The Buzet Thrust Fault in Istria and overturned carbonate megabeds in the Eocene flysch of the Dragonja Valley (Slovenia)

Buzetski narivni prelom v Istri in inverzne karbonatne megaplasti v eocenskem flišu v dolini Dragonje

Ladislav PLACER1,*, Adrijan KOŠIR2, Tomislav POPIT2, Andrej ŠMUC2 & Grega JUVAN3
1 Geološki zavod Slovenije, Dimičeva 14, 1000 Ljubljana, Slovenia
2 Paleontološki inštitut Ivana Rakovca ZRC SAZU, Novi trg 2, 1000 Ljubljana, Slovenija
3 Oddelek za geologijo NTF, Univerza v Ljubljani, 1000 Ljubljana, Slovenia
*E-mail: ladislav.placer@geo-zs.si

Abstract

Detailed geological mapping undertaken in the framework of monitoring of the motorway construction works in SW Slovenia has revealed the existence of a large-scale thrust fault between Buzet and Koper (termed the Buzet Thrust Fault) and extensive thrust-related fold structure which is clearly expressed by overturned carbonate megabeds in the thrust footwall in the eastern part of the Dragonja River basin. The Buzet Thrust Fault represents the southeastern margin of the structurally complex Kras Thrust Edge.

Kratka vsebina

ern part of the Dragonja River basin (Figs. 1, 2).

The study area is composed predominantly of Eocene flysch deposits. While the motorway route between Klanec and Srmin (near Koper) is mostly situated in a structurally complex region, the area between the Bay of Koper and the Dragonja Valley is characterized by a relatively undisturbed flysch succession composed of thin to medi-
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Fig. 2 A. - Sketch of the area mapped in detail showing overturned carbonate megabeds MbA - MbE; B - Profile through the thrust zone.

Sl. 2 A. - Skica natančneje kartiranega ozemlja z obrnjenimi karbonatnimi megaplastmi MbA - MbE, B - Prerez narivne cone.
um bedded siliciclastic and carbonate-sili-
ciclastic turbidite sandstones, marls, and
meter-thick beds (megabeds) of calciturbidites. Our current stratigraphical research
has been primarily aimed at establishing a
framework for the correlation between se-
parate parts of the flysch basin, based on
mapping of major carbonate megabeds in
the Dragonja River basin. Calciturbidite me-
gabeds within the flysch in the hinterland of
Koper are an order of magnitude thicker
than “average” turbidite beds and form wi-
despread Ny stratigraphic markers that can
be traced in an area of more than 100 km².
Due to their relatively high resistance to we-
athering, the megabeds are topographically
well-expressed in the field, and hence of sub-
stantial importance in geological mapping.
The significance of megabeds for the reconstruction of the NW Istran flysch basin was noted by Peckmann (1995) and Pavšič & Peckmann (1996) who divided the flysch succession in the area of Piran into four units, bounded by meter-scale calciturbidites. Along the Dragonja River and its tributaries we have recognized 4 to 6 calciturbidite and bipartite debrite-calciturbidite beds, up to 7 meters thick, which mostly exhibit graded profiles with internal structures of complete or partial Bouma sequences capped by several meters thick marlstone layer. A characteristic feature in most of the calciturbidites is a distinctive imbrication of nummulite tests in the basal (T₀) interval. Preliminary paleotransport measurements based on nummulite orientation indicate sediment transport from the southwest. Consistently, a downcurrent decrease in bed thickness of calciturbidites can generally be followed in the SW–NE direction.

Flysch deposits in the western part of the Dragonja Valley are horizontally to subhorizontally bedded and are well-exposed in steep cliffs and river channels. In the eastern (upper) part of the Dragonja Valley the bedding turns to subvertical and overturned over short distance, forming an asymmetrical non-plunging syncline fold in the thrust footwall. A simplified map and a profile through the broader thrust zone are shown in Fig. 2. The dip of the thrust plane ranges from 5 to 40° NE, depending on local post-

Fig. 5. The waterfall on the Stranica Creek under Trebešić on the overturned carbonate megabed.
Sl. 5. Slap na Stranici pod Trebešići, pogled na slap in obrnjeno karbonatno megaplast.
thrusting deformation. Beds in the thrust footwall are folded and overturned in the thrust direction and generally dipping 40 to 50° towards NE. Locally, the overturned beds are nearly horizontal or even gently dip towards SW. The fold structure is best seen in outcrops along the Dernarnik Creek, in road-cuts along the roads near the village of Trsek, and in valleys between the spring of the Dragonja River and its confluence with the Stranica Creek, SE of the Trsek Village (Fig. 2). The bedding in the thrust hanging wall is normal, with a mean strike and dip of 20/15° NE. Carbonate megabeds have not been observed in the hanging wall in the area shown in Fig. 2 but they occur to the northeast in the area of Buzet.

The flysch succession in the overturned fold limb is about 400 m thick and comprises 6 carbonate megabeds, marked MbA-MbF, according to their stratigraphic position (Fig. 2). The continuation of megabeds between the undeformed western part of the Dragonja Valley and the overturned fold limb has not been established directly; however, as inferred from the altitude of the outcrops of subhorizontal megabeds, the topmost megabed in the eastern part (MbF) presumably corresponds to the innermost megabed in the fold core (Fig. 2B).

Previous understanding of the tectonics of the boundary zone between the External Dinarides and the Adriatic Foreland (Istria) has largely been derived from the Basic Geological Map 1:100.000 (Trst Sheet; Plenica r et al., 1969), which described the Kras Thrust Edge (or Čiarija Zone; Placer & Vrabec, 2004) as an imbricate structure formed along more or less steep reverse faults (Fig. 1). However, structural data obtained in the recent project of geological mapping of the motorway section Klanec–Srmin (Placer, 2002) and the newly discovered Buzet Thrust Fault documented in this paper indicate that the Kras Thrust Edge formed through several phases of deformation, including extensive underthrusting of Istria towards NE. The Buzet Thrust Fault, which represents the outermost SW margin of the Kras Thrust Edge, presumably continues from the studied area to the southeast. The broader structural implications of the Buzet Thrust Fault will be addressed in our further work.

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References


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