敦煌研究院
DUNHUANG ACADEMY

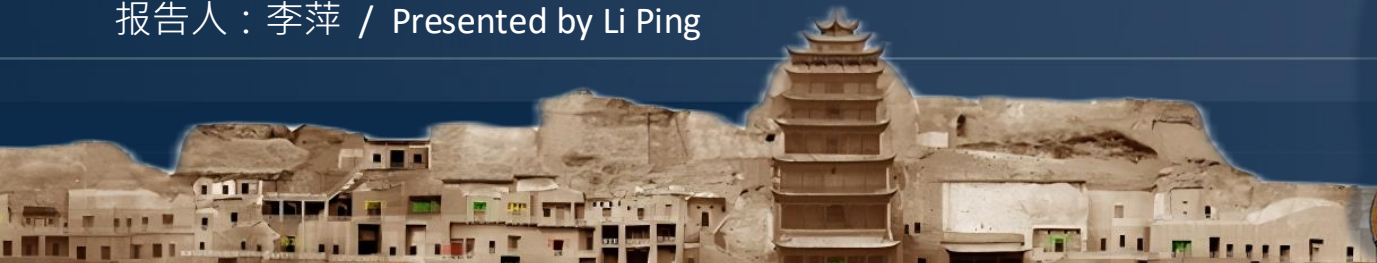
数字敦煌

重塑游客体验与目的地管理

Digital Dunhuang:

Reshaping Visitor Experiences and Destination Management

报告人：李萍 / Presented by Li Ping





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一、莫高窟概况

1. Overview of the Mogao Grotto





莫高窟南区

Southern area

南区供僧俗礼佛、进行佛事活动。
南区约1000米，洞窟487个。

A place of worship and Buddhist ceremonies for monks and laypeople.
Approx. 1,000 metres; 487 grottoes.

莫高窟北区

Northern area

北区主要供佛教信徒生活、居住、习禅、死后瘗埋。
北区约700米，洞窟248个。

An area for daily life, residence, meditation and burial.
Approx. 700 metres; 248 grottoes.

形式多样的洞窟形制

Diverse grotto types (1/2)



禅窟 Meditation Grottoes

正壁开龛塑像，左右两侧壁各开两个或四个仅能容身的斗室，供修行者在内坐禅修行。

A sculpted niche on the main wall faces small meditation cells, with two or four cells along each side wall.



中心塔柱窟 Central-pillar Grottoes

在洞窟中间凿出连地接顶的方柱，柱的四面开龛塑像，象征佛塔，供修行者入窟绕塔观像与礼佛。

A square pillar extends from floor to ceiling. Sculpted niches on its four sides symbolize a stupa, around which worshippers walk and pay homage.



殿堂窟 Hall Grottoes

形式受到中国传统殿堂建筑的影响，平面方形，正壁开龛塑像，其余壁面和窟顶都绘壁画。

Inspired by traditional Chinese halls, these square grottoes have a sculpted niche on the main wall and murals on the other walls and ceiling.

形式多样的洞窟形制

Diverse grotto types (2/2)



中心佛坛窟 Central-altar Grottoes

大型洞窟主室中央凿出方形佛坛。彩塑群像高踞于佛坛之上，信徒可围绕佛坛右旋环通、礼佛观像。

A square altar in the main chamber supports a group of painted sculptures. Worshippers walk clockwise around it to view the figures and pay homage.



大像窟 Giant Buddha Grottoes

因窟中巨大的弥勒佛坐像而得名。

Named after the enormous seated statues of Maitreya Buddha inside.



