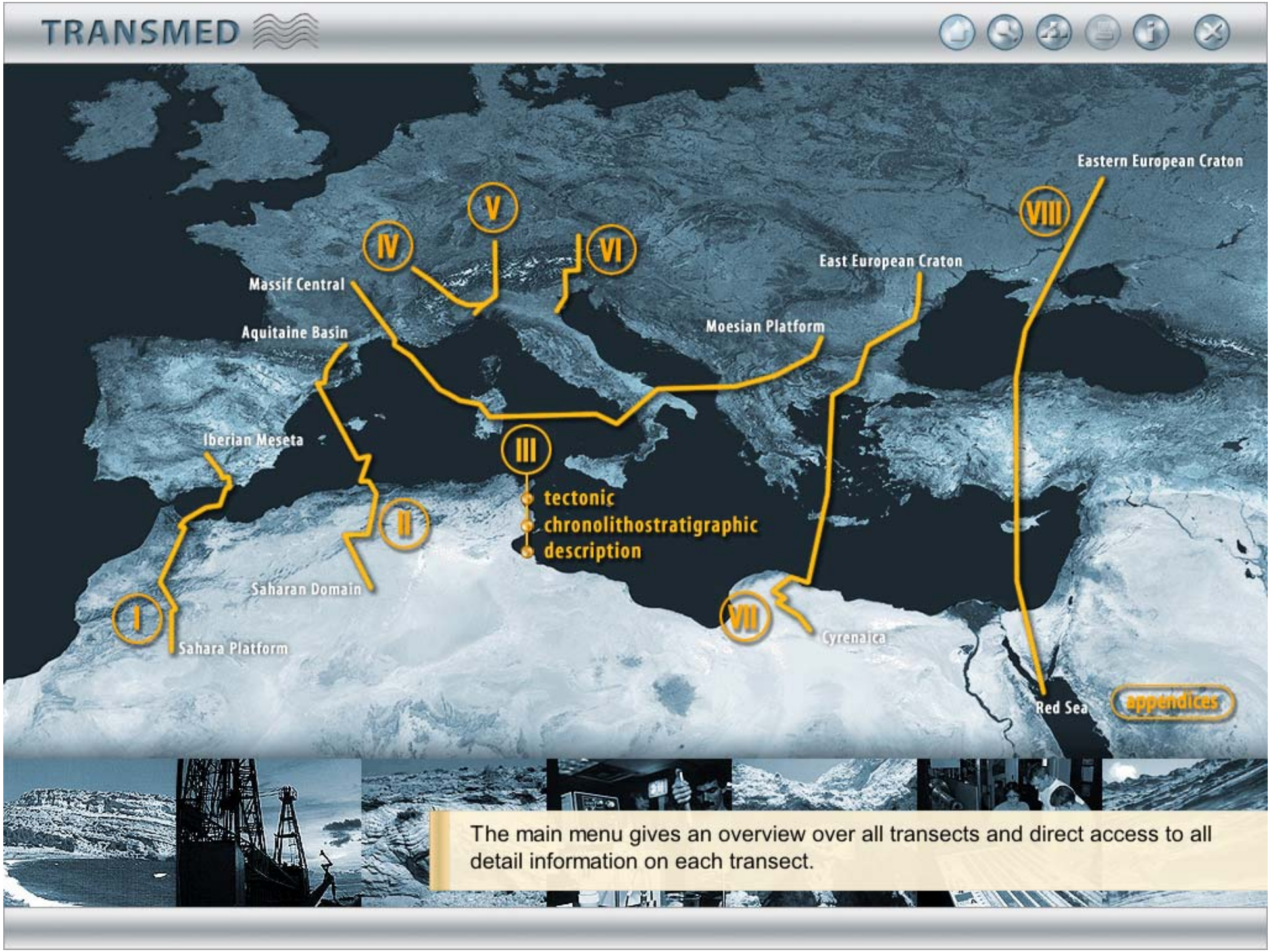
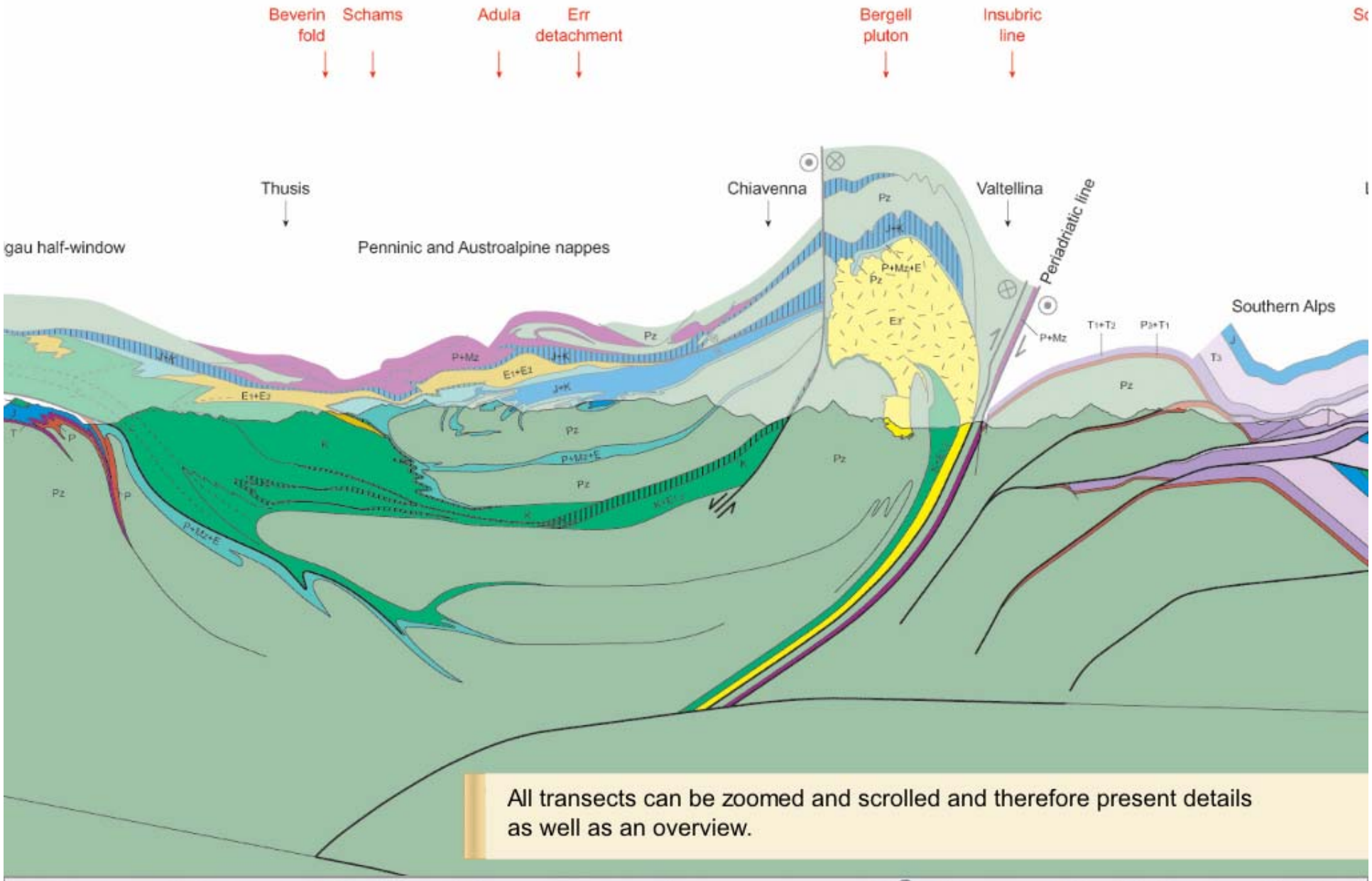
