

(N 46°28'00" / E 14°30'24"), C (N 46°27'59" / E 14°35'03"), E (N 46°28'00" / E 14°30'30"), F1 (N 46°28'02" / E 14°30'12"), F2 (N 46°28'01" / E 14°30'18") published by MOSHAMMER (1989, 1990).

**Derivation of name:** After dominating lithologies.

**Synonyms:** Gailthaler Schichten (Kalk und Schiefer) (LIPOLD, 1856b: p. 349); rötlicher, gebankter bis geflaseter Kalk (do II) (MOSHAMMER, 1989: Fig. 3); "Mudstone mit Cephalopoden" (MOSHAMMER, 1990: p. 575).

**Lithology:** Shale alternating with thin limestone layers.

**Fossils:** Cephalopods.

**Origin, facies:** Marine pelagic deposits; note wrong color code in the ASC 2004.

**Chronostratigraphic age:** Frasnian–Famennian.

**Biostratigraphy:** *marginifera* conodont zone (MOSHAMMER, 1989: p. 627).

**Thickness:** Approx. 2 m.

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

**Underlying unit(s):** Lydites, limestone breccia (conformable contact).

**Overlying unit(s):** Limestones (unconformable contact).

**Lateral unit(s):** Seeberg Coral-Crinoidal Limestone.

**Geographic distribution:** Karavanke Mountains (Eisenkappel and Seeberg area).

**Remarks:** -

**Complementary references:** SCHÖNENBERG (1965, 1967), SCHÖNLAUB (1971a, 1979), MOSHAMMER (1987), SCHÖNLAUB & HISTON (1999, 2000).

### Kalke / Limestones

THOMAS J. SUTTNER

**Validity:** Invalid; first recognized by LIPOLD (1856b) and TELLER (1898); later described by KOLLMANN (1938) and KUPSCH et al. (1971); biostratigraphy by SCHULZE (1968).

**Type area:** ÖK50-UTM, map sheet 4114 Bad Eisenkappel (ÖK50-BMN, map sheets 212 Vellach, 213 Bad Eisenkappel).

**Type section:** -

**Reference section(s):** South-east of Storschitz, between Seebergpaß and Jeritsch-Felsen (N 46°25'09" / E 14°32'10"; N 46°25'11" / E 14°31'49"), south-west of the Pasterkfelden (N 46°25'42" / E 14°32'48") published by SCHULZE (1968).

**Derivation of name:** After lithology.

**Synonyms:** Gailthaler Kalk (LIPOLD, 1856b: p. 350); Devon in Bänderkalkfazies (KOLLMANN, 1938); Bänderkalkschuppen (KUPSCH et al., 1971: Fig. 2, p. 95); Bänderkalke (KUPSCH et al., 1971: Fig. 3, p. 95); graue Bänderkalke bzw. Graue spätige Kalke des Unter-Karbon (SCHULZE, 1968); banded limestone (SCHÖNLAUB, 1980b).

**Lithology:** Grey, laminated limestone (reddish brown weathering), grey sparry limestone.

**Fossils:** Brachiopods, cephalopods, conodonts, crinoids.

**Origin, facies:** Marine limestone, pelagic unit.

**Chronostratigraphic age:** Tournaisian.

**Biostratigraphy:** *anchoralis* conodont zone (SCHULZE, 1968: p. 176); middle *Gattendorfia* ammonoid zone to middle *Pericyclus* ammonoid zone (SCHULZE, 1968: p. 176).

**Thickness:** Approx. 300 m.

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

**Underlying unit(s):** Reef Limestone; Seeland Crinoidal Limestone; Seeberg Coral-Crinoidal Limestone; Shale, Limestones (all units mentioned: unconformable contact).

**Overlying unit(s):** Hochwipfel Formation (unconformable contact).

**Lateral unit(s):** -

**Geographic distribution:** Karavanke Mountains (Seeberg area).

**Remarks:** -

**Complementary references:** HERITSCH (1927d), SCHÖNLAUB (1979), KREUTZER et al. (1997), SCHÖNLAUB & HISTON (1999, 2000).

