# PALAEONTOLOGICAL SITES FROM CHEILE BICAZULUI – HĂŞMAŞ NATIONAL PARK

**DAN GRIGORE, IULIANA LAZAR, CONSTANTIN GRASU, ION GHEUCA, DIANA CIOBANETE, ADRIANA CONSTANTINESCU, IULIA MARCU**

**Abstract.** *This paper is a preliminary form of the Catalogue of palaeontological sites from Hăghimaş Mts., sites found in Cheile Bicazului - Hăşmaş National Park (CBHNP) area or bordering it. The first part presents a data sheet pattern for the site and the catalogue structure. In the second part there are summarised the palaeontological sites inventoried during the project GEOBIOHAS, some of these discovered on this occasion. The paper is a partial revision of the natural heritage (palaeontological one) of Hăşmaş Massif (i.e. of Cheile Bicazului – Hăşmaş National Park).*

**Keywords:** *Sites, Palaeontology, Hăşmaş, National Park.*

**Rezumat. Situri paleontologice din Cheile Bicazului – Parcul Naţional Hăşmaş.** *În aceasta lucrare este prezentată o forma preliminară a Catalogului siturilor paleontologice din masivul Hăghimaş, situri din aria Parcului Naţional Cheile Bicazului – Hăşmaş sau limitrofe acestuia. În prima parte este prezentat un model de fişă de sit şi structura catalogului. În cea de-a doua parte sunt prezentate pe scurt siturile paleontologice inventariate cu ocazia proiectului GEOBIOHAS, unele descoperite cu acest prilej. Lucrarea reprezintă o revizuire parţială a patrimoniului natural din masivul Hăşmaş (i.e. a Parcului Naţional Cheile Bicazului – Hăşmaş).*

**Cuvinte cheie:** *Situri, Palaeontologie, Hăşmaş, Parc Naţional.*

## INTRODUCTION

In Romania, one of the best-known zones for the abundance of Mesozoic palaeontological sites, known starting with FRANZ HERBICH (since 1866) is Hăghimaş Massif (the Eastern Carpathians). The geological researches in this area were made, at great periods of time, sometimes ten or more than ten years, in several expeditions. This way, it seems that information is presently dispersed and the scientific literature consists in most cases in published articles. This fact leads, unfortunately, to an ignorance of the sites discovered in time, some of those notified as international ones. More than that, presently, tourists and even people who live there are not informed about the sites' locations or about the geological information.

Starting from this idea, about two years ago, took birth the GEOBIOHAS Project, project gathering several institutions, in order to revaluate the present situation of the whole natural heritage in this area. The objective is to bring new information about the palaeontological sites from Cheile Bicazului- Hăşmaş National Park and to publish papers in scientific journals for a better understanding of the lithology and stratigraphy of these palaeontological sites.

The present paper aims at briefly rendering the terrain research of the team members. It provides an attempt in revealing information concerning the results and presents a method for data processing. The catalogue comprises various information, some of them exceeding the scientific area and suggesting measures for development or/ and maintenance.

Less than two years ago, the members of the this project (involving the authors) analyzed (formally) in situ the existing situation of 14 palaeontological sites, following the information in the scientific literature; we concluded that some of these sites probably vanished in the wake of geomorphologic evolution of the terrain or they are poorly conserved. On this occasion, new locations/sites were found (about 10). At the same time, we did a detailed analyze, for 7 of the most important ones and we are currently taking part at scientific meetings to bring new information about Hăghimaş area and to publish the results.

## THE SITES CATALOGUE STRUCTURE

The catalogue contains several chapters: introduction, sheets of sites, references, index and annexes - graphic drawings, pictures and map. For data sheet pattern of the site we propose the following content:

1. General data (a. Preserved area type; b. IUCN Category; c. Rating rules IGR category; d. Constitutive act; and e. Landowner);
2. Location (a. Locality; b. Longitude; c. Latitude; d. Altitude; e. Surface; f. Geotectonic unit; g. Lithostratigraphic unit; h. Geographical location: (attached drawing); and 2.b "Access to" (as public indications);
3. Description (a. Exposure mode; b. Geological description – lithology, structure and age enclose) and 3.b "Position in the landscape (attached photos)" and/or "Geotourist features" (as public indications);
4. Palaeontological resources/content (a. significant fossils (label – No. /Coll. indication/ Inv. no. /Species /Specimen indication /Special indication /site features); b. More fossils; c. Collections; d. Inventory data sheet (as attachment);

5. Scientific value (includes a. Motifs to protect the area; and b. Measures for preservation);
6. Suggestion for development and maintenance (site development, sketches);
7. Helpful information (localities, tourist zones, distances, etc.);
8. Indications for a. References; b. Graphics; c. Photos and Web addresses (about natural reserve and tourist accommodation).

