Geol. vjesnik	34	121—125	2 figures	Zagreb, 1981

UDK: 550.3

Depths to the basement of sediments along the line Brač — Palagruža

Bruno ALJINOVIĆ

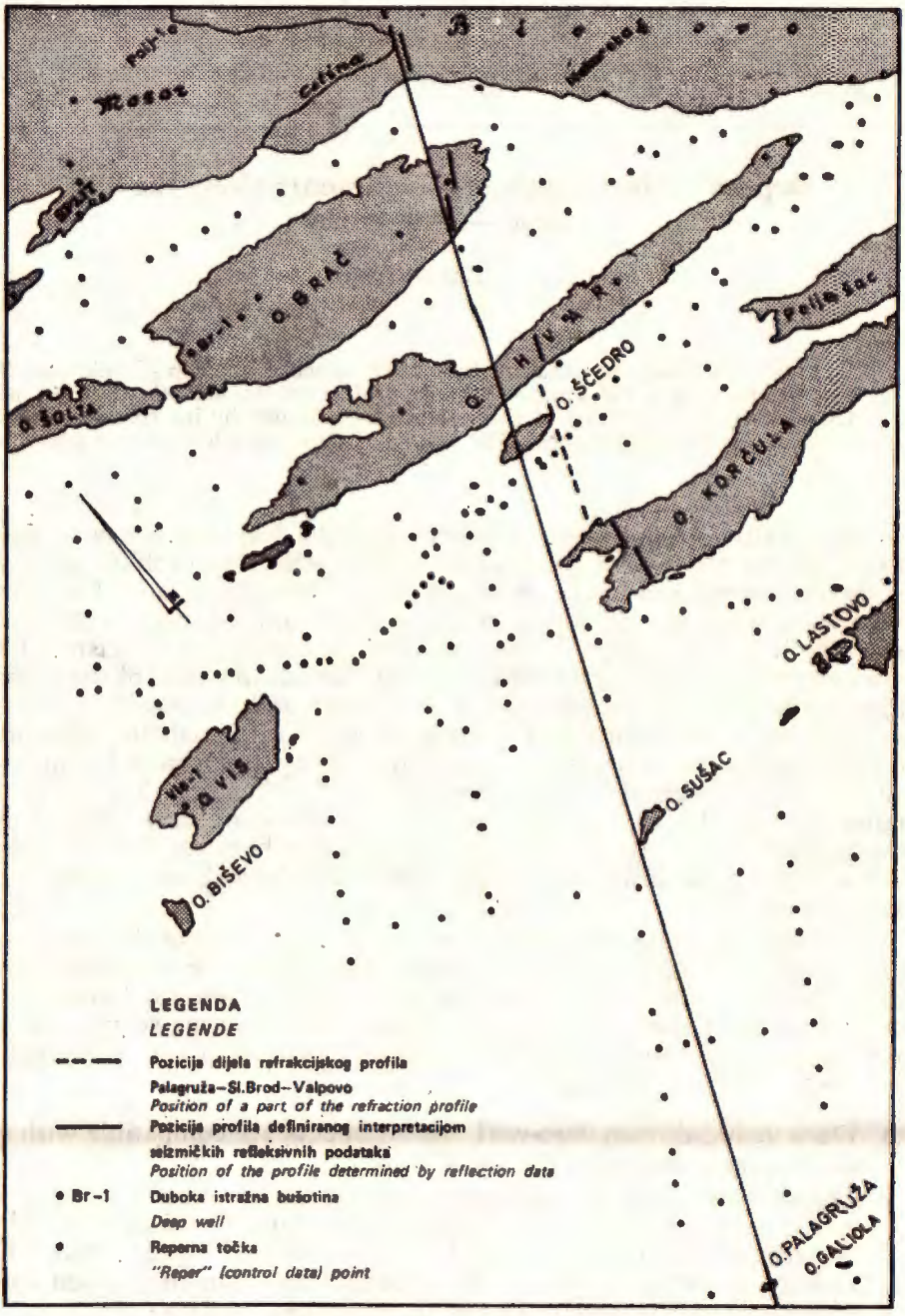
Poor data about the sediment base were recorded by deep seismic sounding on the refraction Palagruža—Valpovo profile on its Adriatic (border) part. Complement information of these data was obtained by interpretation of the reflexive profiles of this area. The results of these complements are presented.