### Hochwipfel-Formation / Hochwipfel Formation (description see Carnic Alps)

## Post-Variscan Sequence

### Auernig-Gruppe / Auernig Group (see description in Carnic Alps)

### Rattendorf-Formation / Rattendorf Formation

HANS P. SCHÖNLAUB

**Validity:** Invalid.

**Type area:** ÖK50-UTM, map sheet 3116 Sonnenalpe Naßfeld (ÖK50-BMN, map sheet 198 Weißbriach), Carnic Alps, Carinthia.

**Type section:** Not defined.

**Reference section(s):** Section on western cliff of Mountain Schulterkofel following the crest south of Rattendorfer Alm to Zottachkopf (HERITSCH et al., 1934: p. 176).

**Remarks:** According to HERITSCH et al. (1934: p. 163) the post-Variscan sequence of the Carnic Alps is subdivided into the "Auernig-Schichten" and the "Rattendorfer Schichten" ranging from the upper Carboniferous to the Lower Permian. The latter were subdivided into the Lower Schwagerina Lst., the Grenzlandbänke and the Upper Schwagerina Lst.

**Derivation of name:** After the village of Rattendorf west of Hermagor to which the pastures around Rattendorfer Alm belongs.

**Synonyms:** Rattendorfer Schichten.

**Lithology:** This lithostratigraphic unit is generally used to designate a Lower Permian sequence of limestones and clastics which cannot be further assigned to one of the Lower Permian formations, e.g., the Schulterkofel, Grenzland or Zweikofel Formation.

**Fossils:** Fusulinids, smaller foraminifers, phylloid algae and dasycladacean algae (*Anthracoportella*), crinoids, corals, brachiopods, bivalves.

**Origin, facies:** Shallow marine deposits in a moderately energetic environment.

**Chronostratigraphic age:** Asselian to lower Artinskian.

**Biostratigraphy:** -

**Thickness:** According to HERITSCH et al. (1934) the total thickness in the reference section is 285 m.

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

**Underlying unit(s):** Auernig Group.

**Overlying unit(s):** Trogkofel Limestone.

**Lateral unit(s):** -

**Geographic distribution:** Carnic Alps, mainly west of Naßfeld crossing the Austrian/Italian border and in particular in the Karavanke Mountains.

**Remarks:** -

**Complementary references:** SCHÖNLAUB & FORKE (2007).

#### **Klastische Trogkofel-Formation / Clastic Trogkofel Formation**

HANS P. SCHÖNLAUB

**Validity:** Invalid; first mention ("clastic facies development of Trogkofel beds") by RAMOVŠ (1963: p. 382).

**Type area:** Karavanke Mountains, northern Slovenia.

**Type section:** A type section for the "Clastic Trogkofel beds" has never been denominated.

**Reference section(s):** -

Remarks: The following sections form the Karavanke Mts. have been described as "Clastic Trogkofel beds" in the literature:

a) southern slope of Košuta range along the river Košutnik (KOCHANSKY-DEVIDÉ et al., 1973): this section belongs to the Schulterkofel Formation (late Gzhelian) (FORKE, 2002).

b) clastic-carbonate deposits above the Dovžanova soteska limestone (BUSER, 1974): this section belongs to the recently established Born Formation (middle-late Asselian) (FORKE, 2002).

The term "Clastic Trogkofel beds" should no longer be maintained, as it represents a mixture of clastic-carbonate sequences ranging from late Gzhelian to Roadian (Wordian?). Sections from the Slovenian part of the Karavanke Mountains, which have been so far reinvestigated, reveal that these sequences belong to various lithologic units (see below), which are older than the Trogkofel Limestone itself. The occurrence of Kungurian (uppermost

Lower Permian) conodonts (RAMOVŠ, 1982) in small limestone lenses of a clastic sequence in the Eastern Karavanke Mts. near Solčava remains enigmatic. The finding could never be confirmed in subsequent investigations (pers. comm. BUSER).

