understand main thoughts and concerns of the authors. For example, the titles indicate that PREUSSER et al. and ELLWANGER et al. focus more on local earth history while DOPPLER et al. and VAN HUSEN & REITNER present their nomenclature and system. To correlate stratigraphic results is not simple and needs careful examination of the authors point of view and of the investigated subjects.

Tab. 1: Ein Vergleich der Titel, der angepeilten Inhalte und der hauptsächlichlichen stratigraphischen Gliederungsansätze **basierend auf dem Textkondensat der Autoren in Form ihrer jeweiligen Text-Zusammenfassungen**. Den Titel und den Abstrakt einer Publikation als erstes zu lesen ist natürlich der normale Zugang zu Publikationen. Genaueres Studium dieser Zusammenfassungen kann vor allem beim Vergleichen ähnlicher Artikel zu besonders betonten Aspekten führen. Ein einfaches Beispiel: schon vom Titel her scheinen PREUSSER et al. und ELLWANGER et al. vor allem die Landschafts- und Erdgeschichte mit ihren Artikeln vermitteln zu wollen. DOPPLER et al. und VAN HUSEN & REITNER dürften dagegen ihre stratigraphischen Begrifflichkeiten und das dazugehörige System (der Geologischen Karten) hauptsächlich im Sinn gehabt haben. Solche unterschiedlichen (Text-)Ansätze zu korrelieren ist weder simpel, noch kann dabei auf ein genaues Studium der subjektiven Ausgangspunkte der Bearbeiter und der objektiven Unterschiede der untersuchten Objekte verzichtet werden.

Papers [this volume] Status 30.04.11	PREUSSER et al.	ELLWANGER et al.	DOPPLER et al.	VAN HUSEN & REITNER
Title of the paper	"Quaternary glaciation history of northern Switzerland"	"The Quaternary of the southwest German Alpine Foreland [Bodensee-Oberschwaben...]"	"Quaternary stratigraphy of southern Bavaria"	"An outline of the Quaternary stratigraphy of Austria"
Main target of the paper mentioned in the abstract	To present "a revised glaciation history of northern ..." Switzerland	"The glacial sediments and landforms are described by units..." in Baden-Württemberg	"A review of current stratigraphical systems ... of Southern Bavaria ..."	"An overview of the Quaternary stratigraphy in Austria is given"
Main stratigraphical systems mentioned in the abstract	"MN 17", "...glacial cycle... comprises.. independent glacial advances", "radiocarbon chronology"	"chronostratigraphical system", "lithostratigraphic system", "...a system of unconformity bounded sedimentary units...", "terrace stratigraphy"	"Climate and Terrace stratigraphy", "...traditional classification after PENCK & BRÜCKNER [1901-1909] and its enhancements ...", "so-called morphostratigraphy",	"Mappable depositional units", "lithostratigraphy [lithic properties]", "allostratigraphy [e.g. unconformities]", "Paleomagnetically correlated..." Marine Isotope Stages [MIS]

Tab. 2: Main investigated sedimentary units, landscape elements and landscape developments (**again based on the authors own assessment in the abstracts**). As the investigated landscapes are different the authors observe and value different subjects. For example "Deckenschotter" seems to be a very important key word in the west (PREUSSER et al., ELLWANGER et al.). Loess and loess-paleosol-sequences seem to be crucial for the stratigraphy of Austria. The investigated landscape has an impact on researchers approach to stratigraphy.

Tab. 2: Hauptsächlich untersuchte Sedimente, Landschaftselemente und Landschaftsentwicklungen (**wiederum auf der Basis der Textkondensate der Autoren in Form ihrer jeweiligen Text-Zusammenfassungen**). Da die untersuchten Landoberflächen unterschiedlich sind, haben die Autoren unterschiedliche Beobachtungen gesammelt und bewerten diese Objekte unterschiedlich. Zum Beispiel „Deckenschotter“ scheinen ein ganz wichtiges Stichwort für die Stratigraphie im Westen zu sein (PREUSSER et al., ELLWANGER et al.). Löss und Löss-Paläoboden-Sequenzen sind offenbar sehr wichtige und tragende Elemente der Stratigraphie in Österreich. Solche unterschiedlichen Landschaften dürften einen Einfluss auf den Zugang der WissenschaftlerInnen zur Stratigraphie haben.

Authors Papers [this volume] Status 30.04.11	PREUSSER et al.	ELLWANGER et al.	DOPPLER et al.	VAN HUSEN & REITNER
Important sedimentary units mentioned in the abstract	"multiphase gravels intercalated by till and overbank deposits ["Deckenschotter"]...", "two complex units [Höhere... Tiefere Deckenschotter].."	"... fluvial gravels... [Deckenschotter]...", "glacial and meltwater deposits", "glacial till"	"continental deposits"	"...fluvial accumulation and loess deposition.", "...loess-paleosol-sequences..", "...proglacial sediments topped by basal till..."
Main landscape elements mentioned in the abstract	"Alpine Rhine", "... differences in the base level., "...most extensive glaciation..."	"Bodensee amphitheatre", "Rhineglacier", "alpine Rhine valley", "terrace levels"	"Terrace sequences were crucial...", "terminal moraines constitute Glaziale Serien with associated terraces..."	"...terminal moraines linked with terrace bodies...", "major glaciations"
Main [local] landscape development mentioned in the abstract	"...Deckenschotter are separated from Middle Pleistocene by a period of important erosion... re-direction of the Alpine Rhine...[Middle Pleistocene Reorganisation...]", "... Middle-late Pleistocene comprises 4 or 5 glaciations..."	"Transformation of alpine margin from a ramp of foothills to ...overdeepened amphitheatre...", "...evolving alpine source...", "foothill landscape towards present topography."	No explicit landscape development in the focus of the abstract	No explicit landscape development mentioned, "...climate deteriorations and consequently glaciations..."