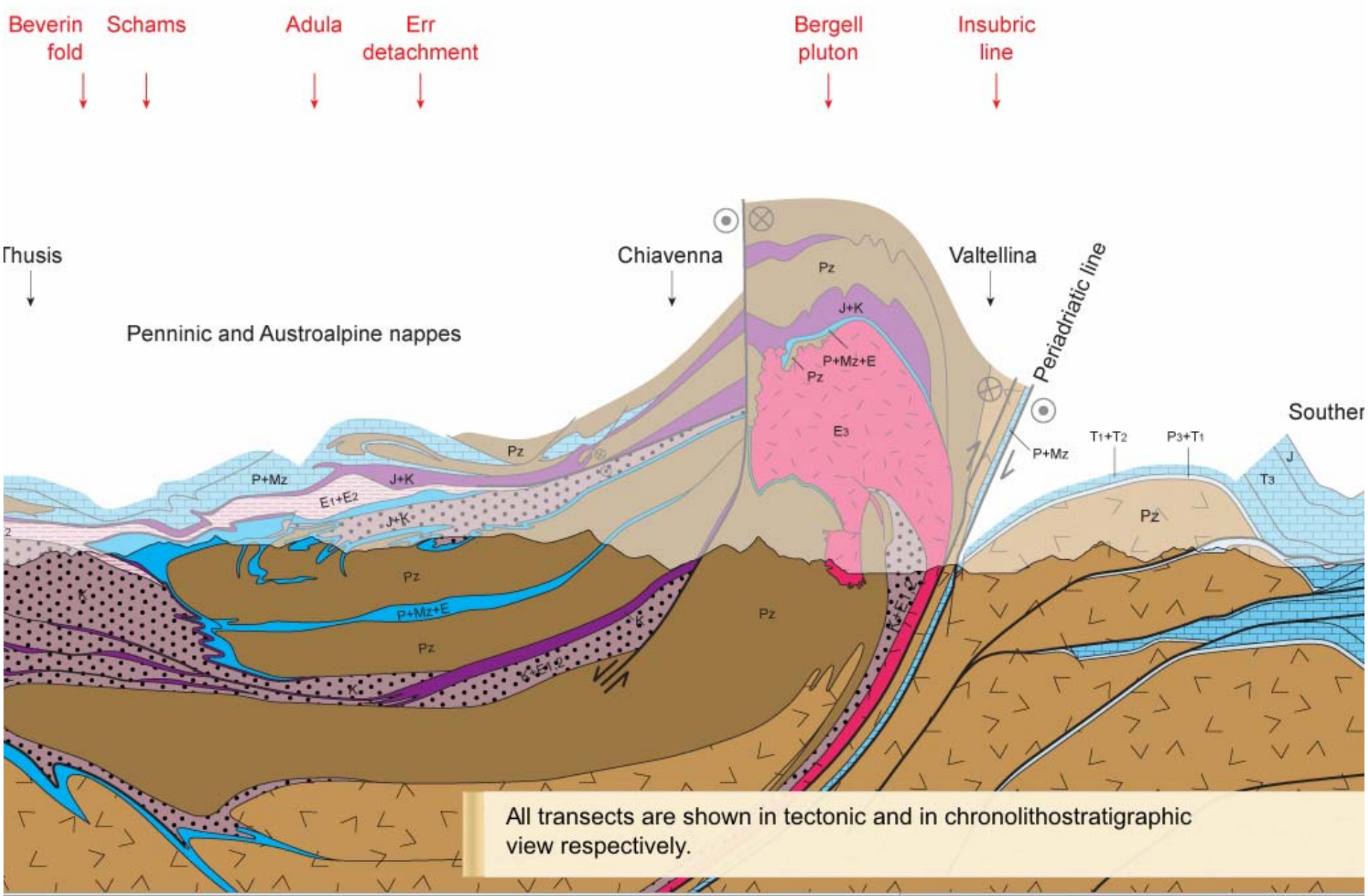