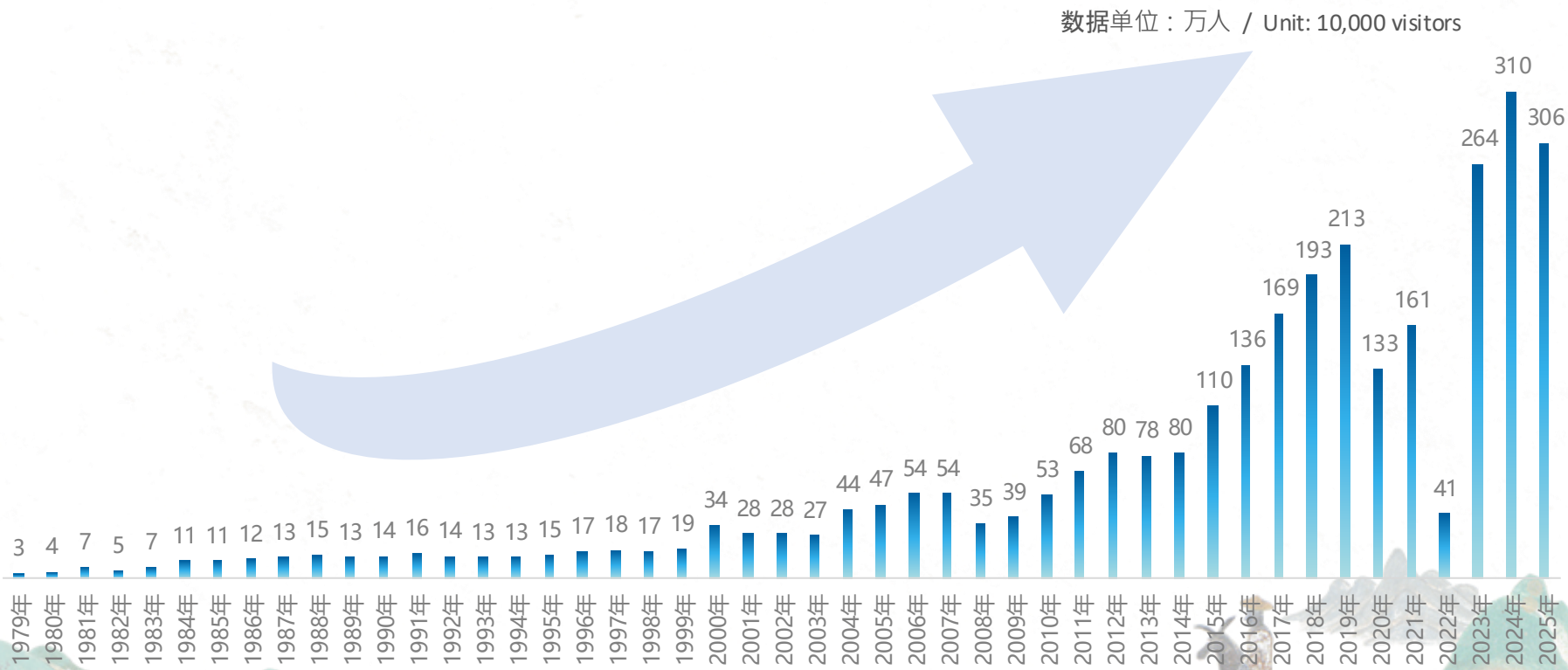
僧房窟 Monks' Residential Grottoes

僧房窟主要集中在莫高窟北区，是古代僧人们生活起居的地方。

Located mainly in the northern area, these grottoes served as living quarters for monks.