"Clastic Trogkofel beds" mentioned in the explanatory notes of the geological map of the Karavanke Mts. (BAUER et al., 1983) need to be re-evaluated, before they can be implemented in a general lithostratigraphic framework.

Sediments from southern Slovenia (Ortnek, Kočevje) should be treated separately, as they display similarities to the facies development in NW Croatia (Gorski Kotar). The age of these deposits is still under discussion. However, the association of Visean deep-water conodonts, Lower Permian deep-water radiolarians, upper Carboniferous–Lower Permian fusulinids in various clasts and Roadian ammonoids reveal a complex history of these deposits, which is yet not well understood.

**Derivation of name:** -

**Synonyms:** Instead of Klastische Trogkofelschichten also the term "Kosna-Folge" (Košna beds) has been used (E. FLÜGEL, 1975; BUGGISCH et al., 1976) in the lithostratigraphic schemes of the Karavanke Mts.

**Lithology:** Clastic carbonates.

**Fossils:** Conodonts, fusulinids, ammonoids.

**Origin, facies:** Various reworking horizons (see remarks above).

**Chronostratigraphic age:** Late Gzhelian–Roadian (Wordian?) (see above).

**Biostratigraphy:** -

**Thickness:** ? (see remarks above).

**Lithostratigraphically higher rank unit:** -

**Lithostratigraphic subdivision:** -

**Underlying unit(s):** - (see remarks above).

**Overlying unit(s):** - (see remarks above).

**Lateral unit(s):** -

**Geographic distribution:** Southern slope of Košuta range and Dovžanova soteska.

**Remarks:** -

**Complementary references:** -

#### **Gröden-Formation / Gröden Formation** (see description in Carnic Alps)

#### **Bellerophon-Formation / Bellerophon Formation** (see description in Carnic Alps)

### **Karbon von Nötsch / Carboniferous of Nötsch**

The famous fossiliferous outcrops of the Carboniferous of Nötsch are located in the Gail Valley between Windische Höhe and Mount Dobratsch. The name-bearing village of Nötsch, however, is situated in the Gailtal Crystalline Complex following to the south of the Carboniferous deposits.

Since the beginning of the 19<sup>th</sup> century the Carboniferous of Nötsch has been famous for its abundance of fos-

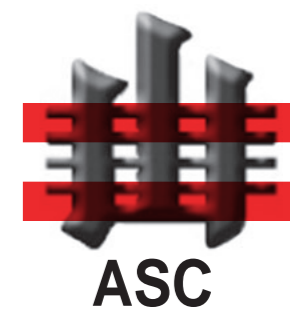
sils and thus has attracted many geologists and paleontologists. The east-west directed exposures extend as a narrow fault-bounded wedge over a distance of 8 km, the maximum width of which is 2 km in the east. Further to the west the Carboniferous rocks are squeezed out between the above-mentioned rocks and are also covered by Quaternary deposits, respectively.



