

CLASSIFICATION OF THE FOUR LARGEST ROCK-CUT CAVE MONASTERIES IN CHINA BY CAVE SHAPE

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Abstract

The four largest rock-cut monasteries in China represent the pinnacle of Buddhist art during the Northern Dynasties, Sui, and Tang Dynasties. Their forms and structures reflect the synthesis trajectory of religious ideologies, regional culture, construction technologies, and craftsmanship in different historical periods. This study constructs a three-dimensional classification model of “function-form-era”, dividing the Four Monasteries’ cave forms into four main categories: meditation, worship, residential, and burial caves. The Four Monasteries cave form’s classification demonstrates the evolutionary logic of “Xiyu pattern – adaptation to Central Chinese culture – regional innovation”. Under the Hexi River Basin culture’s influence, the Mogao Caves in Dunhuang formed a diverse and syncretic system of forms; the early Yungang Caves retain the Gandhara style, while in the late period they demonstrate a tendency toward Sinicization; the Longmen Grottoes directly adopted the Central China architectural traditions, forming regular structures; the Maijishan Grottoes created unique “rock-cut pavilion” structures. Differences in the cave forms’ classification are essentially the result of the interplay of religious needs, political intervention, and regional resources during the Sinicization of Buddhism. The classification system proposed in this article provides an opportunity for research into the rock-cut monasteries’ archaeology and opens up new perspectives on the Buddhist art localization.

Keywords: China; Rock-cut monastery; Mogao Caves in Dunhuang; Yungang Caves; Longmen Caves; Maijishan Caves; Classification; Cave shape

Introduction

The four largest rock-cut monasteries in China (Mogao Caves, Yungang Caves, Longmen Caves, and Maijishan Caves) are located at key points along the Huanghe River basin and the Hexi Corridor. Founded during the Northern Dynasties and further developed during the Tang and Song eras, over the course of a millennium, they formed vast architectural complexes replete with outstanding examples of Buddhist art. The value of these cave monasteries (a veritable “Buddhist history on the rocks”) is manifested not only in their sculptures, frescoes, and epitaphs but also in the architectural ideas and religious functions embodied in their forms and structures. As the spatial foundation of the rock-cut structures, their form directly reflects the skill of the artisans, Buddhist doctrine, the liturgical and everyday needs of monks and believers, and the aesthetic orientations of the era.

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The following scientific publications served as the basis for the presented research:

- fundamental Chinese studies of the Four Rock-cut Monasteries [1]-[29];
- English-language scientometric sources devoted to traditional Chinese art, including the art of Dunhuang [30]-[38];
- studies of Chinese culture, architecture, landscape design, and art [39]-[43];
- articles devoted to the problems of art history and cultural studies [44], [45], [46];
- restoration technologies [47], [48];
- issues of professional training of restorers [49];
- issues of national identity [50].

As Su Bai noted, "The evolution of cave forms is closely related to the routes of the spread of Buddhism, the social background of the era, and regional cultural traditions, and the study of their classification is a fundamental task of the archaeology of rock-cut monasteries" [1].

As noted above, the scientific community has already accumulated extensive material on the four largest rock-cut monasteries. However, existing studies have obvious limitations: firstly, the chaotic nature of classification criteria – some studies focus on external form (e.g., "caves with a central column" and "hall caves"), while others focus on functional purpose (e.g., "meditation caves" and "worship caves"), resulting in the absence of a unified classification system; secondly, the disunity of regional studies – most often, the evolution of the forms of individual grottoes is analyzed, while the connections of dissemination and synthesis between the four large monasteries are ignored; thirdly, the limitations of the research approach – most studies rely on studies of sculptures and frescoes, without considering the forms of the caves as an independent object of study with the formation of an appropriate theoretical framework.

Based on the above, this study, using typological analysis as the primary methodological tool, in combination with an interdisciplinary approach (archaeology, religious studies, architecture, art history, etc.), develops a three-dimensional "function – form – era" classification system for the systematic classification of cave forms at the four largest rock-cut monasteries. The research material consists of archaeological reports, topographic plans, dated epitaphs, and literature on the four monasteries.

A comparative analysis of the cave shapes of various monasteries reveals the religious logic, political motives, and regional cultural factors behind the differences in classification.

The scientific significance of this work is as follows: on a theoretical level, the creation of a unified criterion for classifying the forms of caves in the four rock-cut monasteries, filling the gap in systematic studies of cave forms in the archaeology of rock-cut monasteries; on a practical level, providing theoretical support for the protection and restoration of caves and the exhibition of monuments, as well as for research into the history of Buddhist art and architecture; and on a cultural level, the interpretation of specific paths of the Sinicization of Buddhism and the mechanisms of integration of regional cultures through the analysis of the evolutionary trajectory of the cave forms' classification.

Materials and Methods

The classification of cave forms, as a fundamental work in the archaeology of rock-cut monasteries, is based on methodological justification. This paper, using typological analysis as the primary methodological tool, combined with functional and historical analysis, constructs a three-dimensional classification model of "function – form – era," providing a scientific basis for classifying the cave forms of China's four largest rock-cut monasteries.

(I) Application of typology: logic and order

The fundamental logic of typological analysis is to group monuments by their morphological characteristics and reveal the trajectory of historical development through the evolution of types. When classifying cave forms, typological analysis should follow a three-step algorithm: "grouping by form – chronological arrangement – cultural interpretation".

The first stage is grouping by form, where the primary criterion is the "general structural characteristic." Morphological features of caves include plan type (square, rectangular, or horseshoe-shaped); roof type (flat, domed, or fu-dou-ding type); key elements (central pillar, Buddhist altar, or meditation couch); and other material forms. Based on an analysis of topographic plans of more than 200 dated caves at four monasteries, groups with similar key structural characteristics are combined into a single type. For example, caves with a square plan and a central pillar are classified as Type A caves with a central pillar. It is important to exclude minor size differences due to differences in artisan skill or later modifications caused by restoration and reconstruction, focusing instead on key structural characteristics that reflect the era and functional purpose.

The second stage is classification by time of creation, using dated epitaphs as the anchor point. The four largest rock-cut monasteries contain a large number of dated caves, such as Cave 285 of the Mogao Grottoes in Dunhuang (Western Wei Dynasty, 538), Cave 16 of the Yungang Grottoes (Northern Wei Dynasty, 460), Guiaoyang Cave of the Longmen Grottoes (Northern Wei Dynasty, 493), Cave 74 of the Maijishan Grottoes (Northern Wei Dynasty, 470), and others. These caves provide precise chronological coordinates for the placement of cave forms in a chronological sequence. Correlating different cave types with dated features allows us to establish a "type-era" relationship and reveal the evolutionary sequence of cave form types.

The third stage is cultural interpretation, where the key trace is the evolution of forms. The ultimate goal of typology is not classification per se, but the revelation of cultural dissemination and social change through the evolution of types. For example, the evolution of the early "Gandhara caves with large statues" of the Yungang Caves into the middle "half-caves of the Central Chinese type" reflects the cultural policy of "synthesis of Xiyu and Chinese cultures" before and after the reforms of Emperor Xiao Wendi of the Wei Dynasty; the transition from "meditation caves" to "caves with a central pillar" in Mogao testifies to a functional change in Buddhism – from "the predominance of individual Zen meditation" to "the predominance of worship."

(II) The additional role of functional analysis

Typology focuses on form, but the same cave form can have different functions, and different forms can have the same function. Therefore, functional analysis serves as a complement. The functions of caves can be divided into religious and social, with religious functions being basic (including Zen meditation, worship, preaching Buddhist doctrine, etc.) and social functions including royal sacrifice, popular prayer for blessings, burial, domestic living, and others.

A key element of functional analysis is the examination of the "form-function" correspondence, which is realized primarily in two ways:

- first, through historical textual records. For example, the "History of the Northern Wei – Description of Buddhism and Daoism" states: "Tangyao dug niches and caves on Mount Wuzhou and created sculptures for the five emperors, beginning with Taizu," which clearly defines the liturgical function of the five Tangyao caves in the Yungang Grottoes;

- second, through ancillary elements. For example, Zen caves are typically equipped with meditation couches, small niches, and other ancillary structures; worship caves have wide aisles for liturgical processions and Buddhist altars; and burial grottoes contain burial cots, urns, and other funerary remains.