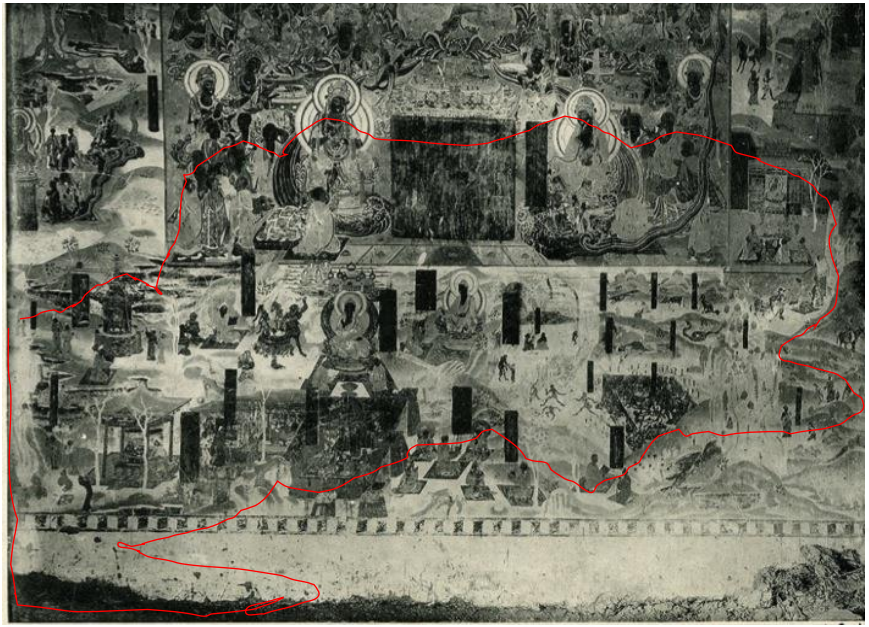
旅游开放接待情况

Visitor Numbers



百年壁画对比

The Change of the Murals in a Century



1908年拍摄 / Photographed in 1908

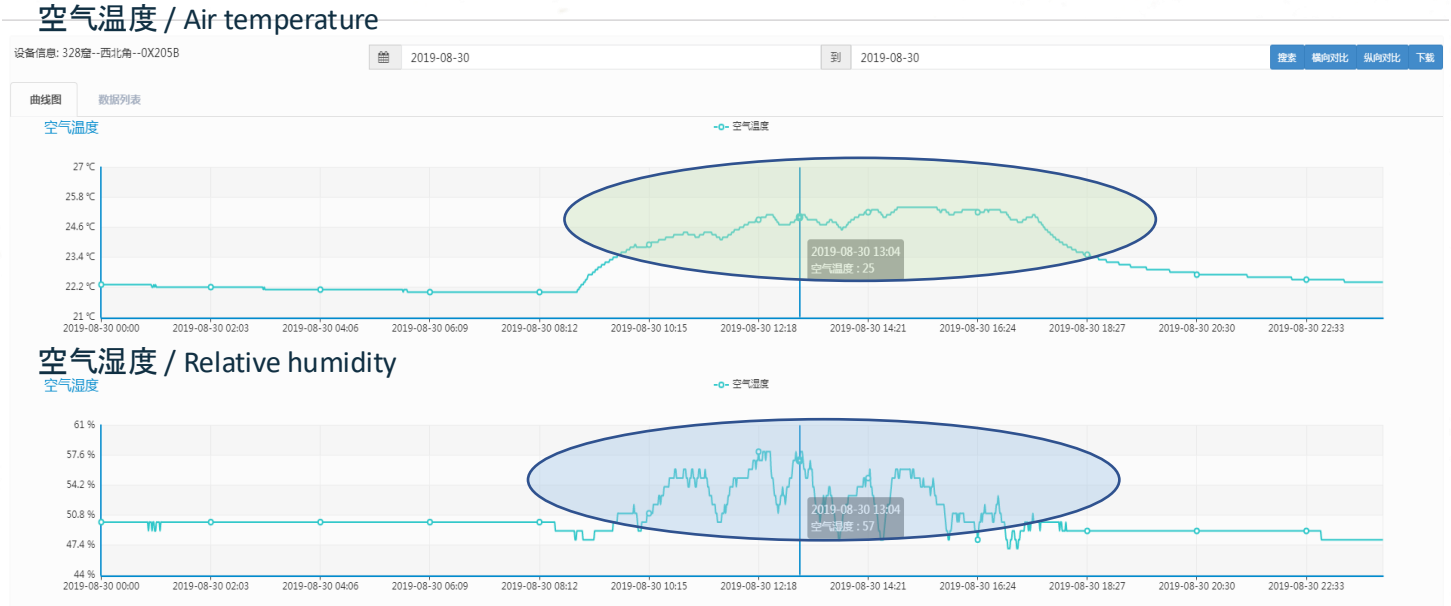


2008年拍摄 / Photographed in 2008

第217窟北壁，盛唐 / North wall, Grotto 217, High Tang period

窟内微环境监测

Monitoring the Grotto Microclimate

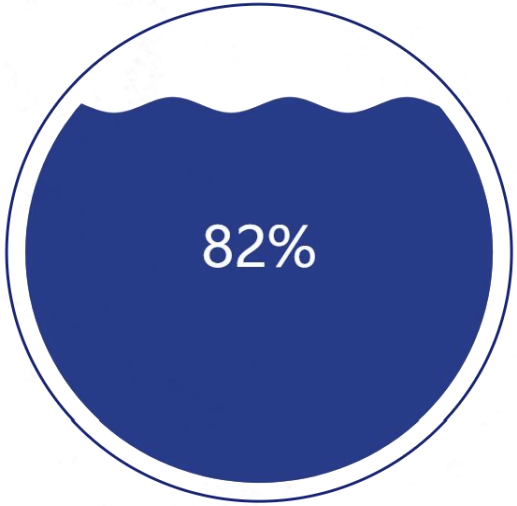


游客的增多打破了洞窟、文物本体恒定的小环境。

Increasing visitor numbers disrupt the stable microclimate around the grottoes and their cultural relics.

