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COMPARISON OF S-ITALIAN PROFETI AND BASSIANO PLATY DOLOMITES AND THEIR GEOCHEMISTRIES

Profeti : Geological setting

The Profeti platy dolomite (I.G.M. Sheet 172 I S.O.- Formicola) constitutes an outcrop that is observable for a thickness of about 5 metres (the rest is under the field plane) along a small field road close to the Profeti village.
This important paleontological site has been found by one of us few years ago, and the first biostratigraphical studies carried out on it (Bravi, 1996; Bravi, 1997) lead to date it to the lower Albian, because of the finding of the dasyclad alga *Salpingoporella dinarica* RADOICIC, which reachs its *acme* zone about 40 meters above the last strata of the platy dolomite horizon.
The fossils of this horizon are particularly interesting : among the animals are well represented the fishes, mainly *Pycnodontids*, with the new species *Coelodus danae* BRAVI, together with a new Macrosemiid also the genus *Lepidotes* is present, but the Teleosteans are represented by not determined forms belonging to the Gonorhynchiformes. The peculiar feature of the fishes of this outcrop is their size : they are specimens in very juvenile stages of growth. Also the preservation of the fossils is often exceptional, being possible to observe for the first time in the world some particulars (e.g. the maxillary bones in *Coelodus*), never preserved in other fossil sites. In the marly-dolomite laminae are sometimes preserved the tracks of worm-bodies soft tissues, showing the metameric structure.
The middle part of the outcrop is particularly rich in land-plants remains, among which the conifers *Podozamites* sp. and *Brachyphyllum* sp. (Bravi, 1996).
By a sedimentological point of view, the outcrop can be subdivided in 3 main facies, well recognizable in the field (from the bottom to the top):

1) Lower part (Facies A) :
Platy dolomite up to 40 cm thick, intercalated with sets of 0,1-2 cm thick strata.

2) Middle Part (Facies B) :
Platy dolomite strata from 1 to 10 cm thickness, interwoven with thick marly-dolomitic laminae sets. The laminae are millimetric and could be due to tide rhythms. The thicker dolomite strata are often storm layers. This part of the outcrop is the richest in fossils.

3) Upper part (Facies C):
The upper part is constituted by stromatolithic sets of laminae, intercalated to dolomitic strata, mainly due to storms. Also in this part some fossil fishes are present in the

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stromatolithic laminae. Just above the platy limestone, 2,5 metres of yellowish-gray, badly stratified dolomite beds are present; then the sequence evolves to normal marine inner carbonate platform lagoonal facies.

The sequence of the different facies from the bottom to the top of the platy dolomite outcrops leads to hypothesize an evolution from deeper lagoonal (but not more than few metres) conditions (Facies A) to more shallow and close lagoonal conditions (Facies B) and finally to algal marsh (Facies C). The small basin was probably very close to lands and represented a coastal enviroment, in which the small fishes found protection in the first stages of growth.

Bassiano : Geological setting.

The Bassiano platy dolomite crops out in the Lepini Mountains, in the province of Latina, close to the Bassiano small village. The first data on the platy dolomite are due to Praturlon (1965), who stressed the presence of conifers and sometimes fishes in the outcrop. A more wide study was carried out by Bravi (1996).

The maximum thickness of the platy dolomite is about 40 metres, but laterally it decreases down to few meters, along the road-cut where it crops out. The lateral extension of the facies is about one kilometer.

The biostratigraphical analysis of the whole sequence lets date the platy dolomite to the Dogger (Bajocian - Bathonian) mainly by the presence of *Mesendothyra croatica* GUSIC and *Valvulina lugeoni* SEPTFONTAINE, together with bivalves belonging to the genus ?*Catella*.

By a lithological point of view, the outcrop is constituted by pink and grayish, regular dolomitic strata from less of 1 cm to about 10 cm thick, sometimes laminated in the body, intercalated with thick marly-dolomitic laminae sets which recall varves.

