

TRIP # 1.
CROSS SECTION THROUGH THE OIL AND GAS-BEARING
MOLASSE BASIN INTO THE ALPINE UNITS IN THE AREA OF
SALZBURG, AUSTRIA-BAVARIA

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ITINERARY

September 3rd

Departure of the field trip bus at 1:00 p.m. from the bus terminal at the Hilton hotel. Arrival at Salzburg approximately 5:00 p.m. Check in at the hotel (Leonharderhof) at St. Leonhard. Trip to Salzburg at 6:30 p.m, walk through the old town and dinner. Return to St. Leonhard approximately 10:00 p.m.

September 4th

Jurassic and Cretaceous of the Northern Calcareous Alps S of Salzburg
 Breakfast at 7:30 a.m., departure to Adnet at 8:30 a.m. Walk through the Adnet quarries. Lunch in a local restaurant. In the afternoon stops at the quarry of the Gartenau cement plant and at Fürstenbrunn ("Untersberger Marmor"). Return to the hotel at St. Leonhard at 6:00 p. m.. Dinner at 7:00 p.m. in a restaurant nearby the hotel.

September 5th

Comparison of Late Paleocene and Early Eocene facies of Rhenodanubian
Flysch and Helveticum. Tertiary Molasse.
 Breakfast at 7:30 a.m., departure at 8:30 a.m.. Outcrops N of Salzburg at Anthering (Paleocene to Early Eocene flysch), Kroisbach (Paleocene shelf), St. Pankraz (Early Eocene shelf) and Lukasedt (Miocene Molasse). Lunch in a local restaurant. In the afternoon visit of Molasse outcrops at the Traun section in Bavaria (Thalberggraben - Lower Egerian, Blaue Wand - Upper Egerian, Wernleithen - Kiscellian). Return to the hotel at St. Leonhard at 7:00 p.m.. Dinner at 8:00 p.m. in a restaurant nearby the hotel.

September 6th

Cretaceous of Rhenodanubian Flysch and Ultrahelveticum. Core storage display
of rocks from the Molasse basement and the Molasse.
 Breakfast at 7:30 a.m., Departure at 8:30 a.m. to Gmunden (Arrival approx. 10:00 a.m. at the Hatschek quarry, Maastrichtian of Rhenodanubian Flysch). Departure at 10:30 a.m. to the Rehkogelgrabensektion (Cretaceous marls of the Ultrahelveticum). Lunch in a local restaurant at 12:30 p.m. In the afternoon core display at Pettenbach. Return to Vienna at 4:00 p.m., arrival at the Hilton hotel approx. 7:00 p.m.