A correlative predominant and recognizable deep horizon was determined on the network of continuous seismic reflection profiles, recorded on shore, islands and in the open sea of the Central Adriatic. The actual reflex is evident in the deeper parts of their time sections. Field tests were carried out in order to determine better conditions of seismic field data acquisition. These tests indicated that changes in values of the seismic parameters did not influence much the quality and the possibility of the registration of the mentioned correlative reflex, although the diapasons of filter apertures, patterns of geophone array per channel, kinds of sources for the seismic signal generation were changing. The reflex remains recognizable on the time sections. Therefore, we may suppose that this horizon represents a real deep discontinuity between the two media with a significant difference among their lithological and seismic characteristics.

The depth vs. time correlation curve was used for the time to depth conversion of the predominant horizon. This regressive parabolic correlation was determined by statistical processing of several hundreds of stacking velocity data. They were deduced from the time sections of the investigated area. Such data show an unsufficient accuracy; nevertheless they were used for two reasons:

1. Data deduced from deep-well measurements are compatible with the given regressive parabolic correlation.
2. Depth domain of the measurement data is less than a half of the same domain for the stacking velocity data. Consequently, while determining depths from 5 to 15 km we shall get bigger errors when using the extrapolation of the measurement data than when using the parabolic correlation of the stacking velocity data.

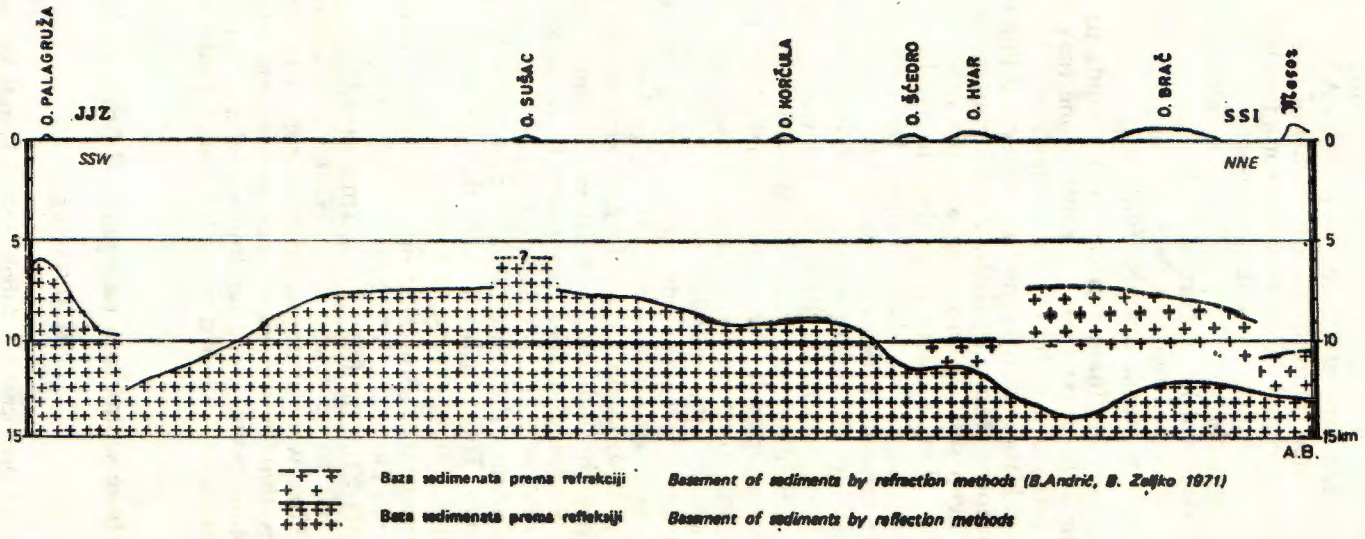
In order to identify the dominant deep horizon, its comparison was made with the basement of sediments on the littoral part of the deep refraction profile carried out along the line Valpovo — Slavonski Brod —