The rhythmic variation in the laminae thickness seems to be in relation with tide mechanisms of sedimentation (see Archer & Feldman, 1994). Higher energy sedimentary events produced periodically the thicker strata, with a finely graded structure and contents of small foraminifers and broken molluscs.

The main fossils of the platy dolomite are abundant remains of Brachyphyllum sp., and by not very common fishes, mainly belonging to the genus Pleuropholis.

The depositional environment could be identified with a shallow, quiet lagoon not far from lands covered by conifer woods.

First geochemical results.

Bassiano and Profeti are two profiles of lagoonal platy dolomites. To demonstrate their geochemical properties, it seems to be reasonable to compare them

A) with other dolomites,

B) with other lagoonal platy limestones.

To A) : It is astonishing that informations about the geochemistry of dolomites in literature are scarce and of doubtful quality. Mostly data are given about Ca, Mg, Fe, Na, and Sr (e.g., Burns et al. 1988, Kruger & Simo, 1994). Those data were generated by dissolution of the dolomite in (rather strong) acids, and determined by AAS methods.

On principle, carbonate rocks consist of the carbonate component itself (calcite, dolomite), and detrital siliciclastic components (quartz, clay minerals, feldspars) together with diagenetic pyrite. During acid attack clay minerals and pyrite are attacked, too (this is strongly dependent from the crystal sizes of the minerals; very fine pyrite - frequent in

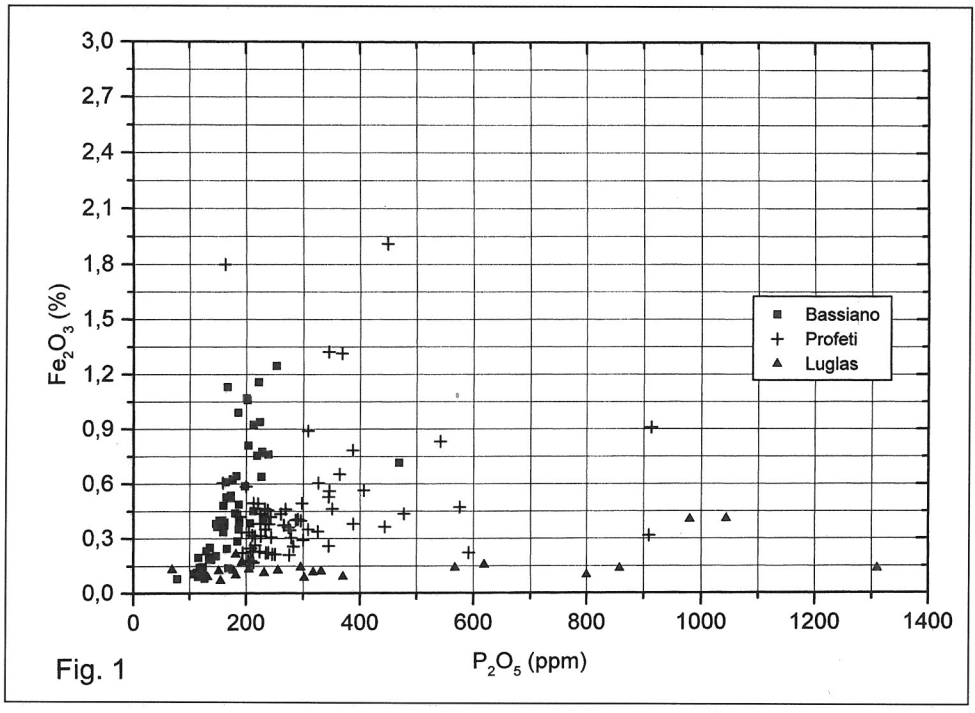
3,0
2,7
2,4
2,1
1,8
1,5
1,2
0,9
0,6
0,3
0,0
Fe_2O_3 (%)
0
200
400
600
800
1000
1200
1400
P_2O_5 (ppm)
Bassiano
Profeti
Luglas