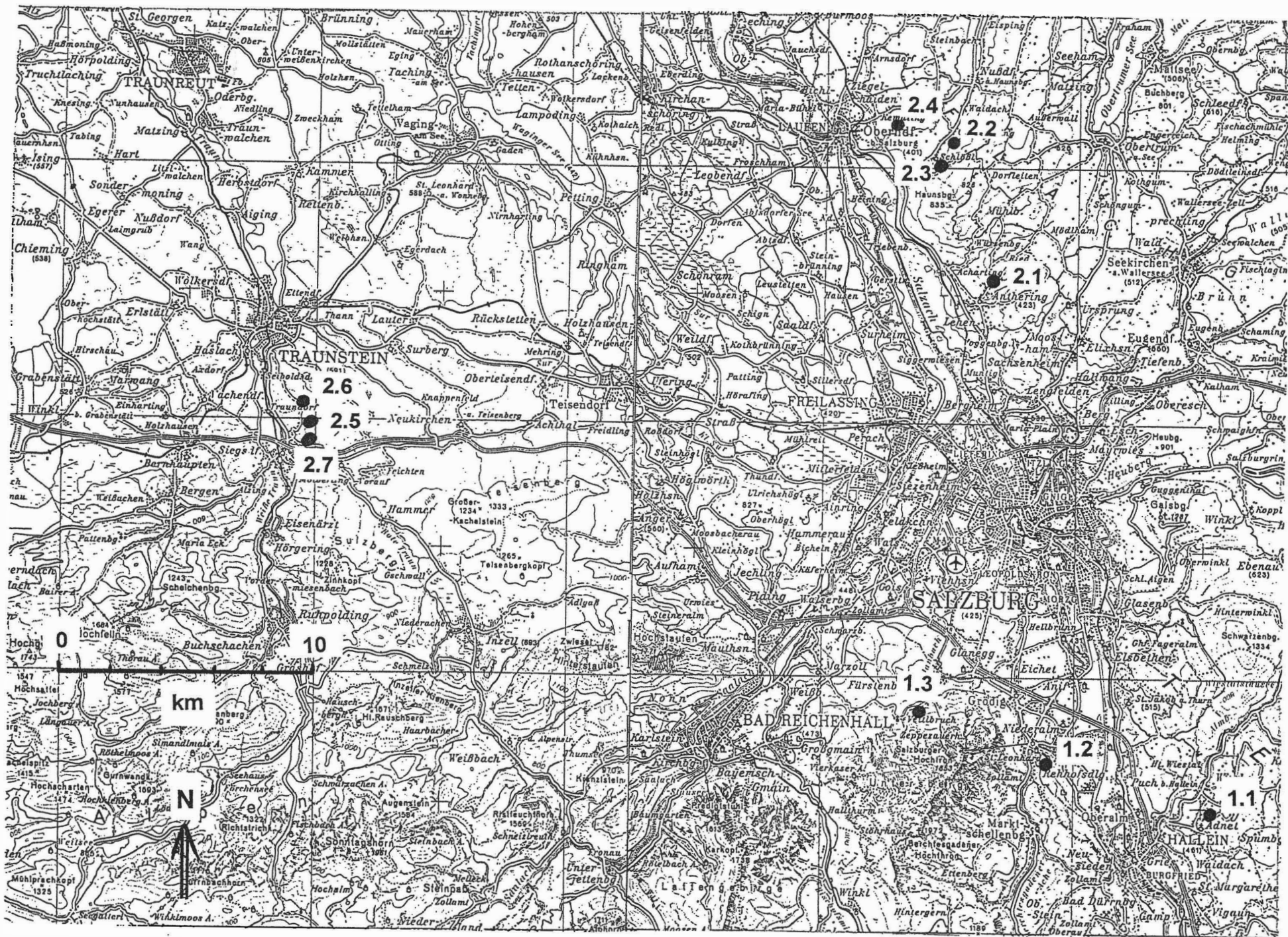


Fig.1 Location of the outcrops of the first two field trip days

INTRODUCTION

The Eastern Alps are a segment of the western Tethys orogenic belt. Tectonically displaced sedimentary rocks of the northern Eastern Alps constitute a complex nappe system, consisting of the Northern Calcareous Alps, Flysch, and Helvetic nappes. These units represent five main paleogeographic zones which are from south to north: (1) Northern Calcareous Alps (shelf and deep marine of the Adriatic continental microplate), (2) Flysch Zone (Penninic ocean), (3) Ultrahelvetic zone (continental slope), (4) Helvetic zone (shelf and slope of the European continental plate), (5) Molasse zone (foreland basin).

The Northern Calcareous Alps (NCA) are the uppermost nappe structure of the area. These nappes are thrust upon Flysch nappes to the north, which, in turn, overlie Helvetic nappes farther north. The NCA comprise a stratigraphic sequence from the late Permian to the early Tertiary. Together with their Palaeozoic basis - the Grauwackenzone - the NCA experienced décollement from the East Alpine Crystalline Basement. As a consequence of subduction and plate-collisions, during the Cretaceous a transport of the Upper East Alpine Units towards the west, respectively north, started. The Permotriassic of the NCA can be considered as