The TRANSMED Atlas
The Mediterranean Region from Crust to Mantle
Geological and Geophysical Structure of the
Mediterranean and the Surrounding Areas
A publication of the Mediterranean Consortium
for the 32nd International Geological Congress
XXXII GEOLOGORUM CONVENTUS FLORENTIAE 20 04 ITALIA MENTE ET MALLEO
XXXII GEOLOGORUM CONVENTUS FLORENTIAE 20 04 ITALIA MENTE ET MALLEO
ISBN: 3-540-22181-6
(c) Springer-Verlag
Berlin Heidelberg New York 2004
Springer is a part of Springer Science+Business Media
Loading...

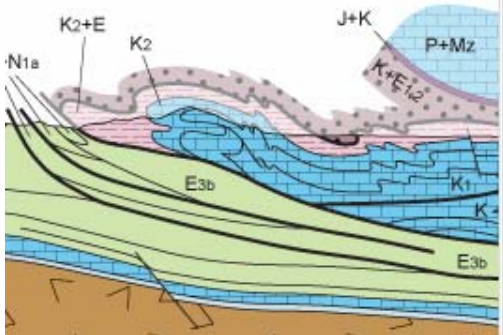

TRANSMED
Eastern European Craton
V
IV
VI
VIII
East European Craton
Massif Central
Aquitaine Basin
Moesian Platform
Iberian Meseta
III
tectonic
chronolithostratigraphic
description
II
Saharan Domain
I
Sahara Platform
VII
Cyrenaica
Red Sea
appendices
The main menu gives an overview over all transects and direct access to all detail information on each transect.


Beverin fold
Schams
Adula
Err detachment
Bergell pluton
Insubric line
Thusis
Chiavenna
Valtellina
Periadriatic line
Southern Alps
gau half-window
Penninic and Austroalpine nappes
Pz
P+Mz
E1+E2
J+K
P+Mz+E
T1+T2
P2+T1
T3
J
P
T
K
E2
All transects can be zoomed and scrolled and therefore present details as well as an overview.


Beverin fold
Schams
Adula
Err detachment
Bergell pluton
Insubric line
Thusis
Chiavenna
Valtellina
Periadriatic line
Penninic and Austroalpine nappes
Pz
J+K
P+Mz+E
E3
P+Mz
T1+T2
P3+T1
J
T3
E1+E2
All transects are shown in tectonic and in chronolithostratigraphic view respectively.

Saentis thrust

Helvetic nappes



Additional Information

Austroalpine nappes (Tilisuna)
Gently N-dipping basal thrust of the Austroalpine Silvretta nappe, above the upper Penninic Arosa unit and the middle Penninic Sulzfluh unit (Jurassic platform carbonates) near Tilisuna hut in the Austrian-Swiss border area (Montafon).

125 %

Additional information on some features of the transects can be accessed by links.

Legend

Tectonic basins

- foreland basin
- piggy-back basin

Shelf/slope/rise

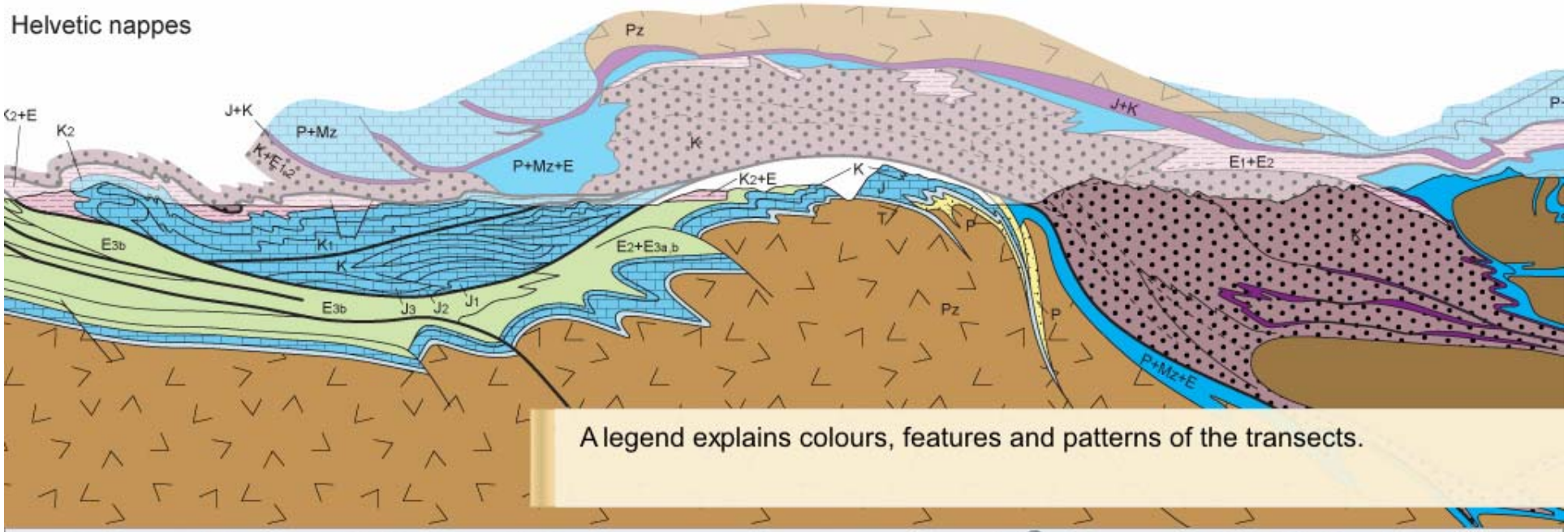
- shelf neritic & paralic clastics
- shelf carbonates
- shelf basins
- slope/rise undifferentiated

Continental crust

- indeterminate sediments (Paleozoic)
- nonmarine clastics (late Paleozoic rifts)
- rifted continental crust
- upper continental crust
- lower continental crust