洞窟开放条件

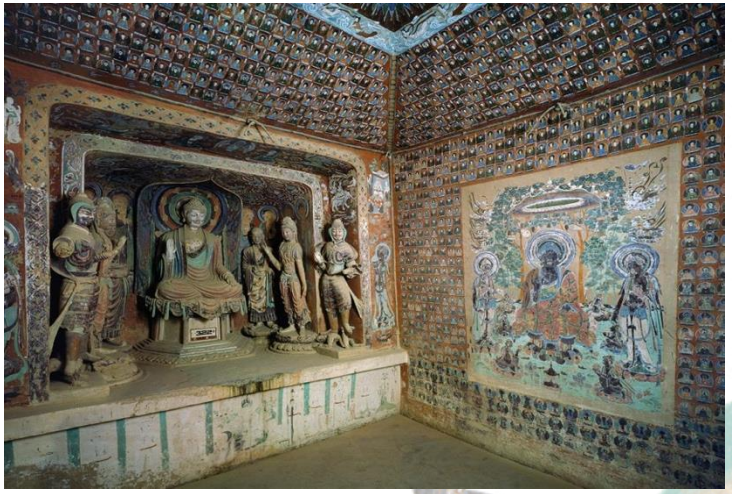
Space constraints for opening grottoes to visitors



82%的洞窟面积不足25平方米
82% of grottoes are smaller than 25m²



洞窟面积 / Grotto floor area



数量：18 / 21 / 41 / 123 / 239 个洞窟
Counts: 18 / 21 / 41 / 123 / 239 grottoes

二、数字敦煌

2. Digital Dunhuang

敦煌石窟数字化
档案
保护、研究、弘扬、管理

Digitization of the Dunhuang Grottoes

Digital Archive

Conservation, Research, Public Engagement and Management

洞窟数字化采集

323 grottoes digitized

数据总量超过

Over 600 TB of data

洞窟拼接处理

210 grottoes with stitched imagery

洞窟全景漫游

227 panoramic grotto tours

省内外16处大遗址的三维重建

16 major heritage sites 3D reconstructions

“永久保存，永续利用”

Permanent Preservation, Sustainable Exploitation

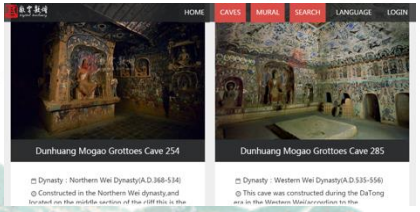
数字敦煌

Digital Dunhuang

2016年上线的“数字敦煌”资源库向全球免费共享高清图像，目前已覆盖78个国家，超过2300万人次浏览。

Launched in 2016, the Digital Dunhuang resource library provides free access to high-resolution images worldwide. It has reached 78 countries and recorded more than 23 million visits.