Functional analysis makes it possible to connect morphological classification with functional needs, avoiding the limitations of a one-sided focus on form.

(III) Creation of a three-dimensional classification system

By integrating typology and functional analysis, the study constructs a three-dimensional "function-form-era" classification system:

– the first level of the system is a functional classification, comprising four main categories (meditation caves (Zen caves), worship caves, residential caves, and burial caves), which encompass the primary functions of four major rock-cut monasteries;

– the second level of the system is a formal classification: within each functional category, caves are divided into several “types” based on morphological characteristics (flat shape, key structural elements, etc.), and each “type” is divided into several “variants” based on minor differences;

– the third level of the system is chronological classification: based on dated epitaphs and archaeological periodization, the evolution of cave forms is divided into four stages: the early Northern Dynasties (439–494), the middle Northern Dynasties (494–581), the Sui and Tang Dynasties (581–907), and the Five Dynasties and Song Dynasties (907–1279).

The advantages of this classification framework are as follows:

– first, systematicity: the simultaneous coverage of three key dimensions (function, form, era) avoids the one-sidedness of a single criterion;

– second, compatibility – preserving elements of traditional classification (e.g., “caves with a central pillar” and “hall caves”) and ensuring a unified comparison between different monasteries through the functional dimension;

– third, dynamism – revealing the evolution of cave form types through the chronological dimension, revealing the directions of cultural dissemination.

It should be noted that the four major rock-cut monasteries were formed over a long period, and some caves were subject to later reconstructions – for example, Cave 96 Mogao in Dunhuang (early Tang Dynasty) was reconstructed in the Song, Western Xia (Xi Xia), and Qin periods; Fenxian Temple of Longmen Grottoes (Golden Tang Dynasty) was reconstructed in the Song, Ming, and Qin periods.

Results and Discussion

1. Classification of cave shapes in China's four largest rock-cut monasteries

(I) Meditation Caves (Zen Caves): From the West Asian Model to Adaptation to the Culture of Central China

Zen caves are the earliest type of rock cave to emerge after the spread of Buddhism in China. Descended from the Indian “vihara,” they served as meditation spaces for Zen Buddhist monks and were therefore isolated from the outside world, enclosed, and extremely simple. Depending on their evolution, Zen caves are divided into three types: “single-room,” “multi-room,” and “complex (combining Zen meditation and worship),” each demonstrating unique characteristics of distribution and development within four major monasteries.

1. Single-chamber Zen caves (type A).

Single-chamber Zen caves represent the original form of Zen structures, originating from the Kutian caves of Western Asia (e.g., the Kizil Caves). Their structural characteristics include a square or rectangular plan, an area of $5\div 10\text{ m}^2$, a flat or domed ceiling, a meditation bed (stone or earth) along one wall, and sometimes small niches for Buddhist sculptures on the walls. This type of cave is widespread in the Mogao Caves of Dunhuang.

All of the single-chamber Mogao Zen caves (there are 72 of them) are located in the northern sector, creating a functional separation from the southern sector, which primarily houses worship caves. The caves in the northern sector are predominantly densely dug into the lower part of the cliff, such as Caves 53, 56, 59, 125, 156, 207, 213, 229, and 231, dating from the Northern Wei to the early Tang periods. They are divided into front and back chambers – the front is mostly destroyed, while the back is better preserved. The ceilings are typically gabled, rarely flat, and the height of the rooms is human-sized; most caves contain meditation beds. The area of each cave is approximately $4\div 9\text{ m}^2$, the height is approximately 2 m, and the walls are devoid of frescoes.

After the middle period of the Northern Dynasties, single-chamber Zen caves gradually declined in number, with only a few surviving examples in the Maijishan Caves. For example, Caves 74 and 78, dating from the Late Qin to early Northern Wei periods, although shaped like Buddhist temples, are designed around "Zen contemplation." These caves are compact, with a niche containing a Zen Buddhist sculpture (mostly seated in a dhyana pose) on the main wall. The wall surfaces are unadorned with intricate carvings, displaying only basic sculptures for Zen contemplation. They were important places for the siddhi of early Zen monks, and their sculptural style was based on Gandhara art, reflecting the simplicity of early Zen caves. During the Sui and Tang Dynasties, with the development of Buddhist Zen schools, places for individual Zen meditation gradually moved to Zen halls in monasteries, and one-room Zen caves almost disappeared.

2. Multi-chamber Zen caves (type B)

Multi-chamber Zen caves are a developed form of single-room Zen structures that primarily appeared in the middle period of the Northern Dynasties. They arose out of the need for several monks to engage in collective Zen meditation. Their design features: Two out of ten smaller Zen rooms are arranged around a main room. The main room contains a Buddhist altar for collective contemplation of Buddhist sculptures, while the smaller rooms contain Zen bunks for individual practice. The total area of such a cave is typically 10÷30 m², and the roof can be flat, like a fu-dou-ding, or acute-angled. This type of cave is an important symbol of the "adaptation of the West Asian model to the culture of Central China" and is predominantly found in the Mogao Caves of Dunhuang, the Maijishan Grottoes, and the middle period.

Mogao Cave 268 in Donghuang (Northern Liang Dynasty, 420–439) is a typical example of a multi-chamber Zen cave: a square plan and a flat roof. Its design is similar to Cave 17 in the Kizil Grottoes (early Jin Dynasty), supporting the scholarly hypothesis that the Hexi Corridor served as a conduit for the eastern spread of Buddhism. A small number of multi-room Zen caves also survive from the late Yungang Grottoes period, such as Cave 31 (Northern Wei Dynasty, 494–524): small niches are dug into the eastern and western walls of the antechamber, suitable for the individual Zen meditation of a single monk.

Regional variations in multi-chamber Zen caves are quite pronounced. The Mogao Multi-room Zen Caves in Donghuang are rich in frescoes, combining folk artistic elements from the Hexi region. Due to the nature of the material (red sandstone), the multi-room Zen caves in the Maijishan Grottoes are predominantly equipped with earthen Zen beds, and the wall surfaces are decorated with clay sculptures. The multi-chamber Zen caves of the Yungang Grottoes are constructed of high-quality stone with masterful carvings, reflecting the style of the caves patronized by the imperial family. During the Sui and Tang dynasties, multi-room Zen caves gradually merged with hall caves (Buddhist temples), forming "complex Zen liturgical caves."

3. Complex Zen Caves (Type C)

Complex Zen caves emerged in the late Northern Dynasties and became widespread during the Sui and Tang Dynasties, merging the functions of Zen and worship. Their design features include a large Zen chamber, complemented by a wide aisle for worship and a Buddhist altar; an area of 30÷50 m²; a flat ceiling, or fu-dou-ding; and walls decorated with both Zen beds and large liturgical frescoes. The emergence of this cave type reflects the expansion of Buddhist spaces' functions, from those used for Zen monks to those used for worship by the faithful.

Cave 285, Mogao, in Donghuang (Western Wei Dynasty, 538) has a square plan of the main room and a floor of the Fu-dou-ding type; in the center, there is a Buddhist altar with a Shakyamuni sculpture; several small Zen rooms are located around the main room. Similar caves include Bobogou Central Cave and Sutra Reading Cave in Longmen Caves (Wu Zhou Dynasty, 690–705) (Wu Zhou). The central cave of Bobogou has a horseshoe-shaped plan. In the cave centre, there are three sculptures of Vairocana (the main Buddha of the Antroi school) on a square platform. This cave is a representative of the art of the Zen school of the Wu Zhou dynasty and is of scientific value for the study of Buddhism and the stone carving of the Tang era.

Complex Zen worship caves are an important manifestation of the secularization of Buddhism in the Sui and Tang eras – with the expansion of the circle of believers from monks to ordinary people, the functions of the caves were to combine Zen meditation and prayers for blessings. This merging tendency is most clearly expressed in the Mogao Dunhuang Caves and the Longmen Caves. In the Yungang Caves, due to the decrease in the intensity of cave construction in the Tang era, few monuments of this type have been preserved.

(II) Caves for worship: from the patronage of the imperial family to popular dissemination

Worship caves are the most numerous and extensive type among the four major rock-cut monasteries. Their primary function is to “provide liturgical ceremonies and allow devotees to admire Buddhist sculptures,” so key design characteristics include “spaciousness, openness, and lavish decoration.” Depending on their key structural elements and scale, worship caves are divided into six types: “caves with a central pillar,” “hall caves,” “caves with a central Buddhist altar,” “Nirvana caves,” “caves with large statues,” and “rock pavilions.” The evolution of each type reflects the interaction of Buddhism with politics and popular beliefs.