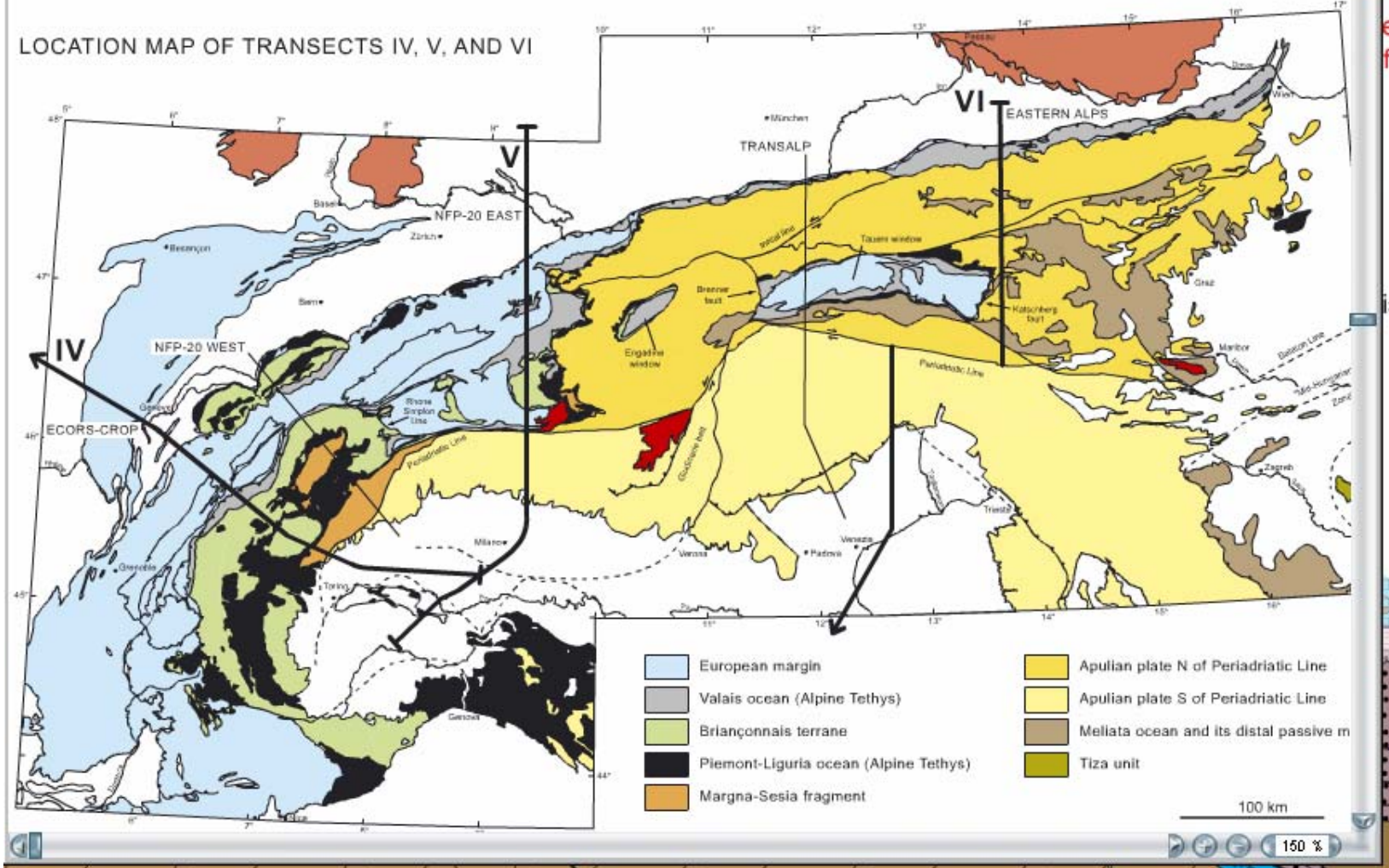
67 %

Helvetic nappes



A legend explains colours, features and patterns of the transects.

Index Map



150 %

erin Schams
fold

is

Penninic and A

In every transect an index map shows the exact location of the transect.

TRANSMED Transects IV, V and VI: Three lithospheric transects across the Alps and their forelands

Stefan M. Schmid, Bernhard Fügenschuh, Eduard Kissling, Ralf Schuster

Contents:

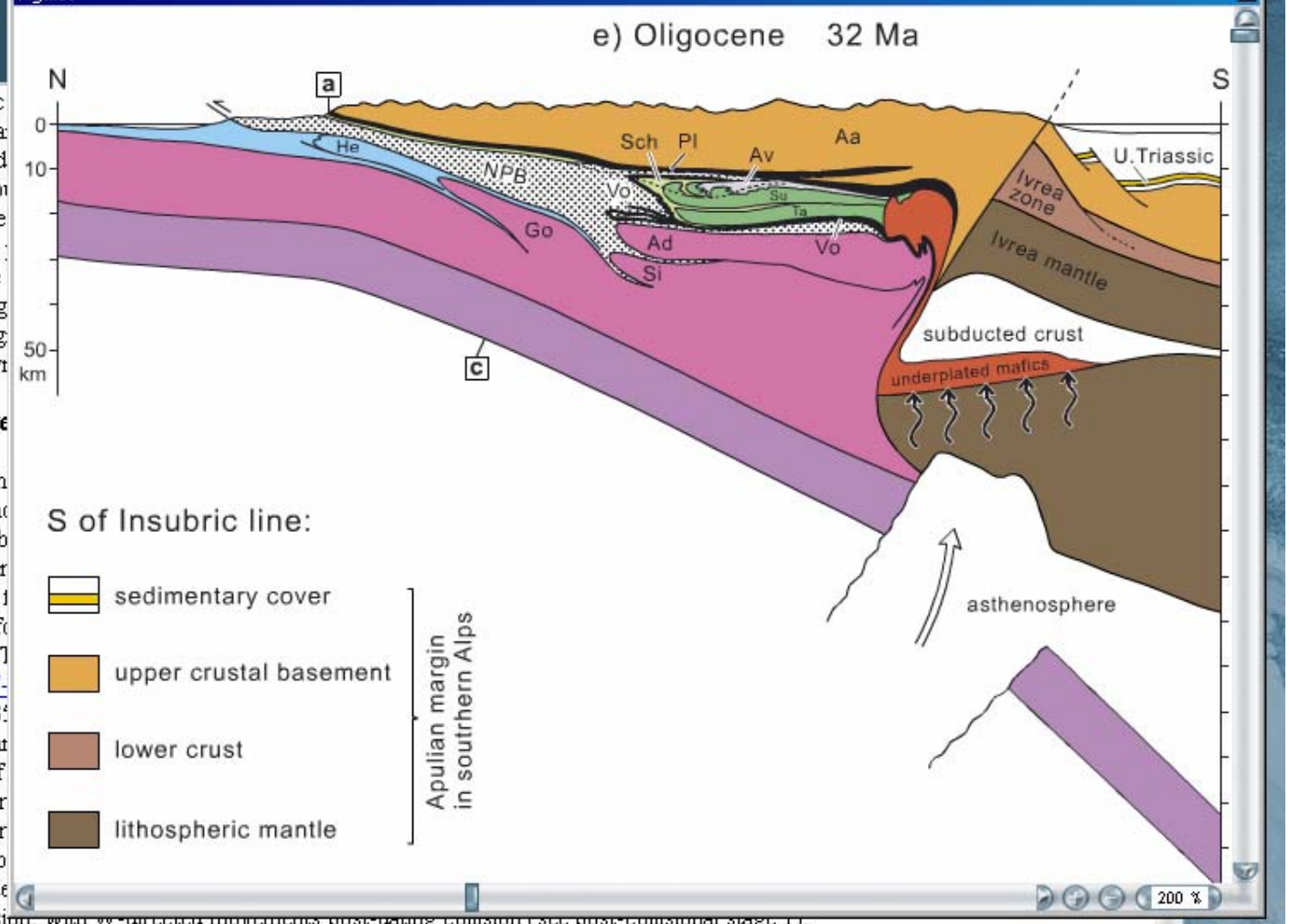
1. General Introduction

The European Alps, located in south-central Europe, record the closure of several ocean basins located in the Mediterranean domain during the Late Cretaceous and Cenozoic convergence of the African (or Apulian) and European plates (e.g. Trümpy 1960; Frisch 1979; Haas et al. 1995; Stampfli et al. 2001a,b). In recent years it has become increasingly evident that the oceanic and continental paleogeographical realms from which the Alpine tectonic units derive were arranged in a rather non-cylindrical fashion. This led to important along-strike changes in the overall architecture of the Alps (Fig. IV-VI.1), also reflected, for example, in the deep structure of the Alps (e.g. Pfiffner et al. 1997; Schmid and Kissling 2000) or in the different age of the main metamorphic events: Tertiary in the Western Alps, Cretaceous in the Austroalpine units of the Eastern Alps (e.g. Gebauer, 1999; Thöni, 1999).
As discussed in this paper (see also

The results and interpretation of the transect-data can be accessed directly from the panorama.

Transect IV-VI

Figures



the rest of the Penninic
nor into the Briançonna
margin, as documented
Cretaceous-Tertiary bo
The attribution of a pre
activity is uncertain. A
the Austroalpine nappe
During the various stag
ophiolites, formed a rig
formed part (not shown

Early Tertiary conve

Following closure of th
which now forms an a
Terrane entered the sub
somewhat longer. After
margin of Europe (the
VI.5b). Penetrative def
Briançonnais Terrane (
Liguria Ocean (Fig. IV-
Tertiary collision (50-3

During the middle a
by the incorporation of
lid formed by the Austr
the northern foreland, r
km N-S convergence b
across the future Weste
convergence and collision, with W-directed movements post-dating collision (see post-collisional stage 1).

Since the Alpine nappes in Fig. IV-VI.5a-d and 5e-g exclusively consist of thin upper crustal slices (basement and/or its cover) detached from their lower crustal and mantle-lithosphere, all European (and Valais) lower crust (including parts of the upper crust) must have been subdu
during this collisional stage took pl

All figures cited in the text can be directly accessed via links and pop up in a separate window.

Transect IV-VI

well. In section C-C' through the 3-D lithospheric model, the Adriatic lower lithosphere is found to have been subducted to the NE and beneath the European Plate down to a depth of 270 km. Using the suture between European and Adriatic Moho as reference, the total shortening since collision amounts to some 210 km, significantly more than observed for the SE-directed subduction along transect B-B' further to the west. There is no indication for a detachment of the subducted lower lithosphere within the observed depth range. Transect C-C' reaches the Po Plain low-velocity anomaly, seen much clearer on Fig. IV-VI.12, near its southwestern end.

The 3-D tomographic model leaves no doubt that the dip direction of the subducted slab flips from a SE to a NE direction between transects B-B' and C-C', this flip occurring over a relatively short distance of about 80 km and between the two

occurs roughly beneath the Giudicaria

IV-VI.14c.

structure of the Alpine mantle-lithosphere

e locations of these ideally chosen mantle

-c and 2d,e, except for transect A-A'. Hence,

s in Fig. IV-VI.14.

l lithospheric features that are nearly identical

ns the sense of subduction and also the

Fig. IV-VI.14b follows NFP 20 EAST/EGT

e eastern margin of the Western Alps. It

ata (Holliger and Kissling 1992; Pfiffner et al.