Slika 1
Figure 1

DUBINE BAZE SEDIMENATA NA PRIOBALNOM DIJELU REFRAKCIJSKOG PROFILA PALAGRUŽA–SL.BROD–VALPOVO

DEPTHS TO THE BASEMENT OF SEDIMENTS ON THE SHORE PART OF THE REFRACTION PROFILE PALAGRUŽA–SL.BROD–VALPOVO



Slika 2

Figure 2

Palagruža. Same depths in both cases are obtained near Aržano, not far from the coast (a few tens of kilometers). In its Adriatic part the refraction profile was carried out only on the islands of Brač, Hvar, Šćedro and Korčula. It is this marginal part where the sounding was not continuously realized and where the obtained data are poor.

On the other hand, the said deep reflex is evident on a relatively dense network of reflexive profiles, recorded in the same area. The positions of such points are plotted in figure 1. We call them »reper« points. The details of the refraction profile are also plotted in the same figure.

Since the deep predominant horizon corresponds to the basement of sediments in the littoral part of the profile, one may anticipate that it represents the same discontinuity along the entire line from the coast to Palagruža island. Its depths along the mentioned line were interpolated by the data of »reper« points. In figure 2 both boundaries are plotted: one determined by deep seismic sounding and the other determined by reflection profiling. Along the line from Brač to Šćedro there are inadmissible differences among their depth values. Data obtained by the interpretation of the seismic profiling network are expected to be more accurrate. The results of the deep prospecting drilling on the island of Brač confirmed this supposition. On Brač, the one-way reflection time of the correlative reflex is about two seconds. According to measurement velocities in the same deep well, the seismic signal needs less than a half of the mentioned time to arrive from the earth surface to the well bottom at a depth of 6 km. For the undrilled section from the well bottom to the basement there remains a signal propagation time interval of more than one second. In case that older sediments are underlain by younger ones, the latter have to be underlain by still older sediments. Mean signal propagation velocities through such a sediment complex should be at least 4000—5000 m/s. Such high values may result from high pressures existing at these depths of over 6 km. On the contrary, if there are no such underlain younger sediments, the velocities are expected to be a little bit higher — about 6000 m/s. Thus, in both cases the depths to the basement of sediments on Brač should exceed 10 km.

All the presented facts show that our assumption is correct. The deep correlative horizon along the line Brač — Palagruža represents the basement of sediments. Still, the fact that seismic profiling was not performed along this line has to be taken into account. Consequently, the depth values along the line were interpolated by means of the adjoining »reper« points. It means that by means of such process of interpolation, when using more distant points, smaller faults and smaller zones of various tectonic disturbances could have remained undetected.

Dubine baze sedimenata na potezu od Brača do Palagruže

B. ALJINOVIĆ

Jedan korelantan i prepoznatljiv duboki seizmički refleks postoji na mreži refleksivnih profila snimljenih na kopnu, otocima i moru srednjeg Jadrana. Lako je uočljiv u dubljim dijelovima njihovih vremenskih sekcija. Terenske probe, koje su vršene radi determinacije boljih uvjeta akvizicije seizmičkih podataka, pokazale su

kako promjene vrijednosti parametara ne utječu vidno na kvalitet i registraciju spomenutog refleksa. Od parametara mjenjani su: otvori filterskih propusta, oblici rasporeda geofona po kanalu, vrste pobude seizmičkog signala. Uza sve to, on i dalje ostaje prepoznatljiv na vremenskim sekcijama profila. To ukazuje da možemo pretpostaviti da se ovdje radi o jednoj realnoj dubokoj granici između dvaju sredstava vidno različitih litoloških odnosno seizmičkih osobina.