1. Caves with a central pillar (type A).

Central-pillar caves originate from Indian “chaityas” and were adapted to Chinese conditions. Their structural characteristics include a rectangular or horseshoe-shaped plan, a central square column with niches and sculptures on four sides, a roof (flat, gabled, domed, or framed), and a liturgical aisle on the floor surrounding the column. The main function of this type of cave was “circumambulation of the pillar for liturgical purposes” – that is, worshippers would walk around the pillar along the aisle, admire the sculptures on its sides, and complete the liturgical ceremony.

Caves with a central pillar were the dominant type of liturgical cave during the early and middle Northern Dynasties, with the majority concentrated in the Yungang and Mogao Caves of Dunhuang. Eight such structures survive in the Yungang Caves, of which Cave 6 (Northern Wei Dynasty, 471–494) represents the pinnacle of their design (Fig. 1).



Fig. 1. Yungang Complex. Polychrome sculptural decoration of caves.

It has a rectangular plan, a central square pillar divided into two tiers and is 15 m high. Its four sides are engraved with reliefs depicting stories from the life of Buddha. The liturgical aisle is 3 m wide, allowing more than 100 people to pass around the pillar at a time. This cave was dug under the patronage of the Northern Wei imperial family; the scale of the pillar and the mastery of its carving reflect the political idea of "imperial power equals Buddhist power."

Cave 254 of Mogao in Dunhuang (Northern Wei Dynasty, 465–494) is the first central pillar cave in Mogao: there are niches on four sides of the central pillar, the front part of the cave has a gable ceiling, the back is flat, the area is about 80 m², and the height of the pillar is 8 m.

The evolution of central pillar caves demonstrates a "west-to-east" trajectory:

- Mogao caves of this type in Dunhuang retain more Western Asian features, while in the middle Yungang Caves, they integrated elements of Central Chinese architecture;

- the central pillar gradually transformed into a "Buddhist altar," and circumambulating the pillar for liturgical purposes evolved into "face-to-face worship of the Buddha."

After the late Northern Dynasties, the pillar caves gradually gave way to hall caves and caves with a central Buddhist altar.

2. Hall caves (type B)

Hall caves are the result of the fusion of traditional Chinese imperial architecture and Buddhist liturgical function. Appearing in the middle period of the Northern Dynasties, they became widespread during the Sui and Tang Dynasties. Their structural characteristics include a rectangular plan, an area of 50–200 m², and the absence of a central pillar in the cave. At the rear is a large niche with sculptures (one Buddha and two bodhisattvas, or one Buddha, two monk disciples, and two bodhisattvas); the ceiling is *fu-dou-ding* or flat; at the front is the entrance door and antechamber; the wall surfaces are decorated with large narrative frescoes on themes from Buddhist sutras or sculptures of a thousand Buddhas. The main function of this type is to "imitate the above-ground hall of a Buddhist temple," which makes liturgical ceremonies more in keeping with traditional Chinese etiquette.

The development of hall caves is closely linked to the reforms of Emperor Xiao Wen of the Northern Wei Dynasty. After moving the capital to Luoyang, the emperor adopted a policy of assimilating Chinese culture, and Buddhist art also underwent a process of adaptation to the culture of Central China. The Guiaoyang Cave of the Longmen Grottoes (Northern Wei Dynasty, 493) is one of the earliest hall caves: rectangular in plan, approximately 70 m² in area, with a Buddhist altar with a sculpture of Shakyamuni installed in the rear and over 800 epitaphs for sculptures engraved on the walls, reflecting a liturgical style adapted to Chinese traditions. During the Sui and Tang Dynasties, hall caves became the dominant type: the main chamber of Cave 323, Mogao, in Dunhuang (early Tang Dynasty), has a square plan and a *fu-dou-ding* ceiling. The Qianxi Temple of the Longmen Grottoes (whose construction date is unknown) is also classified as a hall cave – approximately 120 m² in area. A seated statue of Amitabha (3 m high) stands on the Buddhist altar, and the front gallery features an arcade with brackets, completely replicating the design of a Chinese imperial palace. The twin caves, Caves 7 and 8 of the Yungang Caves, are the first such structures – they consist of a front and back chamber; the main chamber has a rectangular plan, and the sculptures in the caves combine Huan and Chinese features.

The Hall Caves have distinct regional characteristics:

- the Longmen Hall Caves were most influenced by the imperial family, with their regular construction and large sculptures;

- the Mogao Hall Caves in Dunhuang combine folk artistic elements from the Hexi region, with rich frescoes and diverse themes;

- the Yungang Caves are a key building type of the middle Northern Wei period;

- due to the nature of the material, the hall grottoes at the Maijishan Grottoes are predominantly small and medium-sized, decorated with clay sculptures, and distinguished by fresh and simple styles.

3. Caves with a central Buddhist altar (type B)

Caves with a central Buddhist altar are an important transitional type of liturgical cave. Appearing in the late Northern Dynasties, they became widespread during the Sui, Tang, and subsequent dynasties. Their primary function is to "overcome the limitations of circumambulating a pillar for liturgical purposes and provide believers with the opportunity to admire sculptures from all four sides." Structural characteristics: a square or rectangular plan, area $80\div150\text{ m}^2$; in the cave's center is an independent square Buddhist altar (not a pillar), on which sculptures convenient for worship are located; the ceiling is flat, fu-dou-ding, or domed; a wide liturgical aisle runs along the cave's perimeter; and the wall surfaces are decorated with narrative frescoes depicting Buddhist sutras or the life of Buddha. This type of cave represents an "intermediate form of evolution from central pillar caves to hall caves" – it retains the key role of the sculptural complex in the central zone while eliminating the religious-symbolic limitations of the pillar, making it more in line with the liturgical habits of believers in Central China.

Cave 55 Mogao in Dunhuang (Song Dynasty, 962) is a typical example of a cave with a central Buddhist altar: it has an elongated rectangular plan, a horseshoe-shaped Buddhist altar located at the back of the cave, a passage in front of it, and a back panel connected to the cave ceiling at the back.

The evolution of caves with a central Buddhist altar demonstrates the development trend of the construction of the Buddhist altar and the complexity of the composition of the sculptures:

- in the late era of the Northern Dynasties, altars in such caves mainly represented simple square platforms, and sculptural compositions consisted mainly of one Buddha and two bodhisattvas; this type of cave is most concentrated in the Mogao Grottoes of Dunhuang.

- in the era of Sui and Tang, the procedure of worship was modernized – believers moved from a monotonous walk around the column to a multifaceted admiration of the sculptures, which makes religious ceremonies more flexible.

Nirvana caves (type D)

The main function of the Nirvana Caves is to house sculptures of Buddha in Nirvana and depict scenes of His Nirvana. Appearing in the late Northern Dynasties, they became widespread in the middle Tang Dynasty and the Five Dynasties, serving as the material basis for the dissemination of the Buddhist belief in Nirvana. Structural characteristics: elongated plan, either vertically or horizontally, area $20\div300\text{ m}^2$; at the back or along one wall of the cave, a large image of Buddha in Nirvana (usually sleeping), $3\div15\text{ m}$ long, is installed; around the image in Nirvana, attendant sculptures (disciples, bodhisattvas, kings of heaven, etc.) are engraved; the wall surfaces are decorated with narrative frescoes on the theme of the Nirvana Sutra; the ceiling is predominantly flat or fu-dou-ding; a wide entrance opening is made in the front part for convenient viewing.

Cave 158 Mogao in Dunhuang (Golden Tang Dynasty, 781–848) is the pinnacle of nirvana cave design: a horizontally elongated rectangular plan, approximately 120 m^2 in area; on the western wall of the grotto is a 15.5-meter-long nirvana image of Shakyamuni, lying on a stone Buddhist altar in a calm posture, wearing travayasana (a robe covering both shoulders); fifteen sculptures of disciples with different facial expressions (crying, stern) are located around the nirvana image, completely reproducing the sacred scene of Buddha's nirvana. Cave 1 of the Maijishan Grottoes (Ming Dynasty) is the only Nirvana cave in Maijishan; approximately 17 m^2 in area, it was dug during the Northern Wei Dynasty, and all the sculptures in it were restored during the Ming Dynasty.