edge of relatively rigid lower Adriatic crust

f European lower crust was possibly

sect V. However, teleseismic tomography

Fig. IV-VI.14b, the upper or lower boundary

ard subducted high-velocity lower

ern and Eastern Alps can be seen along a

wn in Fig. IV-VI.14c. Features of lower

replaced by a relatively narrow collisional

caria Line joins the Periadriatic Lineament

re here dramatically steep and the structure

as commonly seen in sediments (Dobrin and

Figures

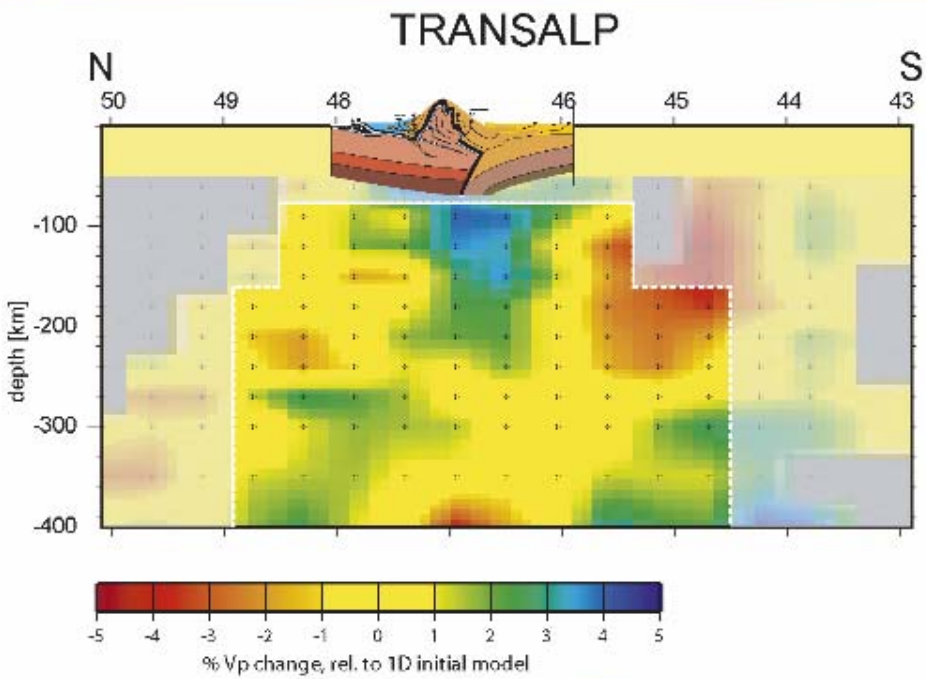


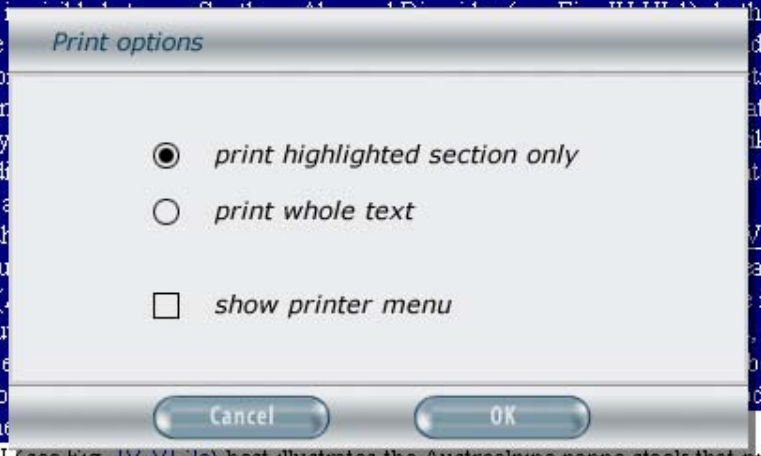
Fig. IV-VI.14: Combined crustal and lower lithosphere transects al
transects (Fig. IV-VI.3b, c, d); after Kissling et al. (in press). For lo

All figures can be zoomed and their windows scaled.

by TRANSALP Working Group (2002) emphasizes displacement along a thrust at the base of the Tauern window, referred to as "Sub-Tauern ramp". In terms of the deep structure, the transect given in Fig. IV-VI.2d completely differs from that given by TRANSALP Working Group (2002). The TRANSALP section of Fig. IV-VI.2d,e -corresponding to TRANSMED Transect VI- show the Apulian Moho as descending northward under the European lithosphere, as indicated by the tomographically defined lithospheric configuration (Lippitsch 1992; Lippitsch et al. 2003; Kissling et al. in press).

This re-interpretation explains the lack of a first-order separation between Southern Alps and External Dinarides. Such a separation would be expected if the Alps and Dinarides would still exhibit opposite subduction polarities, as they did during the Eocene. Since no separation i… are expected to presently occupy the same lower plate … the Brenner Line. We interpret both of these first-o… tion polarity, which was initiated around 20 Ma ago ar… ation. As discussed later, this change in subduction polarity … ike-slip movements along the Periadriatic lineament (includi… ted between the Southern Alps and northern Dinarides …

Note that the polarity of th… VI.1) and the northern rim of the Austroalpine nappes (Apu… ast. This indicates that the northern rim of the Apulian (… in subduction polarity, which only concerns the sou… , the northern deformation front of the Alps can be trace… bduction rollback and slab break-off was initiated at abo… duction polarity, postulated to have occurred between the…



TRANSMED Transect VI (see Fig. IV-VI.2e) best illustrates the Austroalpine nappe stack that preserved a thickness of some 10-20 km in the area east of the Tauern window, an area that lacks substantial exhumation by late stage thrusting and/or orogen-parallel extension during the Tertiary. In this transect the Koralpe-Wölz high-pressure nappe system is interpreted as representing a former extrusion wedge located between the Silvretta-Seckau nappe system in its footwall and the Ötztal-Bundschuh and Drauzug-Gurktal nappe systems in its hanging wall. This extrusion channel exhumed high-pressure units that formed during the subduction of the western embayment of the Meliata Ocean (Figs. IV-VI.2b,c) during the Late Cretaceous orogeny.

2.3 Evolution of the Alpine system and its forelands

The following discussion focuses …

All texts can be printed either complete or just in part.