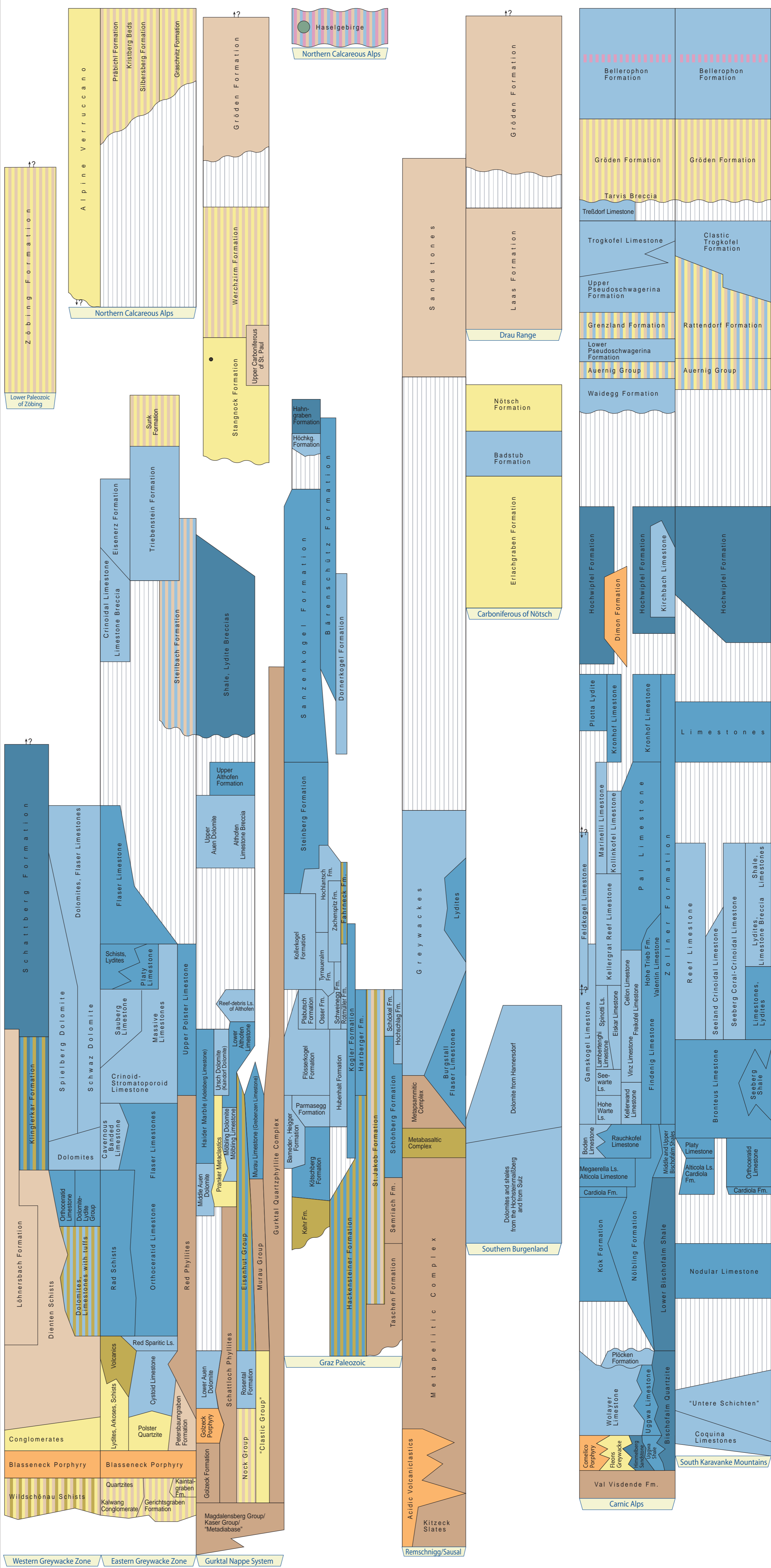
# Austrian Stratigraphic Chart 2004 - Paleozoic

(sedimentary successions)