Fig. 1

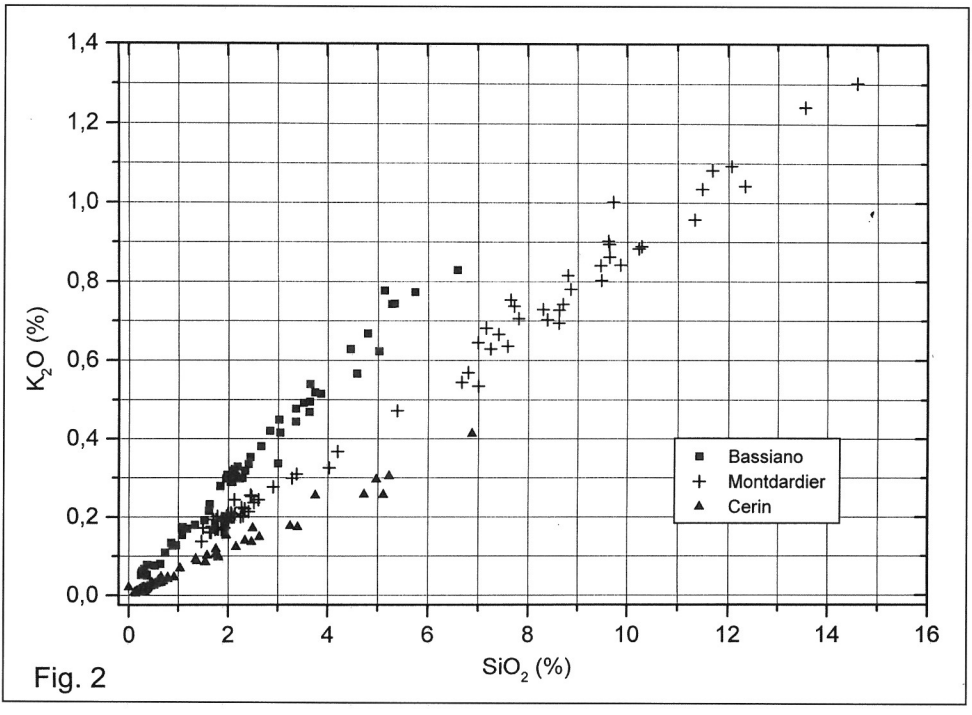
1,4
1,2
1,0
0,8
0,6
0,4
0,2
0,0
K_2O (%)
0
2
4
6
8
10
12
14
16
SiO_2 (%)
Bassiano
Montdardier
Cerin

Fig. 2

sediments - dissolves appreciably). Therefore the results of "geochemistry of dolomites" represent in no case the true trace element contents of the dolomite mineral. However, the more siliciclastics and pyrite are present, the less those analytical data are reliable.
As it is valid for limestones, only whole rock analysis, XRF-methods and plots of 2-element-diagrams are the suitable way of geochemical approach (Bausch 1994).
The comparison with a "normal" reef dolomite (Luglas, Franconia, Germany, drill hole of more than 100 m) reveals that Profeti and Bassiano are rather impure, Bassiano being purer that Profeti. - In closer detail it can be seen that in Profeti two types of dolomites exists, independent from the poorly dolomitic resp. marly dolomitic nature. The second type is poorer in Ca. This feature is not observable at Bassiano.
There are a lot of further differences between (or individual features of) Bassiano and Profeti, which will be shown at the symposium. Only one example may be given in fig. 1.

To B): Both Bassiano and Profeti reveal excellent correlations between the "clastic elements". They behave in this manner like normal limestone/marl succession (including platy limestones). A comparison with classical platy or lithographic limestones, like Cerin or Montdardier, show several interesting differences. As the only one shown here may serve fig. 2, demonstrating that astonishingly the platy dolomites are higher in potassium than the platy (lithographic) limestones.

Finally, data are given about the isotopic compositions of Profeti and Bassiano in comparison with other dolomites.

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