Transect IV-VI

References

Ansorge J (1968) Die Struktur der Erdkruste an der Westflanke der Zone von Ivrea, Schweiz. Mineral. Petrogr. Mitt. 48: 247-254

Ansorge J, Blundell D. Müller, St. (1992) Europe's lithosphere - seismic structure. In: Blundell D, Freeman R, Müller S (eds). A continent revealed: The European Geotraverse. Cambridge Univ. Press pp 33-70

Antoine P (1971) La zone des Brèches de Tarantaise entre Bourg-Saint-Maurice (Vallée de l'Isère) et la frontière Italo-Suisse. Travaux Laboratoire Géologique Faculté des Sciences, Thesis University Grenoble, France

Argand E (1916) Sur l'arc des Alpes Occidentales. Eclogae geol. Helv. 14: 145-204

Arlitt R, Kissling E, Ansorge J (1999) Three-dimensional crustal structure beneath the TOR array and effects on teleseismic wavefronts. Tectonophysics 314: 309-319

Babuska V, Plomerova J, Granet M (1990) The deep lithosphere in the Alps: A model inferred from P residuals. Tectonophysics 176: 137-165

Bagnoud A, Wernli R, Sartori M (1998) Découverte de foraminifères planctoniques paléogènes dans la zone de Sion-Courmayeur à Sion. Eclogae geol. Helv. 91: 421-429

Ballèvre M, Merle O. (1993) The Combin Fault: compressional reactivation of a Late Cretaceous-Early Tertiary detachment fault in the Western Alps. Schweiz. Mineral. Petr. Mitt. 73: 205-227

Baudin T (1987) Etude géologique du massif du Ruitor (Alpes franco-italiennes): Evolution structurale d'un socle briançonnais. Ph.D. thesis, Université de Grenoble, France

Bayer R, Carozzo MT, Lanza R, Miletto M, Rey D. (1989), Gravity modelling along the ECORS-CROP vertical seismic reflection profile through the Western Alps. Tectonophysics 162: 203-218

Bayer R, Lanza R, Truffert C (1996) Gravimetric and magnetic studies of the Western Alps in the context of the ECORS and ECORS-CROP projects; data and interpretations. Mém. Soc. géol. Fr. 170: 61-72

Beaumont C, Fullsack PH, Hamilton J (1994) Styles of crustal deformation in compressional orogens caused by subduction of the underlying lithosphere. Tectonophysics 232: 119-132

Berger A (1996) Geological-tectonic map of the Bergell pluton and surrounding country rocks (Southern Switzerland, Northern Italy). Schweiz. Mineral. Petrogr. Mitt. 76: plate

Berger A, Gieré R (1995) Structural observations at the eastern contact of the Bergell Pluton. Schweiz. Mineral. Petrogr. Mitt. 75: 241-258

Berger A, Rosenberg C, Schmid SM (1996) Ascent, emplacement and exhumation of the Bergell pluton within the Southern Steep Belt of the Central Alps. Schweiz. Mineral. Petrogr. Mitt. 76: 357-382

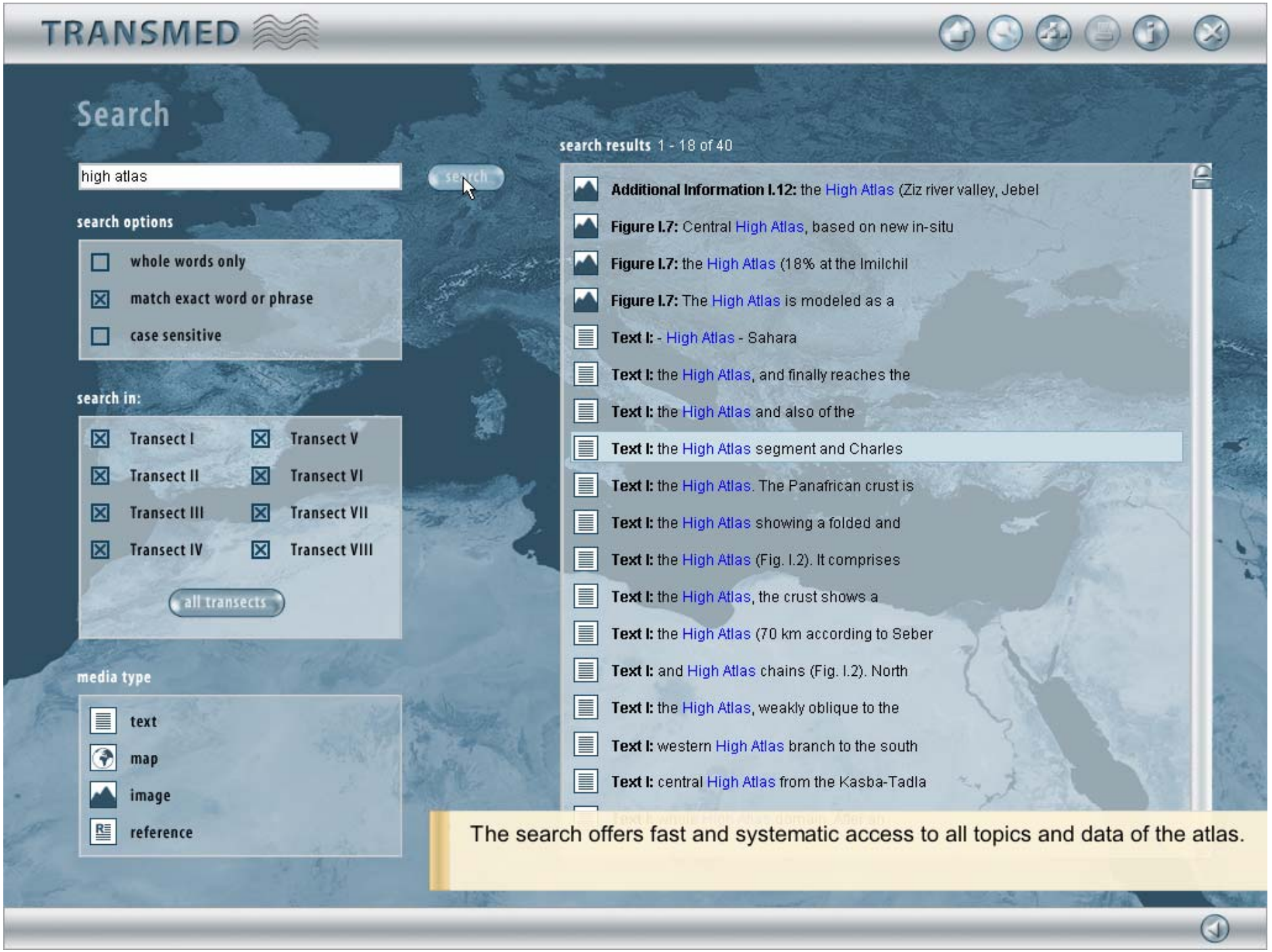
Bergerat F, Mugnier JL, Guellec S, Truffert C, Cazes M, Damotte B, Roure, F (1990). Extensional tectonics and subsidence of the Bresse basin: an interpretation from ECORS data. In: Roure F, Heitzmann P, Polino R (eds). Deep Structure of the Alps. Mémoire de la societée geologique Suisse 1: 145-156