The regional distribution of nirvana caves is closely linked to the spread of the nirvana belief:

- The Mogao Caves in Dunhuang, located on the Hexi Corridor, were deeply influenced by the West Asian belief in nirvana – they contain the largest number of nirvana caves, and they are distinguished by their size. Besides Cave 158, Cave 148 (Golden Tang Dynasty) is a major nirvana cave;

- The Longmen and Yungang Caves do not have any structures specifically dedicated to nirvana;

– Nirvana caves are extremely rare in the Maijishan Caves – the nature of the material makes it difficult to carve large rock sculptures; only small niches containing nirvana images remain.

The spread of this type of cave reflects the deepening of Buddhist belief after the Golden Tang Dynasty – from "prayers for blessings and avoiding disasters" to "caring for life."

5. Large sculpture caves (niches) (type E)

Large sculpture caves (niches) are a special type of worship cave; their key characteristic is the patronage of giant Buddhist sculptures. They are distinguished by their large-scale construction, typically exceeding 200 m² in area. The cave or niche houses only one or a few giant sculptures (over 10 m high), and the wall surfaces are simplified and equipped with only small niches containing sculptures. The ceiling may be domed, open (roofless), or wooden; a large entrance opening is often made at the front for convenient viewing. Some large sculpture structures are rock niches on cliff ledges – a special subtype. The function of this type is to demonstrate Buddhist authority and political power; they were primarily built under the patronage of the imperial family or large monasteries.

Large sculpture caves became widespread during the Sui and Tang dynasties. Among the four great monasteries, the most famous are those located in Mogao at Dunhuang, Yungang Grottoes, and Longmen Grottoes. The five Tanyao Caves within the Yungang Grottoes (Caves 16–20), dug during the Northern Wei period (460–465), are representative of the earliest large sculpture caves. At the center of each of the five caves is a giant sculpture of the Tathagata, symbolizing the five emperors of the five dynasties of the Northern Wei.

Mogao Cave 96 in Donghuang (early Tang Dynasty, 695) houses the Northern Great Buddha, a 35.5-meter-tall seated Buddha – the third-tallest seated Buddha in China and the tallest in Mogao. The cave has a rectangular floor plan and an open roof (converted to a fu-dou-ding roof during the Song Dynasty). At the front is a three-story wooden canopy, combining elements of Central Chinese and West Asian cave architecture.

The Fenxian Temple of the Longmen Grottoes (Golden Tang Dynasty, 672–675) is the largest and most artistically accomplished rock-cut sculpture complex in the Longmen Grottoes. It is an open niche (without a roof) and is a masterpiece of Tang sculptural art. It is approximately 34 m wide in the northeast direction and approximately 39 m deep in the northwest direction. In the center is a seated image of the Lushen Buddha, 17.14 m tall (with a head height of 4 m). On either side are two monk-disciples, two bodhisattvas, two kings of heaven, and two heroes, forming a complete Buddhist system. The Fenxian Temple was excavated under the patronage of Empress Wu Zetian, and the facial features of the main sculpture, according to legend, reproduce her appearance, reflecting the idea of the unity of politics and Buddhism.

Cave 13 of Maijishan Grottoes (Sui Dynasty) (Fig. 2), commonly known as the Eastern Rock Big Buddha, is a plaster sculpture of Buddha and two bodhisattvas on a stone base using the high-relief technique. Situated in the center of the eastern cliff, it was restored during the Shaoqing Dynasty of the Southern Song Dynasty. It is a large rock niche with a nearly square façade, 17 m high, and approximately 18 m wide.

The evolution of large sculpture caves demonstrates a trend of increasing scale and deepening transformation in accordance with local traditions:

– the early large caves of the Northern Dynasties were strongly influenced by the Gandhara style – the sculptures have specific poses, and clothing is executed in the "open right shoulder style";

– during the Sui and Tang periods, they were completely Sinicized: with the improvement of artisan skill, the sculptures acquired specific poses, and clothing was executed in the "wide robe and belt style" or "travayasana" (garment covering both shoulders); furthermore, they became more closely associated with the politics of Central China, becoming a symbol of the imperial family's power.

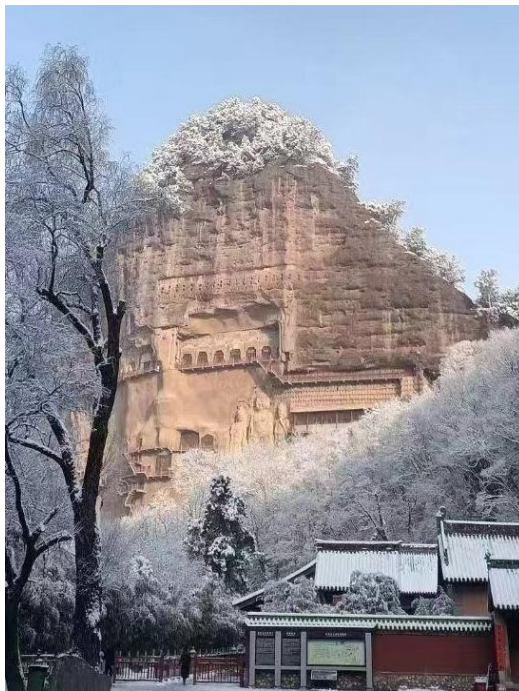


Fig. 2. Maijishan Complex. General view.

6. Rock Pavilion Caves (Niches) (Type F)

Rock Pavilion Caves are a unique type of liturgical cave characteristic only of the Maijishan Caves. They were formed due to a geological feature of the reddish-brown sandstone of Maijishan – developed vertical cracks that facilitate the drilling of multi-tiered structures. Structural characteristics: multi-tiered pavilion caves excavated into the cliff; each tier contains several hall caves or Zen caves connected by wooden ramps. The overall structure resembles a pavilion. The caves vary greatly in size: small rock pavilion niches (e.g., Niche 152) are approximately 2 m², while larger ones (e.g., Cave 4 – “Seven Buddhist Pavilions”) are approximately 500 m². This is the result of a combination of regional geological resources and Buddhism.

Cave 4 of the Maijishan Grottoes (Seven Buddhist Pavilions, Northern Zhou Dynasty, 557–581) is a representative example of this type. It is excavated into a cliff face approximately 60 m high, with a total height of 16 m, a width of 31.7 m, and a depth of 13 m, covering a total area of approximately 500 m². The original structure was an imitation of an imperial palace, with seven bays and eight columns, a front gallery, and a rear chamber. However, due to earthquakes and other natural disasters, the front portion of the cave collapsed: of the eight columns in the front gallery, six have been destroyed, while two (the eastern and western) remain intact.

The cave’s design combines elements of Chinese pavilion architecture and Western Asian caves: brackets (arched structures), railings, and other architectural details are carved into the rock surface, imitating above-ground pavilions, while maintaining the enclosed nature of the grotto – this simultaneously satisfies the needs of worship and is convenient for monks. Furthermore, the previously mentioned Cave 13 of the Maijishan Grottoes (Sui Dynasty) – the Eastern Rock Buddha – is also a large pavilion cave, demonstrating its characteristic combination of giant sculptures and pavilion structure.

Rock pavilion caves are unique to the Maijishan Grottoes, representing the most distinctly regionally distinctive type among the four major rock-cut monasteries. Their formation is closely linked to the geological conditions and geographic location of Maijishan:

- Maijishan is located in the Qingling Range, characterized by relatively isolated transportation links, so monks needed integrated spaces combining Zen, worship, and everyday life;
- the characteristics of the reddish-brown sandstone allowed for the drilling of multi-story structures.

This innovative design enriched the architectural styles of Chinese caves, demonstrating the unique interaction between human creativity and natural resources (Fig. 3).



Fig. 3. Maijishan Complex. Cave No. 4, "Pavilion of Scattering Flowers."

Worship caves are the most numerous and extensive type among the four major rock-cut monasteries. Their primary function is to "provide liturgical ceremonies and allow devotees to admire Buddhist sculptures," so key structural characteristics include "spaciousness, openness, and lavish decoration." Depending on the key elements and scale of the structure, they are divided into six types: "caves with a central pillar," "hall caves," "caves with a central Buddhist altar," "nirvana caves," "large sculpture caves," and "rock pavilion caves." The evolution of each type reflects the interaction of Buddhism with politics and popular beliefs.