**SITES DATA SHEET**

**F 1** Ghilcoş 1 Site ("Kimmeridgian of the Ghilcoş Mts. walls") (Figs. 1, 2)

Exposures of Upper Jurassic (Kimmeridgian - Lower Tithonian) deposits are located in the base of the western walls of Ghilcoş Massif and were discovered by FRANZ HERBICH in 1866.

Fossils: lumachelle ammonites and other rarer invertebrates: bivalves, brachiopods, gastropods, belemnites, echinoids and plants.

Importance: biostratigraphy, palaeontology, palaeoecology and palaeogeography of Upper Jurassic.

It provides one of the richest Kimmeridgian ammonites' fauna.

Until now, this was not legally notified as a reserve. The effective area of exposures is about 2.5 hectares and is located within the CBHNP area.

References: HERBICH (1866, 1878), NEUMAYR (1873), VADASZ (1915), JEKELIUS (1921), BĂNCILĂ (1941), PATRULIUS (1960), PREDA & PELIN (1965), GRASU (1969b), SĂNDULESCU (1969, 1975), PREDA (1973), DRAGASTAN (1975, 1980), PREDA et al. (1976b), GRASU & TURCULEȚ (1980), TURCULEȚ (1980), NEAGU & NEAGU (1995), GRIGORE (1996, 2000a, 2000b, 2002), TURCULEȚ & GRIGORE (2006).

**F 2** Ghilcoş 2 Site ("Kimmeridgian blocks of the Ghilcoş slope") (Figs. 3, 5)

Exposures of Upper Jurassic (Kimmeridgian - Early Tithonian) deposits are located in a large area with blocks on the northwestern slope of Ghilcoş Massif and discovered by FRANZ HERBICH in 1866.

Fossils: ammonites lumachelle and other rare invertebrates: bivalves, brachiopods, gastropods, belemnites, echinoids and plants.

Importance: biostratigraphy, palaeontology, palaeoecology and palaeogeography of Upper Jurassic and tectonic interpretations.

These exposures were never considered to be palaeontologically or biostratigraphically important and proposed as a reserve until now. The complete area of exposures is about 3.5 hectares and it is located within the CBHNP area.

References: HERBICH (1866, 1878), NEUMAYR (1973), JEKELIUS (1921), PATRULIUS (1960), PATRULIUS et al. (1969), PREDA (1973), SĂNDULESCU (1975), GRIGORE (1996, 2000a, 2000b, 2002), TURCULEȚ & GRIGORE (2006).

***F 3** Ghilcoş 3 Site ("Marls with ammonites from western Ghilcoş") (Fig. 4)

Exposures of Upper Jurassic deposits located in base of the northwestern walls of Ghilcoş Massif, discovered by the authors in 2008.

Fossils: ammonites, brachiopods and plant debris.

Importance: biostratigraphy, palaeontology and palaeoecology of Upper Jurassic.

The complete area of exposures is about 1.5 hectares and is located within the CBHNP area.

No references.

***F 4** Ghilcoş 4 Site ("Limestones with brachiopods from north Ghilcoş") (Fig. 6)

Outcrop of Upper Jurassic deposits located in base of the northwestern walls of Ghilcoş Massif, discovered by the authors in 2008.

Fossils: brachiopods, bivalves, gastropods, echinoids and crabs – perirecifal facieses.

Importance: biostratigraphy, palaeontology and palaeoecology of Upper Jurassic.

The effective area of the outcrop is about 0.3 hectares and is located within the CBHNP area.

No references.

**F 5** "Ghilcoş Valley 1" Site ("Liassic of the Ghilcoş Valley")

Exposures of Lower Jurassic (Liassic) deposits located on right side of the Ghilcoş Valley, near the confluence with the Oii Valley (i.e. Hăghimaş Valley).