Roure F, Heitzmann P, Polino R (eds). Deep Structure of the Alps. Mémoire de la societée geologique Suisse 1

Bernoulli D, Laubscher H (1972) The pal

Bernoulli D, Winkler W (1990) Heavy mi

Every text is accompanied by references.


TRANSMED
Search
high atlas
search
search options
whole words only
match exact word or phrase
case sensitive
search in:
Transect I
Transect II
Transect III
Transect IV
Transect V
Transect VI
Transect VII
Transect VIII
all transects
media type
text
map
image
reference
search results 1 - 18 of 40
Additional Information I.12: the High Atlas (Ziz river valley, Jebel
Figure I.7: Central High Atlas, based on new in-situ
Figure I.7: the High Atlas (18% at the Imilchil
Figure I.7: The High Atlas is modeled as a
Text I: - High Atlas - Sahara
Text I: the High Atlas, and finally reaches the
Text I: the High Atlas and also of the
Text I: the High Atlas segment and Charles
Text I: the High Atlas. The Panafrican crust is
Text I: the High Atlas showing a folded and
Text I: the High Atlas (Fig. I.2). It comprises
Text I: the High Atlas, the crust shows a
Text I: the High Atlas (70 km according to Seber
Text I: and High Atlas chains (Fig. I.2). North
Text I: the High Atlas, weakly oblique to the
Text I: western High Atlas branch to the south
Text I: central High Atlas from the Kasba-Tadla
The search offers fast and systematic access to all topics and data of the atlas.

Additional Information

Bathonian reef facies of the High Atlas (Ziz river valley, Jebel Assameur n'Aït Fergane,100 km east of the transect)
Photo: D. Ponsard, Museum National d'Histoire Naturelle, Paris.

100 %

2° 56' W
36° 28' N

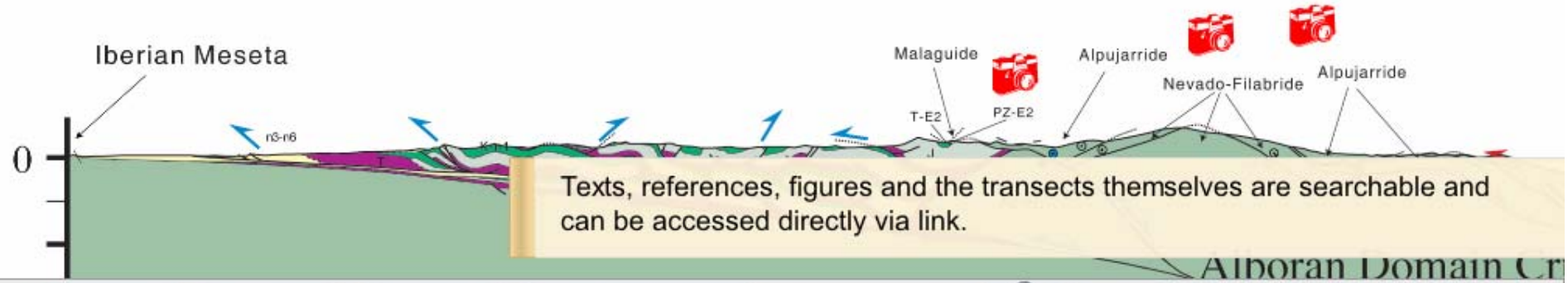
3° 23' W
36° 55' N

3° 02' W
37° 00' N

SSE NNW SSE NN

00

Internal Betics



Texts, references, figures and the transects themselves are searchable and can be accessed directly via link.


TRANSMED
Sitemap
Transect I
Chronolithostratigraphic Transect I
Tectonic Transect I
Text I
Transect II
Transect III
Transect IV
Transect V
Transect VI
Transect VII
Additional Information I.1
Additional Information I.2
Additional Information I.3
Additional Information I.4
Additional Information I.5
Additional Information I.6
Additional Information I.7
Additional Information I.8
Additional Information I.9
Additional Information I.10
Additional Information I.11
Additional Information I.12
Additional Information I.13
Additional Information I.14
Additional Information I.15
Additional Information I.16
Additional Information I.17
media type
text
map
image
The sitemap gives an overview about the structure and all information, texts and figures contained in the CD.

http://www.springer.com/978-3-540-22181-4

The TRANSMED Atlas. The Mediterranean Region from Crust to Mantle

Geological and Geophysical Framework of the Mediterranean and the Surrounding Areas

Cavazza, W.; Roure, F.M.; Spakman, W.; Stampfli, G.M.; Ziegler, P.A. (Eds.)

2004, XXIII, 141 p. 52 illus., 41 illus. in color. With CD-ROM., Hardcover
ISBN: 978-3-540-22181-4