(III) Residential caves: from auxiliary living spaces to a place for Zen meditation

Residential caves are a unique type, characteristic only of Mogao (some researchers call them monastic chambers). However, the authors believe that the function of these caves was not limited to the residence of monks – they also served the needs of artisans, believers, and other people residing in the area. Formed during the construction of the caves and the holding of religious events, they served the primary function of providing living conditions for artisans engaged in construction, monks, Zen practitioners, and believers residing there. Key design characteristics include a combination of practicality for everyday life and economical use of space. The distribution and evolution of these caves are closely related to the course of construction of the complex and the scale of religious events. Appearing in the early Northern Dynasties and existing until the Sui and Tang eras, they have the following design features: a rectangular plan, an area of $8\div 15\text{ m}^2$, and a flat or gable ceiling. The cave is equipped with stone or earthen ovens, storage niches, sleeping areas, and other amenities.

Cave 45 in the northern Mogao district of Donghuang (Fig. 4) (date of construction unknown) is a typical example of a residential cave. It has a rectangular plan and consists of a

front room, a passage, and a back room. Traces of a stone oven were discovered in the southeastern floor area. Archaeological excavations have yielded writing materials, a wooden spoon, wooden chopsticks, pottery fragments, porcelain fragments, a straw-clay lamp, and other household items.

Consequently, residential caves, along with Zen caves, worship caves, and burial caves, form the main functional system of the four large rock-cut temple complexes: "Zen meditation – worship – residence – burial." It is important not to confuse residential caves with Zen caves: although both monastic chambers (residential caves) and Zen caves are functional structures of rock-cut temples, their key difference lies in their functional purpose.

Monastic chambers (residential caves) are the monks' daily living quarters, varying in size from small, designed for one person, to large, accommodating several. They are used for sleeping, eating, storing personal belongings, sutras, and Buddhist paraphernalia. Some caves are equipped with fire pits, sleeping areas, wall lockers, earthen beds, and other amenities. These are the basic spaces that support the monks' long-term stays in the cave complex.

Zen caves are special "Zen spaces" designed for siddhi, concentration, and meditation by monks. Their spaces are more compact, typically small, single-person rooms, rarely larger structures for group meditation. Some meditation caves feature a small niche in the main wall with a Buddha sculpture, intended for contemplation during meditation; other areas are devoid of unnecessary decoration. Functionally, they focus on "quiet meditation" without emphasizing everyday comforts; some caves are designed as small, single-person spaces, shielded from external disturbances, in keeping with Buddhist rituals of concentration.



Fig. 4. Northern Area of the Mogao Grottoes.

(IV) Burial caves (from monastic burials to secular burials)

Burial caves are a type of cave designed for the burial of the ashes or bodies of monks and believers, possessing significant religious and social significance. Their primary function is Buddhist burial, and their key structural characteristics are their closed nature, the absence of light, and the presence of specialized burial structures. This type of cave emerged in the early Northern dynasties. Its structural features are as follows: a square or rectangular plan, an area of 5–10 m², and a gabled, flat, or domed ceiling. The cave contains stone tomb platforms or niches for urns containing ashes; the walls are sometimes engraved with the spiritual names of monks or dated epitaphs. Characterized by their high degree of closure, they are predominantly excavated in remote areas of rock complexes.

The distribution of burial caves follows a clear pattern: they are most often located at the edges of rock complexes. For example, in Mogao in Dunhuang, most burial caves are concentrated in the northern region. This distribution not only reflects the concept of separating burial and liturgical spaces but also facilitates the perpetuation of the monks' memory.

Cave 43 of the Maijishan Grottoes (Western Wei Dynasty) is the tomb of Empress Yi Fu, wife of Emperor Wuyi of the Western Wei. As noted in the Northern History Biographies of Empresses, "The empress entered the room, covering herself with a blanket, and died at the age of thirty-one. She was buried in a niche dug into the cliff of Maijishan... This place later became known as the Tomb of Silence." This is the earliest documented case of a rock-cut burial in China.

The Longmen Grottoes contain 39 burial caves, all dating to the Tang Dynasty. For example, the first burial cave on the northern ledge of the Pearl Spring (early Tang) has a structure consisting of a front and back chamber. A house-like canopy hangs over the cave entrance, fragments of Buddhist sculptures remain on the eastern and western walls of the front chamber, and a buried body lies horizontally on the rear wall of the back chamber. A female body in luxurious attire was discovered in Mogao Cave 464 in Donghuang (Yuan Dynasty); in recent years, numerous burial caves have also been discovered in the northern Mogao region.

Thus, despite their small number, burial caves, as a distinct functional type of the four major rock-cut complexes, fully reflect the Buddhist concept of burial. Together with Zen meditation caves, worship caves, and residential caves, they form a complete four-dimensional functional system of "meditation–worship–residence–burial," demonstrating the essential characteristic of rock-cut complexes as "the bearer of the entire Buddhist life." Possessing significant religious and social significance, they remain focused on the primary function of Buddhist burial and the structural features of closure, lightlessness, and the presence of burial structures. Differences in the burial objects and structural scale of these caves reflect the evolution of the Buddhist concept of burial.

III. Reasons for differences and the trajectory of merging in the classification of cave types of four large rock complexes

The classification study in the previous section reveals that the cave types of the four major rock formations combine both common features (e.g., the predominance of meditation caves, worship caves, and large sculpture caves) and significant differences (e.g., the rock pavilion caves of the Maijishan Caves and the residential caves of the Mogao Caves). These differences are not random; they result from the interaction of three factors: religious needs, political intervention, and regional resources. At the same time, a clear trajectory of the spread and fusion of cave types is observed across the four complexes, which together form the architectural image of Buddhism in China.

(I) Three main reasons for the differences in the classification of cave types

1. Religious needs: functional evolution from meditative practice to secular prayers for blessings

As Buddhism spread in China, its function evolved from one dominated by monks' meditation to one dominated by the royal family's worship and then to one dominated by ordinary people's prayers for blessings. This functional transformation directly influenced the differences in the classification of cave types.

In the early Northern Dynasties, when Buddhism was just beginning to spread, monks were the primary group of believers, and the primary religious need was for meditative practice. Simultaneously with the construction of the grottoes, the need for auxiliary living spaces for artisans arose, so all four complexes primarily consisted of meditation caves (single- and multi-person), small worship caves (caves with a central pillar), and residential caves.

In the middle period of the Northern Dynasties, following the reforms of Emperor Xiao Wen of the Northern Wei, the imperial family became the dominant force in Buddhism, and religious needs shifted toward demonstrating imperial power and holding large-scale liturgical ceremonies. As a result, liturgical caves (central pillar caves and hall caves) increased in size and

number, while meditation caves gradually faded into secondary importance. Caves 5 and 6 of the Yungang Grottoes (middle period) and the Guyaoyang Cave of the Longmen Grottoes (early period) are examples of large imperial liturgical caves: their area significantly exceeded that of earlier caves, and their sculptural decoration was distinguished by high craftsmanship, reflecting the religious demand for equality between imperial and Buddhist authority.

During the Sui and Tang Dynasties, the further penetration of Buddhism into the masses made ordinary people the primary group of believers, and religious needs shifted to prayers for blessings and the avoidance of misfortune, as well as rebirth in the Pure Light. Consequently, the design of worship caves (hall caves, large sculpture caves) became more oriented toward the participation of believers: for example, the Mogao Hall Caves received expanded worship aisles, while the large sculpture caves of the Longmen Grottoes were designed in an open format for convenient viewing. At the same time, the number of burial caves increased, indicating the acceptance of Buddhist funeral concepts by ordinary people. This evolution of religious needs was the main reason for the transformation of the cave classification of the four rock-cut temple complexes from the "simple meditation type" to the "lavish liturgical type."

2. Political intervention: the dual influence of imperial patronage and regional administration

In the context of ancient Chinese society, which embraced the idea of "the unity of religion and state," political intervention had a significant impact on the classification of cave types, manifesting itself in two aspects: imperial patronage over cave construction and the regional administrative system. Among the four complexes, political intervention was strongest in the Yungang and Longmen Grottoes, while the Mogao and Maijishan Grottoes were primarily developed through popular initiative – this difference directly influenced the different classifications of cave types.