Fossils: brachiopods, belemnites, bivalves and rare ammonites.

Importance: biostratigraphy, palaeontology and palaeoecology of Lower Jurassic.

The outcrop is about 0.1 hectares and is located outside the CBHNP area.

References: BĂNCILĂ (1941), ATANASIU & RĂILEANU (1952), PREDA & PELIN (1963, 1969), GRASU & TURCULEȚ (1967, 1980), PELIN (1967), GRASU (1970a, 1970b), PREDA (1976a).

**F 6** "Ghilcoş Valley 2" Site ("Dogger of the Ghilcoş Valley") (Fig. 7)

Exposures of Middle Jurassic (Dogger) deposits located in the riverbed and on the right side of the Ghilcoş Valley, at the middle rivulet way.

Fossils: bivalves, belemnites, rare ammonites, and plant debris.

Importance: biostratigraphy, palaeontology and palaeoecology of Upper Jurassic.

The complete area of exposures is about 0.5 hectares and is located outside the CBHNP area.

References: HERBICH (1878), BĂNCILĂ (1941), GRASU (1969a), PREDA (1976a), GRASU & TURCULEŢ (1980).

***F 7** "Cherecului Valley 1" Site ("Cretaceous Gossau from the Cherecului Valley") (Fig. 8)

Exposures of Cretaceous deposits located in the riverbed of the Cherecului Valley, in its spring area. Discovered by the authors in 2008.

Fossils: gastropods (*Nerinea* and other), bivalves and solitary corals.

Importance: biostratigraphy, palaeontology, palaeoecology and Palaeogeography of Cretaceous.

The complete area with river debris and outcrop is about 0.5 hectares and is located within the CBHNP area.

No references (?).

***F 8** "Valea Cherecului 2" Site ("Limestones with Nerinea from the Cherecului Valley") (Fig. 7)

Exposures of Lower Cretaceous deposits are located on the right side of the Cherecului Valley, on the path near its conjunction with the rivulet. Discovered by the authors in 2008.

Fossils: gastropods (*Nerinea*) and rare bivalves, brachiopods, crinoids.

Importance: palaeontology and palaeoecology of Cretaceous.

The area of outcrop is about 0.1 hectares and is located outside the limit of the CBHNP.

No references.

***F 9** "Hăghimaşul Negru Valley 1" Site ("Triassic reef from the Hăghimaşul Negru Valley") (Fig. 10)

Exposures of Triassic coral reef located on the slope from the right side of the Hăghimaş Valley (i.e. Oii), near the confluence with the Hăghimaşul Negru Valley, on the path towards Poiana Albă. Discovered by the authors in 2008.

Fossils: fossil coral reef.

Importance: palaeontology, palaeoecology and palaeogeography of Triassic.

The complete area of exposures is about 1 hectare and is located outside the CBHNP area.

No references.

***F 10** "Hăghimaşul Negru Valley 2" Site ("Liassic with cephalopods from the Hăghimaşul Negru Valley") (Fig. 13)

Exposures of Liassic deposits located on the slope from right side of the Hăghimaş Valley (i.e. Oii), in the path towards Poiana Albă. Discovered by authors in 2008.

Fossils: belemnites, bivalves and rare aptychi.

Importance: biostratigraphy, palaeontology, palaeoecology and palaeogeography of Lower Jurassic.

The complete area of outcrop is about 0.1 hectares and is located within the CBHNP area.

No references.

***F 11** "Potcoava Mts. 1" Site ("Kimmeridgian from Potcoava Mts.")

Exposures of Upper Jurassic (Kimmeridgian-Tithonian) deposits located on the western slope of Potcoava Mts., in the path towards Poiana Albă, in the spring area of a tributary of the Hăghimaşul Negru rivulet. Discovered by the unders in 2008.

Fossils: rare brachiopods, ammonites and belemnites.

Importance: biostratigraphy and palaeogeography of Upper Jurassic.

The complete area of exposures is about 0.3 hectares and is located outside the limit of the CBHNP.

No references.

***F 12** "Potcoava Mts. 2" Site ("Recifal limestones from Potcoava Mts.") (Fig. 11)

Exposures of Upper Jurassic deposits located on the western slope of Potcoava Mts., on the path towards Poiana Alba, an area with large blocks (debris slope) at the base of walls. Discovered by the authors in 2008.