Za determinaciju njegovih dubina korišten je zakon korelacije između dubina i vremena. Ta parabolička ovisnost određena je statističkom obradom više stotina podataka iz stekirajućih brzina sa tog terena. Ovakvi podaci, iako nisu dovoljno precizni, korišteni su iz dva razloga:

1. definiraju zakone u odnosu na koje mjerni podaci iz bušotina sa tog terena dobro se uklapaju,
2. dubinska domena mjernih podataka u odnosu na stekirajuće je dvostruko manja (oko 5 km), pa bi velike ekstrapolacije sa njima utvrđenih zakona rezultirale većim pogreškama u prognozi dubina.

Radi identifikacije repernog horizonta izvršena je njegova komparacija sa bazom sedimenata na priobalnom dijelu refrakcijskog profila Valpovo—Slavonski Brod—Palagruža koji prolazi ovim područjem. U kopnenom dijelu tog profila (kod Aržanova) dubine su im sukladne. Od obale prema Palagruži refrakcijski profil je izveden samo na otocima: Brač, Hvar, Šćedro i Korčula. To su mu rubni dijelovi gdje su zbog otežanih terenskih uvjeta dobiveni nepotpuni odnosno oskudni podaci. S druge strane, u tom području po relativno gustoj mreži snimljenih refleksivnih profila evidentan je spomenuti duboki refleks. Na slici 1 ucrtane su pozicije takvih točaka nazvanih — repernima. Isto tako ucrtani su detalji na kojima je izvršeno refrakcijsko snimanje.

Pošto se u kopnenom dijelu duboki reperni horizont podudara sa bazom sedimenata, očekivati je da on i od obale prema Palagruži predstavlja istu granicu. Korištenjem podataka o dubinama na repernim točkama određene su mu dubine na potezu od kopna do Palagruže. Na slici 2 ucrtane su obe granice: 1. koja je determinirana refrakcijom i 2. sa refleksivnim snimanjem. Netolerantna razlika postoji među njima na potezu od Brača do Šćedra. Za očekivati je da je točniji podatak dobiven interpolacijom mreže seizmičkih profila. Tome u prilog idu rezultati dubokog istražnog bušenja na Braču. Jednostruko vrijeme do dubokog korelantnog refleksa tu iznosi oko 2 sekunde. Prema mjerenim brzinama na toj istražnoj bušotini za širenje signala od površine do dna bušotine (oko 6 km) potrebno je manje od polovine vremena dubokog refleksa. Za neprobušeni interval od dna bušotine do baze preostaje vrijeme širenja veće od jedne sekunde. Ako tu postoje mlađi podvučeni sedimenti, ispod njih treba još biti i starijih. Srednje brzine širenja signala kroz čitav takav kompleks trebale bi iznositi bar 4—5000 m/s. Razlog tolikim iznosima mogu biti veličine pritisaka koje egzistiraju na tim dubinama od preko 6 km. U protivnom, ukoliko ne postoje takvi mlađi — podvučeni sedimenti, može se očekivati da su brzine nešto veće i da iznose bar 5—6000 m/s. Dakle, u oba slučaja dubine do baze sedimenata na Braču trebaju biti preko a ne ispod 10 km.

Sve ovo ukazuje na realnost pretpostavke da duboki korelantni refleks na potezu od Brača do Palagruže predstavlja bazu sedimenata uz napomenu da seizmičko profiliranje nije vršeno duž tog poteza. To ima za posljedicu da su vrijednosti dubina na njemu interpolirane pomoću susjednih repernih točaka. Odnosno manji lomovi i rasjedne zone u bazi mogli su postupkom interpolacije daljih točaka biti ispušteni tj. neuočeni.

Primljeno: 26. 04. 1980.