The Yungang Grottoes were a rock-cut complex rated as a "state monastery" during the Northern Wei Dynasty. From the Five Tanyao Grottoes (Northern Wei Dynasty, 460) to the mid-period caves (Taihe period, Northern Wei Dynasty), all structures were built under the patronage of the imperial family, which possessed ample finances and the ability to attract highly skilled artisans. As a result, a classification characteristic emerged that favored large, regularly designed worship caves. For example, the Five Tanyao Grottoes were "emperor sculptures" in the format of large sculpture caves, with Buddhas exceeding 13-17 meters in height, reflecting the Northern Wei political idea of "Buddha as Emperor." The mid-period caves, with their central pillars, were over 100 square meters in area and decorated with reliefs depicting stories from the life of Buddha and scenes of imperial worship, directly serving the religious and political needs of the imperial family.

The Longmen Grottoes became an imperial rock complex after the Northern Wei capital was moved to Luoyang (494), and during the Tang Dynasty, they were transformed into an "imperial complex" under Empress Wu Zetian, which led to even more direct political intervention. The Fenxian Temple, home to the Lushen Buddha sculpture, was built with the financial support of Wu Zetian, who "donated twenty thousand qian from her own funds." The sculpture's facial features, according to legend, resembled those of the empress, reflecting the idea of "the unity of politics and Buddhism." The Guyaoyang Grottoes, as a sculpture complex for the Northern Wei aristocracy, were decorated with numerous epitaphs of aristocrats and featured a regular hall-grotto structure, demonstrating the aesthetic preferences of the imperial family.

Unlike the two aforementioned complexes, the Mogao and Maijishan Grottoes developed primarily through popular initiative, with less political interference, so their classification of cave types was more diverse and regionalized. The main investors and builders of the Mogao Grottoes were aristocrats, merchants, and monks from the Hexi region, resulting in differences in financial means and the skill level of the artisans. The complex included both large hall caves and small meditation caves, and the murals combined folk stories. The Maijishan Grottoes were built by monks and ordinary people from the Qingling region, characterized by extreme geographic

isolation and weak political influence, leading to the development of a unique type of rock pavilion cave. The regional administrative system also influenced the classification of cave types: for example, during the Tang Dynasty, Dunhuan was the administrative center of the Guiyi Army governor, and the line of governors led the construction of numerous large hall caves, which led to the characteristic of a combination of state and popular initiative in the Tang Dynasty Mogao cave types.

3. Regional resources: constraints and innovations due to geological conditions and cultural traditions

The four major rock-cut complexes are located in different regions with significant differences in geological conditions and cultural traditions. These regional resource differences exerted a dual influence – limitation and innovation – on the classification of cave types, becoming the primary reason for the formation of unique regional cave types. Geological conditions determined the difficulty of drilling and the structural scale of caves, while cultural traditions influenced architectural style and functional design.

Geological conditions.

The Yungang Caves are located on Mount Wuzhou in Datongshan (Shanxi). The rock is Jurassic sandstone with a strong and uniform structure, suitable for drilling large grottoes and fine carvings. This has led to a classification dominated by large sculptured caves and caves with a central pillar.

The Longmen Caves are located in the Yiqu Mountains in Luoyang (Henan). The rock is Paleozoic limestone, strong and suitable for drilling large open niches and caves.

The Mogao Caves are located on Mount Mingsha in Dunhuang (Gansu). The rock is Quaternary gravel with a loose structure, unsuitable for fine carving. Therefore, the cave types are characterized by a predominance of frescoes and a secondary role for carving, while the residential caves were generally easy to drill, saving labor.

The Maijishan Caves are located on Mount Maijishan in Tianshui, Gansu. The rock is Crade red sandstone, loose in texture but with well-developed vertical fractures, making it convenient for drilling multi-tiered structures. This has resulted in the formation of a unique type of rock pavilion grottoes, ensuring efficient use of space.

Cultural Traditions.

The Mogao Caves are a crossroads of Central Chinese and West Asian cultures. Therefore, their cave classification combines features of West Asian (e.g., the meditation caves of the Kutian Caves) and Central Chinese traditions (e.g., the architectural elements of the hall caves).

The Yungang and Longmen Caves are located in the Central Chinese region, where the cultural tradition was based on Central Chinese architecture. Therefore, their cave classification gradually shed West Asian influences, developing the Central Chinese style of hall caves.

The Maijishan Caves are located in the Qingling Range, influenced by the Ba-Shu culture and Central China. The pavilion structure of the rock pavilion caves combines elements of the hanging houses of the Ba-Shu region, demonstrating the innovations of regional culture.

(II) The trajectory of the merger and the distribution routes of the cave types of four large rock complexes

Although the classification of cave types in the four major rock complexes differs significantly, they did not develop in isolation. Instead, a clear pattern of dissemination and fusion emerged along the Silk Road, and this fusion is an important manifestation of the Sinicization of Buddhism in China.

The starting point of this dissemination route is the West Asian Kutian Caves (e.g., the Kizil Caves). Their cave types, such as single-chamber meditation caves and central pillar caves, were introduced to Mogao in Donghuang via the Hexi Corridor, forming the West Asian paradigm of cave types in the four complexes. The multi-chamber meditation caves of Mogao during the Northern Liang period (e.g., Cave 268) bear a high degree of similarity to the meditation caves of the Kizil Caves, confirming this dissemination relationship. The Northern

Wei Mogao Central Pillar Caves (e.g., Cave 254) also retained the basic function of circumambulation for liturgical purposes from the Kutian Caves but added elements of Central Chinese architecture, completing the modification of the West Asian paradigm at Hexi.

The interim point in this dissemination route is the Yungang Caves. Mogao cave styles were transferred to Yungang via artisan teams under the Northern Wei imperial family, forming a transitional phase between modification in Hexi and innovation in Central China. In the first year of the Northern Wei Heping period (460), when Tangyao oversaw the construction of the Yungang Caves, numerous artisans from the Hexi region were recruited. These artisans brought the central pillar cave style from Dunhuang to Yungang and, simultaneously, in response to the needs of the imperial family, increased the scale of the structures, forming the early central pillar caves of the Yungang Caves (e.g., Caves 7 and 8). After the reforms of Emperor Xiao Wen of the Northern Wei, elements of Central Chinese architecture were integrated: the central pillar caves of the Yungang Caves of the middle period were given brackets, railings, and other architectural details of the Central Chinese style, completing the Sinicized modification of the West Asian paradigm.

The final point of this diffusion route was the Longmen Grottoes. The Sinicized Yungang Grottoes were introduced to Luoyang, forming a fully Sinicized system of cave types. After the Northern Wei relocated its capital to Luoyang (494), artisans from the Yungang Grottoes moved with the imperial family to Luoyang and began building early Longmen Grottoes, such as Guyaoyang Cave, introducing the hall cave type from Yungang. During the Tang Dynasty, the Longmen Grottoes completely shed Western Asian influence, developing a Sinicized classification system, primarily consisting of hall caves and large, open-air sculpture caves. For example, the combination of the open format of Fenxian Temple with the architecture of the central Chinese imperial palace marked the complete Sinicization of Buddhist cave types.

The Maijishan Grottoes, located in the Qingling region, although diverging from the main Silk Road route, were also influenced by the Mogao and Yungang Caves. For example, the multi-chambered meditative Maijishan Grottoes of the Northern Wei period bear similarities to Cave 285 of the Mogao, while the pavilion-shaped rock caves of the Northern Zhou period integrated elements of the hall-shaped Yungang Grottoes, demonstrating the dual characteristics of regional innovation and external fusion. This transboundary diffusion and fusion led to the development of the classification of cave types within the four complexes along the lines of "same origin, different directions," together forming an architectural poem of the Sinicization of Buddhism in China.

Conclusions

The classification of cave types in China's four major rock formations represents the evolution of Buddhism in China under the influence of local conditions and traditions. The classification system and evolutionary trajectory reflect the complex interaction of religious needs, political intervention, and regional culture. Based on typology, functional analysis, and a historical method, this study proposes a three-dimensional "function – construction – era" classification model, according to which the cave types in the four formations are divided into four main categories and eleven subtypes:

- meditation caves (three subtypes: single-chamber, multi-chamber, and those combining meditation and worship);
- worship caves (six subtypes: with a central pillar, hall caves, with a central Buddhist altar, nirvana caves, large sculpture caves, and rock-cut pavilion caves);
- residential caves;
- burial caves.