Fossils: brachiopods, echinoids, gastropods, bivalves and crabs.

Importance: palaeontology, palaeoecology and palaeogeography for Upper Jurassic.

The complete area of exposures is about 0.5 hectares and is located within the CBHNP area.

No references.

**F 13** "Fagu Oltului Valley 1" Site ("Brachiopods from the Fagu Oltului Valley") (Fig. 12)

Outcrop of Upper Jurassic (Oxfordian ? Kimmeridgian) deposits located on the left side of the Fagu Oltului Valley, on the river bed and valley walls, in the spring area.

Fossils: brachiopods, crinoids and rare bivalves – lumachelle.

Importance: biostratigraphy, palaeontology, palaeoecology and palaeogeography of Upper Jurassic.
The effective area of outcrop is about 0.2 hectares and is located within the CBHNP area.
References: GRASU (1964, 1969a), PELIN (1965), PREDA (1973), GRASU & TURCULEȚ (1980).

***F 14** "Fagu Oltului Valley 2" Site ("Limestones with brachiopods from the Fagu Oltului Valley")
Outcrop of Upper Jurassic (?Kimmeridgian) deposits located on the right side of the Fagu Oltului Valley (in the walls) in the spring area. Discovered by the authors in 2008.
Fossils: rare brachiopods, crinoids, bivalves and belemnites.
Importance: biostratigraphy, palaeontology and palaeoecology for Upper Jurassic.
The effective area of outcrop is about 0.2 hectares and it is located within the CBHNP area.
No references.

**F 15** "Fagu Oltului Valley 3" Site ("Limestones with Nerineea from the Fagu Oltului Valley") (Fig. 16)
Outcrop of Upper Jurassic (Tithonian) deposits located on the Fagu Oltului Valley (in the spring area), in the river bed and valley walls; in the southern walls of Piatra Roşie Mts.
Fossils: *Nerinea* sp. – lumachelle.
Importance: palaeontology and palaeoecology for Upper Jurassic.
The effective area of outcrop is about 0.2 hectares and it is located inside the limit of the CBHNP.
References: HERBICH (1870, 1878), GRASU (1964, 1969a), PELIN (1967), DRAGASTAN (1975, 1980), GRASU & TURCULEȚ (1980).

**F 16** "Piatra Unică 1" Site ("Kimmeridgian from Piatra Unică Mts.") (Fig. 15)
Exposures of Upper Jurassic deposits located on the western slope of Piatra Unică Mts., near its walls.
Fossils: brachiopods, crinoids and rare ammonites.
Importance: biostratigraphy, palaeontology and palaeoecology of Upper Jurassic.
The complete area of exposures is about 1 hectare and is located inside the limit of the CBHNP.
References: HERBICH (1870, 1878), JEKELIUS (1921), BĂNCILĂ (1941), PELIN (1967), SĂNDULESCU (1969, 1975), PREDA (1973), SĂNDULESCU et al. (1975).

**F 17** "Cheia Valley" Site ("Kimmeridgian with ammonites from the Cheia Valley") (Fig. 14)
Exposures of Upper Jurassic (Kimmeridgian) deposits are located in the spring area of the Cheia Valley, on the path towards Bălan locality. We presume this was discovered by HERBICH in the year 1866 (possible corresponding to Ciofronca site).
Fossils: ammonites and rare brachiopods – lumachelle.
Importance: biostratigraphy, palaeontology, palaeoecology and palaeogeography of Upper Jurassic.
The complete area of exposures is about 0.5 hectares and is located outside within the CBHNP area.
References: HERBICH (1866, 1870, 1878), NEUMAYR (1873), VADASZ (1915), JEKELIUS (1921), PREDA (1973), PELIN (1976).

**F 18** "Tunnel of Bicaz Gorges" Site ("Kimmeridgian with ammonites of the tunnel from Bicaz Gorges")
Outcrop of Upper Jurassic (Kimmeridgian - Lower Tithonian) deposits located in Bicaz Gorges walls, near to the old tunnel.
Fossils: ammonites.
Importance: biostratigraphy, palaeontology and palaeogeography for Upper Jurassic.
The effective area of exposures is about 0.5 hectares and is located within the CBHNP area.
References: Preda I. (1973).