Tab.3: ALBRECHT PENCK (1858–1945) provided in his publications axioms for Quaternary research like the base level concept. In the Bavarian Alpine foreland he derived his model of four glaciations. In the text body by DOPPLER et al. addicted about 13 % of all their mentioned citations to PENCK. In the other papers between 5.6 and 7.8 % of citations are dedicated to PENCK. Use of Pencks paradigm is still a very important factor. His scientific legacy includes famous local studies and general orientations for several generations of researchers.

Tab. 3: ALBRECHT PENCK (1858–1945) lieferte in seinen Publikationen grundlegende Annahmen (Axiome) für die nachfolgende Quartärforschung wie zum Beispiel das so genannte Leitfossil der Penck'schen Quartärstratigraphie: die Schotterunterkante. Im Bayerischen Alpenvorland hat er sein Modell der vier Eiszeiten abgeleitet. DOPPLER et al. haben 13 % ihrer Zitate im Text Penck gewidmet. In den anderen Publikationen weisen zwischen 5,6 und 7,8 % aller Zitate auf PENCK hin. Die Penck'schen Grundannahmen (Paradigmen) werden also auch 100 Jahre nach ihrer Publikation als sehr wichtig erachtet. Sein wissenschaftliches Vermächtnis enthält neben generellen Leitlinien für Forschergenerationen auch berühmt gewordene Detailstudien.

Papers [this volume] Status 30.04.11	PREUSSER et al.	ELLWANGER et al.	DOPPLER et al.	VAN HUSEN & REITNER
Total number of references	70 [100 %]	56 [100 %]	167 [100 %]	125 [100 %]
"PENCK" citations in references	1 [1.4 %]	1 [1.8 %]	4 [2.4 %]	3 [2.4 %]
Total number of citations in text body [without fig.]	125 [100 %]	115 [100 %]	447 [100 %]	312 [100 %]
"PENCK" citations in text	7 [5.6 %]	9 [7.8 %]	58 [13 %]	19 [6 %]

List of some participants of AGAQ meetings:

Uwe Abramowski, Naki Akcar, Ali Aktas, Helga Alten-schmidt, Erich Bauer, Raimo Becker-Haumann, Otfried Baume, Ute Bellmann, Christof Benz, Erhard Bibus, Lukas Bickel, Wolfgang Bludau, Ronny Boch, Wolfgang Boenigk, Sigmar Bortenschlager, Margot Böse, Karl Brunnacker, Björn Buggle, Katrin Büsel, Sixten Bussemer, Andreas Dehnert, Demel, Kathrin Dick, Georg Dietmair, Gerhard Doppler, Dostler, Ilse Draxler, Ruth Draxler, Ruth Drescher-Schneider, Rudolf Ebel, Bernhard Eitel, Dietrich Ellwanger, Markus Felber, Wolfgang Fessler, Lea Fixl, Thomas Forster, Horst Frank, Manfred Frechen, Burkhard Frenzel, Kurt Fromm, Gerhard Furrer, Dorian Gaar, Andreas Gerth, Benjamin Geßlein, Willibald Gleich, Christian Gnägi, Hansruedi Graf, Hans Graul, Walter Grottenthaler, Eberhard Grüger, Thomas Gubler, Thomas Haag, Karl Albert Habbe, Torsten Hahn, Peter Haldimann, René Hantke, Philipp Häuselmann, Klaus Heine, Hellrung, Matthias Hinderer, Raimund Hipp, Susan Ivy-Ochs, Hermann Jerz, Ulrich Jörin, Oskar Keller, Hanns Kerschner, Nicole Klasen, Maria Knipping, Hermann Kohl, Michael Kösel, Karl-Heinz Krause, Edgar Krayss, Ernst

Kroemer, Jörg Lämmermann-Barthel, Bernhard Lempe, Arne Link, Johanna Lomax, Manfred Löscher, Sven Lukas, Joachim Marcinek, Hella Marcinek-Kinzel, Holger Megies, Michael Meyer, Stefan Miara, Benjamin Müller, Erich Müller, Petra Münzberger, Heinrich Naef, Inge Neeb, Peter Peschke, Gerhard Poscher, Frank Preusser, Ralf Ramsch, Jürgen Reitner, Anne Reuther, Konrad Rögner, Axel Röhrig, Christian Rolf, Silke Sämman, Martin Sander, Ingo Schaefer, Gerhard Schellmann, Lorenz Scheuenpflug, Patrick Schielein, Wolfgang Schirmer, Christian Schlüchter, Thomas Schneider, Philippe Schoeneich, Herbert Scholz, Guntram Schönfeld, Udo Schreiber, Albert Schreiner, Herbert Schwarz, Sergey Sedov, Andreas Sekinger, Peter Sinn, Joel Spencer, Christoph Spötl, Reinhard Starnberger, Sabine Stopper, Christa Szenkler, Birgit Terhorst, Robert Traidl, Rolf Tschumpes, Thomas Untersweg, Brigitte Urban, Dirk van Husen, Rainer Verderber, Eckhard Villinger, Gerhart Wagner, Johannes Wallner, Samuel Wegmüller, Ralf Weinsziehr, Ulrike Wieland-Schuster, Johann Wierer, Georg Wyssling, Conradin Zahno, Michael Zech, Roland Zech, Wolfgang Zech, Ludwig Zöllner, Gabi Zollinger