As a result of the conducted research, the following conclusions were formulated.

1. The classification of cave types demonstrates the basic principle of "dominant function – design conformity – evolution over time."

Meditation caves, the main type of the early period, underwent an evolution from single-occupancy to multi-occupancy, combining meditation and worship, reflecting the expansion of Buddhism's functionality from monastic meditation to believers' participation. Worship caves, the most numerous type, include six subtypes (with a central pillar, hall caves, caves with a central Buddhist altar, nirvana caves, large sculpture caves, and rock-cut pavilions), demonstrating a structural modification from the Western Asian paradigm to innovations in Central China. The emergence of hall caves overcame the limitations of circumambulating a pillar for worship, while nirvana caves deepened the expression of Buddhist concern for life. Residential caves, as an auxiliary type, reflect the expansion of their function from a construction site to a religious complex and further to a secular space. Funeral caves, as a special type, mark the secularization of Buddhist funeral concepts. The emergence of these four types is completely synchronous with the historical process of synthesizing Buddhism in China and is the result of the interaction of religious functions, construction, and social needs.

2. Differences in the classification of cave types are the result of the combined influence of religious needs, political intervention, and regional resources.

The Yungang and Longmen Grottoes, patronized by the imperial family, are characterized by a predominance of large liturgical grottoes, reflecting the political logic of the unity of politics and Buddhism and the ability to support construction. For example, the Nirvana and Central Pillar Caves of the Longmen Caves have a regular structure thanks to the support of the imperial family. The Mogao Caves, a blend of West Asian and Central Chinese culture, exhibit the characteristics of multiple fusions: residential caves combine simplicity and commercialization, while worship caves include several subtypes (central pillar, hall, central Buddhist altar, large sculpture, and Nirvana), reflecting regional characteristics of cultural intersection and vernacular cave construction. The Maijishan Caves, based on the geological conditions of typical red sandstone, have defined the "uniqueness of rock pavilion caves," demonstrating the logic of innovation based on regional resources. The differences in the classification of the four complexes are not abrupt: the Silk Road established a dissemination route from Western Asia to Hexi to Central China, ensuring the development of a confluence based on the principle of "same origin, different directions."

3. The three-dimensional classification model "function – construction – era" opens up new perspectives for standardized research into the archaeology of rock monasteries.

This model provides a unified comparison between different rock complexes, making it applicable to classification studies of other rock complexes. At the same time, the study of cave classification revealed a specific path for the localization of Buddhist art: not simply copying West Asian experience, but adapting cave functions and structures to the political, cultural, and social needs of Central China. This adaptive innovation is the main mechanism for the Sinicization of Buddhism in China.

References

- [1] B. Su, *Studies on Chinese Grotto Temples*, Beijing: Cultural Relics Publishing House (in Chinese), 1996, p. 23.
- [2] B. Su, *Theory and Practice of Archaeological Typology*, Beijing: Cultural Relics Publishing House (in Chinese), 1990, p. 45.
- [3] Dunhuang Institute of Cultural Relics, *Complete Catalog of the Contents of Mogao Grottoes in Dunhuang*, Beijing: Cultural Relics Publishing House (in Chinese), 1982, p. 28.
- [4] Yungang Grottoes Research Institute, *Complete Works of Yungang Grottoes*, vol. 2, Beijing: Cultural Relics Publishing House (in Chinese), 2006, p. 103.

- [5] Longmen Grottoes Research Institute, *Collected Inscriptions on the Sculptures of Longmen Grottoes*, Beijing: Cultural Relics Publishing House (in Chinese), 1998, p. 56.
- [6] W. Wei, "The Construction Date of Cave 74 and Cave 78 at the Maiji Mountain Grottoes," *Dunhuang Research*, 2003, n. pag.
- [7] Z. Wang, "Archaeology of Ancient Chinese Grotto Temples" (in Chinese), *Archaeology*, no. 2, p. 78, 2000.
- [8] G. Zhang and X. Rong, *Dunhuang Documents and Studies on the History of the Silk Road*, Shanghai: Shanghai Ancient Books Publishing House (in Chinese), 2006, p. 98.
- [9] S. Wei, *Book of Wei*, vol. 114: Treatise 10 – Buddhism and Daoism, p. 3037.
- [10] Dunhuang Academy, *Archaeological Report on Mogao Grottoes in Dunhuang*, vol. 4, Beijing: Cultural Relics Publishing House (in Chinese), 2015, p. 98.
- [11] Longmen Grottoes Academy, "Inscriptions on the Sculptures of South Leigutai Grotto of Longmen Grottoes" (in Chinese), *Collected Inscriptions on the Sculptures of Longmen Grottoes*, p. 189.
- [12] Dunhuang Institute of Cultural Relics, *Archaeological Report on the Northern Area of Dunhuang Mogao Grottoes*, Beijing: Cultural Relics Publishing House (in Chinese), 2000, p. 45.
- [13] Dunhuang Academy, *Northern Area of Dunhuang Mogao Grottoes*, vol. 1, Beijing: Cultural Relics Publishing House (in Chinese), 2000, pp. 122, 187.
- [14] Longmen Grottoes Research Institute, "A Brief Report on the Archaeological Survey of Xiangshan Temple Area of Longmen Grottoes," *Archaeology and Cultural Relics*, no. 3, p. 67, 2010.
- [15] Z. Wu, "Stele Commemorating the Construction of Large Statues in Honor of the Two Sages," *Complete Tang Prose*, vol. 97, Beijing: Zhonghua Book Company (in Chinese), 1983, p. 1002.
- [16] Tianshui Maijishan Grottoes Art Research Institute, *Chinese Grottoes. Tianshui. Maijishan*, Beijing: Cultural Relics Publishing House (in Chinese), p. 298.
- [17] L. Gan, L. Wang, "Maijishan Above the Clouds, Scattering-Flower Pavilion – Grotto 4 of Maijishan Grottoes" (in Chinese). Sohu.com. Accessed: Dec. 12, 2025. [Online.] Available: https://www.sohu.com/a/412645735_120207621
- [18] S. Li and J.J. Suisen, "The Relationship Between Buddhist Burial Forms in Grotto Temples and Traditional Funeral Customs" (in Chinese), *Cultural Relics of Central China*, no. 4, p. 65, 2002.
- [19] Tianshui Maijishan Grottoes Art Research Institute, "Chinese Grottoes. Tianshui. Maijishan. Heibonsha, Japan: Cultural Relics Publishing House (in Chinese), 1998, p. 207.
- [20] W. Li and C. Yang, "New Discoveries of Buddhist Burial Forms in Longmen Grottoes — An Analysis of the Burial Niches of Longmen Grottoes" (in Chinese), *Cultural Relics*, no. 9, pp. 71–77, 1995.
- [21] D. Yuan, "A Study on the Meditation Grottoes of the Wu Zhou Period in Longmen Grottoes," *Dunhuang Research*, no. 119, p. 54.
- [22] W. Wei, *Survey and Research on the Early Grottoes of Maijishan Grottoes*, Lanzhou: Gansu Education Press (in Chinese), 2017, p. 456.
- [23] Q. Ma and P. Zhang, "Current Situation Investigation and Research on Grotto 74 of Maijishan Grottoes" (in Chinese), *The Silk Road*, no. 185, p. 32.
- [24] W. Yang, "A Study on Grotto 78 of Maijishan Grottoes" (in Chinese), *Journal of Tianshui Normal University*, vol. 38, no. 1, p. 56.
- [25] X. Xu and Y. Wang, "Archaeological Excavations in the Northern Area of Mogao Grottoes" (in Chinese), China Social Sciences Network, p. 1.
- [26] H. Zhang and J. Fu, "The Evolution of Cave Forms of Yungang Grottoes from the Perspective of Spatial Art" (in Chinese), *Yungang Research*, vol. 4, no. 2, p. 7.