**F 19** "Curmătura" Site ("The Adneth limestones from Curmătura")
Exposure of Lower Jurassic (Liassic) deposits located in the place named "Curmatura", near the spring area of the "Pârâul Sec"; it was discovered by FRANZ HERBICH in 1866. Not refunded after 1970 (SĂNDULESCU, 1975).
Fossils: ammonites - lumachelle.
Importance: biostratigraphy, palaeontology, palaeoecology and palaeogeography for Lower Jurassic.
References: HERBICH (1866, 1870, 1878), VADASZ (1915), JEKELIUS (1921), BĂNCILĂ (1941), ATANASIU & RĂILEANU (1952), GRASU (1968), PREDA (1976a), GRASU & TURCULEȚ (1980).

**F 20** "Hăghimaşul Negru Mts". Site ("Lower Cretaceous marls with ammonites from Hăghimaşul Negru Mts.")
Exposures of Lower Cretaceous deposits located on the western slope of Hăghimaşul Negru Mts., in the spring area of the Hăghimaşul Negru rivulet. Discovered by CONSTANTIN GRASU in 1960.
Fossils: ammonites and other invertebrates more rare.
Importance: biostratigraphy, palaeontology and palaeogeography of Lower Cretaceous.
References: GRASU (1969c).

**F 21** Ghilcoş 5 Site ("Neocomian of the Ghilcoş Mts.")

Exposures of Lower Cretaceous deposits located on the north-eastern slope of Ghilcoş Massif. Discovered by CONSTANTIN GRASU in 1960.

Fossils: ammonites and other invertebrates more rare.

Importance: biostratigraphy, palaeontology and palaeogeography of Lower Cretaceous.

References: GRASU (1969c).

***F 22** Suhard 1 Site ("Limestones with crinoids of Suhard Mts.")

Outcrop of Upper Jurassic deposits located in the southern walls and slope (as debris) of Suhard Mts. Discovered by the authors in 2008.

Fossils: Crinoids' lumachelle and other invertebrates: bivalves, brachiopods, gastropods, crabs and echinoids.

Importance: palaeontology, palaeoecology and palaeogeography for Upper Jurassic.

No references.

**F 23** Surduc 1 Site ("Kimmeridgian of the wall from Postal Office-Lacu Roşu")

Exposures of Upper Jurassic (Kimmeridgian - Lower Tithonian) deposits located in base of the western walls of Surduc Massif, near the Postal Office-Lacu Roşu.

Fossils: brachiopods, echinoids.

Importance: biostratigraphy, palaeontology, palaeoecology and palaeogeography for Upper Jurassic.

References: PREDA (1973).

**F 24** Surduc 2 Site ("Limestones with *Requenia* of Surduc Mts.")

Exposures of Lower Cretaceous deposits located on the top of Surduc Massif. Discover by FRANZ HERBICH in 1870.

Fossils: *Requenia* sp. lumachelle and other rarer bivalves and gastropods.

Importance: palaeontology, palaeoecology for Lower Cretaceous.

References: HERBICH (1870, 1878), JEKELIUS (1921), BĂNCILĂ (1941), PATRULIUS (1960), PELIN & PREDA (1964), PELIN (1967), GRASU (1969a, 1969b), SĂNDULESCU (1975), DRAGASTAN (1975, 1980).

**F 25** Suhard 2 Site ("Dogger from Suhard Mts.")

Exposures of Middle Jurassic deposits located on the southern slope of Suhard Massif, near the Bicaz resurgence from the Lacu Roşu. Discovered by FRANZ HERBICH in 1866.

Fossils: bivalves, gastropods and other invertebrates.

Importance: palaeontology, palaeoecology for Middle Jurassic.

References: HERBICH (1866, 1870, 1878), VADASZ (1915), JEKELIUS (1921), BĂNCILĂ (1941), GRASU (1969a), PREDA (1976a), GRASU & TURCULEŢ (1980).

**F 26** Site "Piatra Unică 2" ("The Hallstatt limestones from Piatra Unică Mts.")

Exposures of Triassic deposits located on the southern slope of Piatra Unică Mts, near the path towards Bălan locality. Discovered by FRANZ HERBICH in 1870.

Fossils: bivalves, gastropods and other invertebrates.

Importance: palaeontology, palaeoecology of Triassic.