Austrian Stratigraphic Commission



ERA	SYSTEM / PERIOD / SERIES / EPOCH	STAGE / AGE	DURATION Ma	Global Classification					
				ERATHM / ERA	SYSTEM / PERIOD / SERIES / EPOCH				
PALEOZOIC	PERMIAN	CHANGHSINGIAN / Dorashanian	251	PERMIAN	MID PERMIAN / GUADALUPIAN / LOPINGIAN				
		WUCHIAPINGIAN / Dufuflian	255						
		CAPITANIAN	260						
		WORDIAN	265						
		ROADIAN	270						
		PERMIAN	LOWER PERMIAN / CISURALIAN			KUNGURIAN	275		
						ARTINSKIAN	280		
						SAKMARIAN	285		
						ASSELIAN	290		
		PERMIAN	UPPER PERMIAN / CARBONIFEROUS / PENNSYLVANIAN			GZHELIAN	295	PERMIAN	LOWER PERMIAN / CISURALIAN
KASIMOVIAN	300								
MOSKOVIAN	305								
BASHKIRIAN	310								
PERMIAN	UPPER PERMIAN / CARBONIFEROUS / PENNSYLVANIAN			SERPUKHOVIAN	315				
				VISEAN	320				
					325				
PERMIAN	LOWER PERMIAN / MISSISSIPPIAN			TOURNAISIAN	330	PERMIAN	LOWER PERMIAN / MISSISSIPPIAN		
				335					
				340					
		345							
		350							
		355							
		359.2							
		365							
		370							
		375							
PERMIAN	UPPER DEVONIAN	FAMENNIAN	365	PERMIAN	UPPER DEVONIAN				
		FRASNIAN	370						
		375							
		380							
		385							
		390							
		395							
		400							
		405							
		410							
PERMIAN	LOWER DEVONIAN	EMSIAN	385	PERMIAN	LOWER DEVONIAN				
		EIFELIAN	390						
		GIVETIAN	395						
		395							
		400							
		405							
		410							
		415							
		420							
		425							
PERMIAN	MIDDLE DEVONIAN	LOCHKOVIAN	410	PERMIAN	MIDDLE DEVONIAN				
		PRAGIAN	415						
		Zlichovian	420						
		425							
		430							
		435							
		440							
		443.7							
		445							
		445							
PERMIAN	LOWER DEVONIAN	WEN-LUD-LOCKHOLM	420	PERMIAN	LOWER DEVONIAN				
		HOMERIAN	425						
		SHEINWOOD	430						
		TELYCHIAN	435						
		AERONIAN	440						
		RHUDDANIAN	445						
		HIRNANTIAN	445						
		445							
		450							
		455							
PERMIAN	UPPER ORDOVICIAN	LLANDOVERY	440	PERMIAN	UPPER ORDOVICIAN				
		445							
		450							
		455							
		460							
		465							
		470							
		475							
		480							
		485							
PERMIAN	MIDDLE ORDOVICIAN	DARRIWILIAN	465	PERMIAN	MIDDLE ORDOVICIAN				
		470							
		475							
		480							
		485							
		490							
		495							
		500							
		505							
		510							
PERMIAN	LOWER ORDOVICIAN	TREMA-DOCIAN	485	PERMIAN	LOWER ORDOVICIAN				
		490							
		495							
		500							
		505							
		510							
		515							
		520							
		525							
		530							
PERMIAN	UPPER CAMBRIAN	PAIBIAN	495	PERMIAN	UPPER CAMBRIAN				
		500							
		505							
		510							
		515							
		520							
		525							
		530							
		535							
		540							
PERMIAN	MIDDLE CAMBRIAN	MIDDLE CAMBRIAN	MIDDLE CAMBRIAN	PERMIAN	MIDDLE CAMBRIAN				
						505			
						510			
						515			
						520			
						525			
						530			
						535			
						540			
						PERMIAN	LOWER CAMBRIAN	LOWER CAMBRIAN	LOWER CAMBRIAN
505									
510									
515									
520									
525									
530									
535									
540									
542									



- Legend**
- pelagic, offshore, siliciclastic
  - pelagic, nearshore, calcareous
  - shallow marin, neritic
  - terrestrial-continental, coarse clastic
  - terrestrial-continental, fine clastic
  - evaporite (chloride, sulphate)
  - rhyolite, dacite
  - (basaltic) andesite, trachyandesite
  - basalt
  - phyllite
  - mixed-facies (in corresponding colors)
  - coal (may include several seams)
  - ? position/age doubtful/controversial
  - | equal units
  - \ older unit left \ younger unit right
  - hiatus
  - unconformity
  - GSSP
  - Fm. Formation
  - Ls. Limestone

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Cutout and English adaptation of the "Die Stratigraphische Tabelle von Österreich 2004": Geological Survey of Austria

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