- [27] Yungang Grottoes Research Institute, Shanxi Provincial Institute of Archaeology, Datong Museum. *A Brief Report on the Excavation of the Site of Grotto 3 of Yungang Grottoes*, pp. 67–68.
- [28] Y. Cao, “A Preliminary Analysis of the Central Pagoda Pillars in Yungang Grottoes” (in Chinese), *Yungang Research*, vol. 3, no. 4, pp. 23–24, 2023.
- [29] Z. Zhao, “The Development and Evolution of Meditation Grottoes in the Hexi Region (3rd – 8th Centuries)” (in Chinese), *Cultural Relics and Museums*, no. 5, pp. 48–49, 2017.
- [30] Y. Ivashko and Y. Wu, “The concept of the 'Flashing ideal world': the experience of Ancient China for today,” *Art Inquiry. Recherches sur les arts*, vol. XXVII, pp. 81–99, 2025, doi: 10.26485/AI/2025/27/5.
- [31] I. Sandu, S. Wang, B. Boros, Y. Ivashko, A.V. Sandu, and P. Tišliar, “Analysis of the Wall Painting of the Dunhuang Fresco as a Basis for Its Preservation and Restoration,” *International Journal of Conservation Science*, vol. 15, spec. iss., pp. 371–388, 2024. DOI: 10.36868/IJCS.2024.si.27.
- [32] P. Tišliar, Z. Wang, and S. Wang, “Return to national origins in contemporary Chinese Art and Design,” *Art Inquiry. Recherches sur les arts*, vol. XXVII, pp. 101–119, 2025. DOI: 10.26485/AI/2025/27/6.
- [33] S. Wang, I. Sandu, K. Paprzyca, O. Ivashko, O. Kravchuk, and T. Yevdokimova, “Genesis of the Planning Structure and Ceilings of Dunhuang Sanctuaries,” *International Journal of Conservation Science*, vol. 15, pp. 349–370, 2024. DOI: 10.36868/IJCS.2024.si.26.
- [34] S. Wang, I. Sandu, Y. Ivashko, M. Krupa, A. Krukowiecka-Brzęczek, T. Yevdokimova, S. Stavroyany, O. Kravchuk, and A.V. Sandu, “Methods for the Preservation and Restoration of Dunhuang Wall Paintings: Foreign Experience,” *International Journal of Conservation Science*, vol. 15, no. 1, pp. 731–748, 2024. DOI: 10.36868/IJCS.2024.01.24.
- [35] S. Wang, Y. Wu, I. Chornomordenko, S. Rubtsova, B. Boros, and T. Krotowski, “Polychrome Sculpture in the Interiors of Dunhuang Sanctuaries, its Periodization and Artistic-Picture Features,” *International Journal of Conservation Science*, vol. 16, no. 4, pp. 1687–1700, 2025. DOI: 10.36868/IJCS.2025.04.05.
- [36] Y. Wu, H. Liu, Y. Ding, J. Kobylarczyk, and P. Chang, “National Identity in Traditional Chinese Architecture and Wall Paintings: Symbolism, Transformation, and Artistic Evolution,” *International Journal of Conservation Science*, vol. 16, spec. iss., pp. 395–408, 2025. DOI: 10.36868/IJCS.2025.si.03.
- [37] Y. Wu, H. Liu, S. Wang, A. Pawłowska, P. Chang, D. Yang, and J. Magiera, “Symbolic and Aesthetic Role of Polychromy in Traditional Architecture and Sacred Art of China,” *International Journal of Conservation Science*, vol. 16, spec. iss., pp. 701–720, 2025. DOI: 10.36868/IJCS.2025.si.23.
- [38] V. Zaitseva, A.V. Sandu, V. Smilka, B. Boros, O. Ivashko, T. Kozłowski, Y. Kharaborska, and L. Shevchenko, “Aspects on Preserving Wall Paintings (Example of Ukraine and China),” *International Journal of Conservation Science*, vol. 15, no. 3, pp. 1351–1370, 2024. DOI: 10.36868/IJCS.2024.03.13.
- [39] Y. Ivashko, P. Chang, P. Zueva, Y. Ding, and T. Kuzmenko, “Continuity of traditions and innovation in modern landscape design in China,” *Landscape Architecture and Art*, vol. 18, no. 18, pp. 94–103, 2021. DOI: 10.22616/j.landarchart.2021.18.10.
- [40] Y. Ivashko, D. Kuśnierz-Krupa, and P. Chang, “History of origin and development, compositional and morphological features of park pavilions in ancient China,” *Landscape Architecture and Art*, vol. 15, no. 15, pp. 75–82, 2019. DOI: 10.22616/j.landarchart.2019.15.08.
- [41] Y. Ivashko, P. Chang, A. Dmytrenko, T. Kozłowski, and D. Mykhailovskyi, “Influence of structural schemes on the shaping of historical wooden buildings: On the examples of traditional Chinese pavilions, pavilions of the Chinoiserie style and Ukrainian wooden churches” | “Wpływ układów konstrukcyjnych na kształtowanie zabytkowych obiektów

- drewnianych na przykładzie tradycyjnych pawilonów chińskich, pawilonów w stylu chinoiserie oraz ukraińskich kościołów drewnianych,” *Wiadomości Konserwatorskie – Journal of Heritage Conservation*, no. 67, pp. 49–60, 2021. DOI: 10.48234/WK67INFLUENCE.
- [42] M. Żychowska, Y. Ivashko, P. Chang, A. Dmytrenko, N. Kulichenko, and X.M. Zhang, “The influence of traditional Chinese landscape architecture on the image of small architectural forms in Europe,” *Landscape Architecture and Art*, vol. 18, no. 18, pp. 59–68, 2021. DOI: 10.22616/J.LANDARCHART.2021.18.06.
- [43] M. Żychowska, I. Sandu, Y. Ivashko, A. Dmytrenko, O. Ivashko, and O. Morklyanyk, “Style as a Reflection of Ideology of the Authorities,” *Art Inquiry. Recherches sur les arts*, vol. XXIV, pp. 273–297, 2022. DOI: 10.26485/AI/2022/24/16.
- [44] P. Gryglewski, Y. Ivashko, D. Chernyshev, P. Chang, and A. Dmytrenko, “Art as a message realized through various means of artistic expression,” *Art Inquiry. Recherches sur les arts*, vol. XXII, pp. 57–88, 2020. DOI: 10.26485/AI/2020/22/4.
- [45] M. Orlenko, “Methodology of studying the architectural construction systems of objects of conservation,” *European Journal of Technical and Natural Sciences*, no. 4, pp. 6–8, 2017. DOI: 10.20534/EJTNS-17-4-6-8.
- [46] M. Orlenko and Y. Ivashko, “The concept of art and works of art in the theory of art and in the restoration industry,” *Art Inquiry. Recherches sur les arts*, vol. XXI, pp. 171–190, 2019. DOI: 10.26485/AI/2019/21/12.
- [47] I. Sandu, Gy. Deak, Y. Ding, Y. Ivashko, A.V. Sandu, A. Moncea, I.G. Sandu, “Materials for Finishing of Ancient Monuments and Process of Obtaining and Applying,” *International Journal of Conservation Science*, vol. 12, no. 4, pp. 1249–1258, 2021.
- [48] R. Strangi, A. Macchia, B. Gabriele, R. Mancuso, and M.F. La Russa, “Efficacy of Deep Eutectic Solvents (DESs) For Mitigating Biodeterioration In Cultural Heritage: In Situ Evaluation,” *International Journal of Conservation Science*, vol. 15, no. 3, pp. 1147–1164, 2024. DOI: 10.36868/IJCS.2024.03.01.
- [49] D. Kuśnierz-Krupa, J. Kobylarczyk, J. Malczewska, Y. Ivashko, and M. Lisińska-Kuśnierz, “Analiza jakościowa edukacji architektonicznej w zakresie ochrony miasta zabytkowego,” *Wiadomości Konserwatorskie – Journal of Heritage Conservation*, no. 65, pp. 20–25, 2021. DOI: 10.48234/WK65PROTECTION.
- [50] Y. Ivashko, A. Dmytrenko, S. Belinskyi, M. Pabich, D. Kuśnierz-Krupa, J. Kobylarczyk, L. Bednarz, H. Kuzmina, and N. Kovtiukh, “The Influence of Colonial Policy on the Destruction of National Cultural Identity and Ways of Overcoming Its Consequences,” *International Journal of Conservation Science*, vol. 15, spec. iss., pp. 31–42, 2024. DOI: 10.36868/IJCS.2024.SI.03.

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