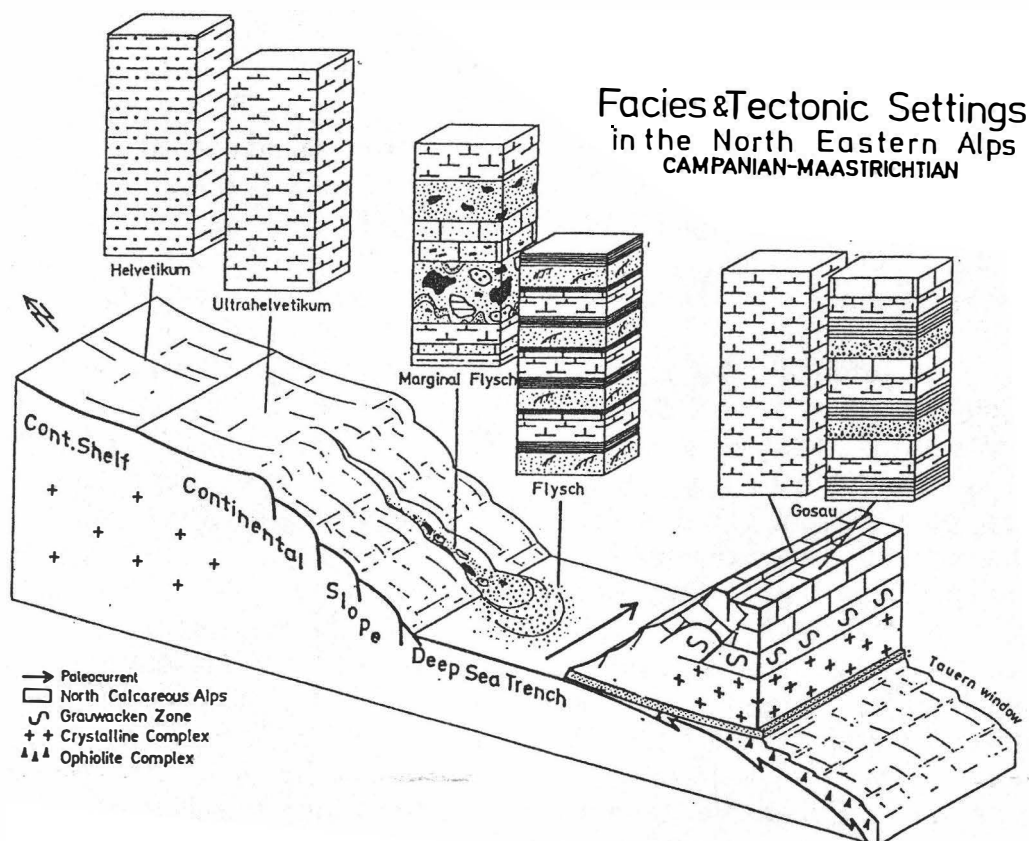


Fig. 2 Block diagram showing the Late Cretaceous arrangement of alpine facies zones

rift-stage of the Tethys ocean. In the early/middle Jurassic subsidence and the formation of basins took place (e.g. BÖHM et al. 1995). The thin crusts of Adnet Limestones (Stop 1.1) are deposited on deep-marine swells, which contrast with thick sequences of grey marly sediments of the Allgäu Fm. in the basins. In the early Cretaceous in-sequence overthrusting towards the NW started and the piggyback-basins of the Roßfeld Formation (Stop 1.2) were formed (WAGREICH in WAGREICH et al. 1996). Following the mid-Cretaceous overthrustings, a new sedimentary cycle started with the Gosau Group (Stop 1.3). In the Middle-Late Eocene the sedimentation in the NCA terminated as a consequence of collision of the East Alpine Unit with the stable southern rim of the European plate.

The Rhenodanubian Flyschzone constitutes a subunit of the Penninic nappe complex of the Eastern Alps. It comprises a stratigraphic sequence from the early Cretaceous (Barreme) to the early Eocene. The collision of the Adriatic plate with the European plate take place in the middle Cretaceous. The late Cretaceous to Early Eocene sediments of this flyschzone were deposited in a moderately converging remnant oceanic basin. Thin layers of green hemipelagic claystone between the sand- and silt-sized carbonate bearing turbidites reveal that this basin was located below the local calcite compensation depth (CCD). The sequence of the Rhenodanubian Flysch, which can obtain a thickness of approximately 2 km, is dominated by the "distal" turbidite facies C and D of MUTTI et al 1975. Only occasionally coarse grained sandstones are intercalated within these fine grained facies.

In contrast to Switzerland in Salzburg and Upper Austria , the Helvetic and Ultrahelvetic zones are an extremely narrow belt of dismembered and sheared off thrust slices. The Helvetic nappes display the lowest relief and represent the deepest tectonic structures in the area. Still farther to the north, the Helvetic nappes lie upon the southern limits of the Molasse sediments. Drilling records have shown that Molasse sediments also overlie autochthonous Mesozoic sedimentary rocks of Helvetic facies. The Molasse Basin is the Alpine - Carpathian foredeep in the Cenozoic. It extends from France in the west through Switzerland, Southern Germany, Austria and the Czech Republic to Slovakia in the east. The Cenozoic sediments of the Molasse are divided into three tectonic units (F. STEININGER & al, 1987). The autochthonous Molasse rests relatively undisturbed upon Mesozoic and Crystalline basement of the Middle European shelf. The allochthonous Molasse is composed of the southern Molasse sediments, which are included in the Alpine-Carpathian thrusts and which are moved tectonically into and across the southern autochthonous Molasse. The allochthonous Molasse includes the Molasse Imbrications, the disturbed Molasse and the Waschberg Zone. The parautochthonous Molasse are Molasse sediments riding piggy back upon Helveticum, Flysch or East Alpine nappes e. g. in the Vienna Basin. The Molasse Basin in the area of Salzburg and Upper Austria became part of the Alpine foredeep in Late Eocene. Its basement is formed by the Crystalline of the Bohemian Massif and its Mesozoic sedimentary cover. The autochthonous Mesozoic and Tertiary complex is in the South for a considerable distance overthrust by the Alpine nappes. A detailed study of the surface geology the Molasse in Salzburg and Upper Austria is given by ABERER (1958.)