References: HERBICH (1870, 1878), MOJSISOVICS (1875), BĂNCILĂ (1941), PATRULIUS (1960), PATRULIUS et al. (1969).

## CONCLUSIONS

Many of these natural values of Romania were given to the drawer is thought the best way of protection. But it turned out that it is not the best solution for preserving and in fact, the place is often occupied by other activities and enterprises, instead of sustained not only did we deviate from this value the wealth, which nature has given us one.

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**Dan Grigore, Ion Gheuca, Adriana Constantinescu**
Geological Institute of Romania,
Caransebeş 1st., Bucharest 012721, Romania
E-mail: dan1_grigore@yahoo.com
E-mail: i_gheuca@yahoo.com
E-mail: adrianaaqua@yahoo.com
**Iuliana Lazar, Diana Ciobanete, Iulia Marcu**
University of Bucharest,
Faculty of Geology and Geophysics,
N. Bălcescu 1Ave, RO-010041, Bucharest, Romania,
E-mail: iuliana.lazar@g.unibuc.ro
E-mail: zephyr_cancer87@yahoo.com
E-mail: tazz_iulius@yahoo.com
**Constantin Grasu**
University "Al.I.Cuza" – Iaşi,
Faculty of Geography and Geology,
Carol I 20AAve, RO-700505, Iaşi, Romania

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Figures 1-6. 1 and 2) Ghilcoş western walls site (F 1) – Kimmeridgian-Lower Tithonian; 3 and 5) The site Ghilcoş north-western slope (F 2) – blocks with Kimmeridgian-Lower Tithonian deposits; 4) The site F 4 – north-western walls of Ghilcoş; 6) The site F 3 – north-western Ghilcoş side with Kimmeridgian-Lower Tithonian deposits. Fossils: *Taramelliceras compsum* (OPPEL) and *Hybonoticeras beckeri* (NEUMAYR).

Figuri 1-6. 1 and 2) Situl Ghilcoş, pereții vestici (F 1) – Kimmeridgian-Tithonian inferior; 3 and 5) Situl Ghilcoş, versantul nord-vestic (F 2) – blocuri cu depozite din Kimmeridgian-Tithonic Inferior; 4) Situl F 4 – Ghilcoş, pereții nord-vestici; 6) Situl F 3 – Ghilcoş, partea nord-vestică cu depozite din Kimmeridgian-Tithonic Inferior. Fosile: *Taramelliceras compsum* (OPPEL) şi *Hybonoticeras beckeri* (NEUMAYR).

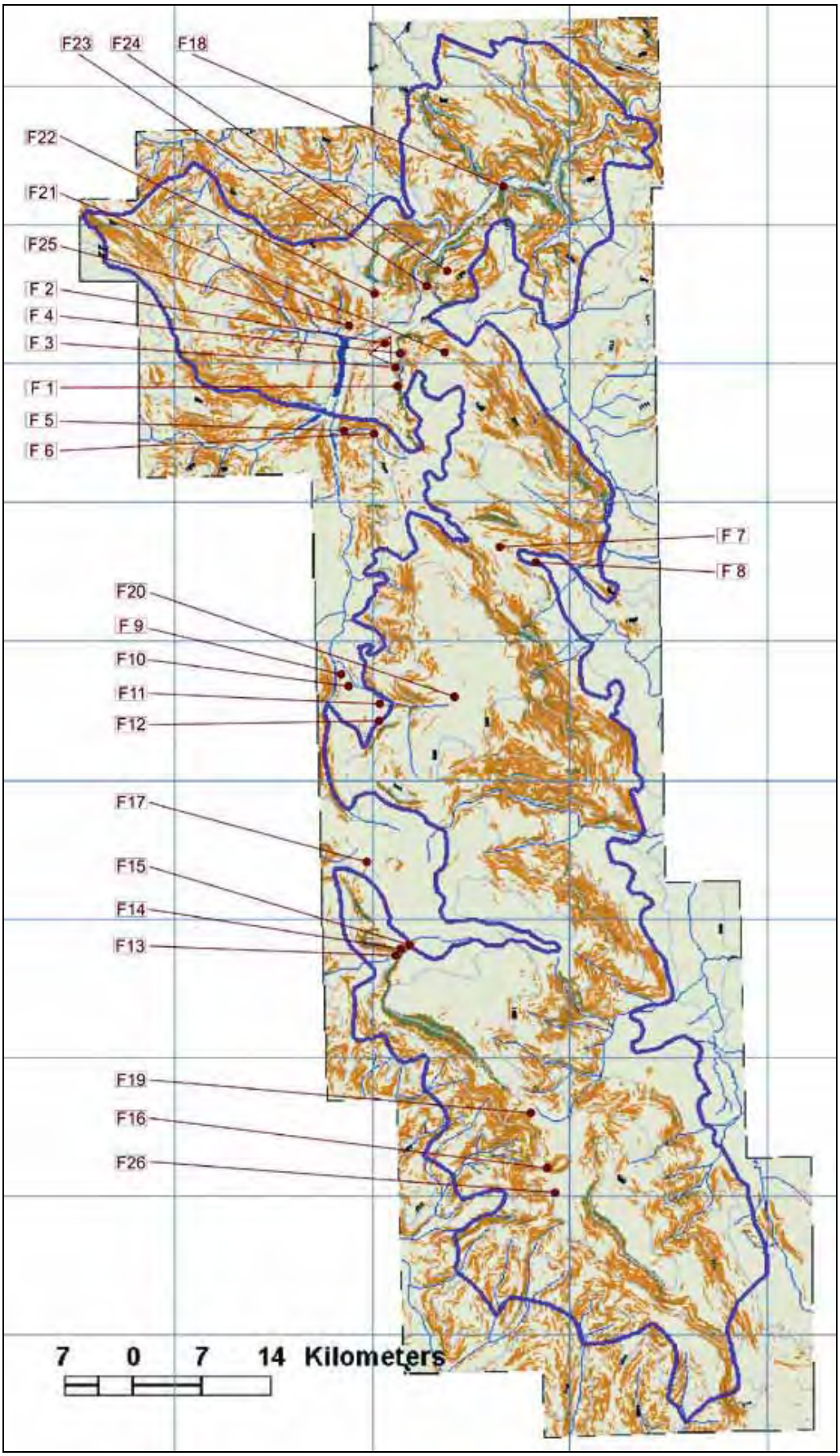


Figure 17. Sites location on Hăghimaş morphological map. Cheile Bicazului – Hăşmaş National Park limits in blue line.
Figura 17. Localizarea siturilor pe harta morfologică a zonei Hăghimaş. Limitele Parcului Național Cheile Bicazului – Hăşmaş sunt marcate cu albastru.


Figures 7-12. 7) Site F 8 – the Chereculuі Valley; 8) Site F 7 – the Chereculuі Valley; 9) Site F 6 – the Ghilcoş Valley; 10) Site F 9 – the Hăghimaşul Negru Valley (triassic reef); 11) Site F 12 – Potcoava Mts.; 12) Site F 13 – the Fagu Oltului Valley – brahiopodes. Fossils: *Nerineea* sp., gastropode, *Chlamis* sp., crab, *Lacunosella* sp. (in figs. order).
Figuri 7-12. 7) Situl F 8 – Valea Chereculuі; 8) Situl F 7 – Valea Chereculuі; 9) Situl F 6 – Valea Ghilcoş; 10) Situl F 9 – Valea Hăghimaşul Negru (recif triasic); 11) Situl F 12 – Munţii Potcoava; 12) Situl F 13 – Valea Fagu Oltului– brahiopode. Fosile: *Nerineea* sp., gastropode, *Chlamis* sp., crab, *Lacunosella* sp. (în ordinea figurilor).


Figures 13-16. 13) Site F 10 – the Hăghimaşul Negru Valley (Liassic); 14) Site F 17 – the Cheia Valley (Kimmeridgian); 15) Site F 16 – Piatra Singuratică Mts. (Oxfordian-Kimmeridgian); 16) Site F 15 – the Fagu Oltului Valley (limestones with *Nerineea*). Fossils: belemnites, ammonite, *Nerineea* sp.

Figuri 13-16. 13) Situl F 10 – Valea Hăghimaşul Negru (Liasic); 14) Situl F 17 – Valea Cheia (Kimmeridgian); 15) Situl F 16 – Munţii Singuratică Mts. (Oxfordian-Kimmeridgian); 16) Situl F 15 – Valea Fagu Oltului (calcare cu *Nerineea*). Fosile: belemniţi, amoniţi, *Nerineea* sp.