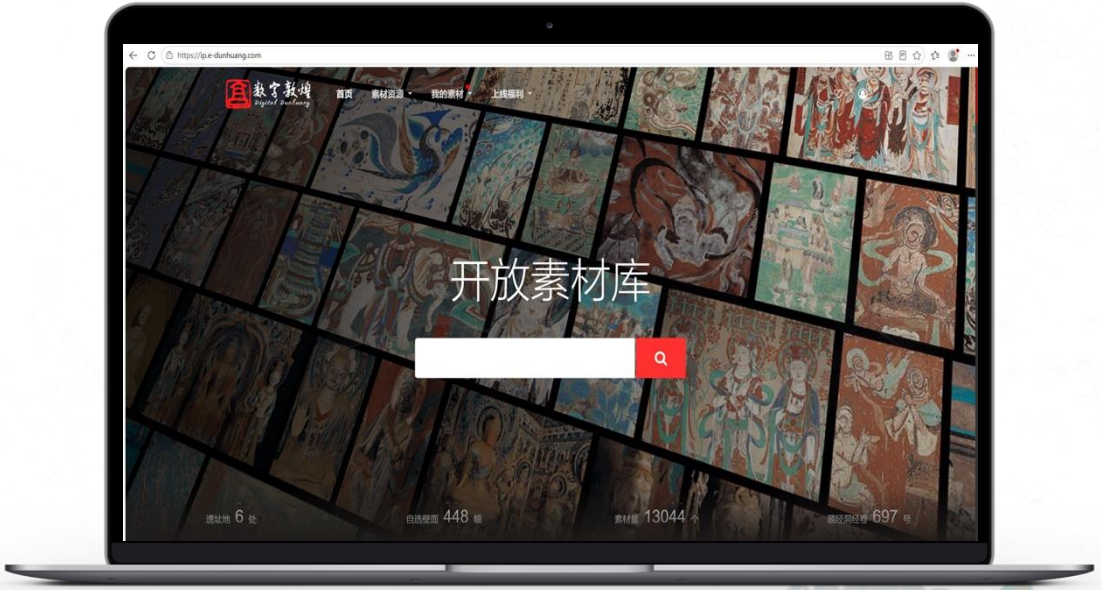


www.e-dunhuang.com

数字敦煌开放素材库

Digital Dunhuang Open Material Library

2022年，“数字敦煌开放素材库”利用区块链技术实现数据授权追溯，用户可根据需求申请下载资源，研究者可提取元素与线条进行二次创作，普通用户可按名称甚至按色彩喜好调取敦煌素材。



Launched in 2022, the library uses blockchain to trace resource licensing. Users can apply to download assets, researchers can extract motifs and lines for new creations, and visitors can search by name or preferred colour.

https://ip.e-dunhuang.com/

数字藏经洞

Digital Library Grotto

2025年5月上线的“数字藏经洞”数据库平台，已录入文物目录超74000条，发布敦煌文书超9900卷，标志着流失海外敦煌文物的数字化回归取得实质性进展。

Launched in May 2025, the database contains more than 74,000 catalogue entries and over 9,900 Dunhuang manuscript volumes. It marks substantial progress in digitally reuniting Dunhuang heritage dispersed overseas.





https://dlc.e-dunhuang.com/

三、莫高窟旅游开放新模式

3. A New Tourism Model for Mogao

莫高窟数字展示中心投入使用

Opening of the Digital Exhibition Centre

2014年8月莫高窟开始实行旅游开放新模式，使以往游客只进洞窟参观2小时左右的单一游览模式，改变为在莫高窟数字展示中心观赏敦煌石窟艺术高清数字电影与莫高窟实地体验相结合的复合参观模式。



Introduced in August 2014, the new model combines high-definition films about Dunhuang grotto art at the Digital Exhibition Centre with visits to the grottoes. It replaces the earlier model of a grotto-only visit lasting around two hours.

展现敦煌文化的多元价值

A Richer Experience, with Better Tourism Management

数字展示中心以数字化为基础，利用当代先进的信息技术和展示手段，通过全方位、立体化的虚拟洞窟场景，**使游客感受身**临其境的参观效果，其参观体验也得到量**的充**实和质的提高。



The centre uses digital technologies and immersive virtual grotto environments to enrich the visit and improve the quality of the experience.

同时，数字展示中心的调控功能有效平衡旅游旺季莫高窟游客流量的分布，缓解莫高窟旅游开放与保护之间的矛盾。

It also helps distribute visitor flows during peak periods, easing the tension between public access and heritage conservation.

莫高窟开放新模式介绍

How the Tourism Model Works

01

单日总量控制

Daily Visitor Limit

6000人

6,000 visitors

02

线上预约购票

Advance Online Booking

莫高窟参观预约网
微信小程序

Booking website and WeChat mini programme
https://www.mgk.org.cn/

03

数字洞窟展示

Digital Grotto Experience

主题电影《千年莫高窟》
球幕电影《梦幻佛宫》

A film on Mogao's history, *Mogao Through the Ages,* and an immersive dome film, *The Dreamlike Palace of Buddhism*

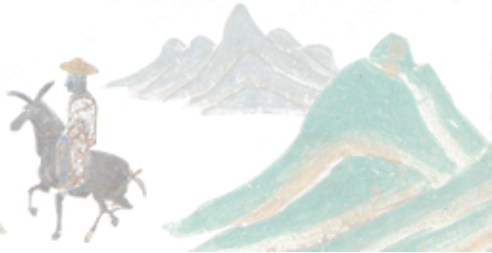
04

实体洞窟参观

Visits to the Grottoes

8个实体洞窟

8 physical Grottoes



莫高窟参观新模式

The New Tourism Model



主题电影《千年莫高》

Thematic film, *Mogao Through the Ages*



球幕电影《梦幻佛宫》

Dome film, *The Dreamlike Palace of Buddhism*



实体洞窟参观

Visits to the grottoes

《千年莫高》 《梦幻佛宫》

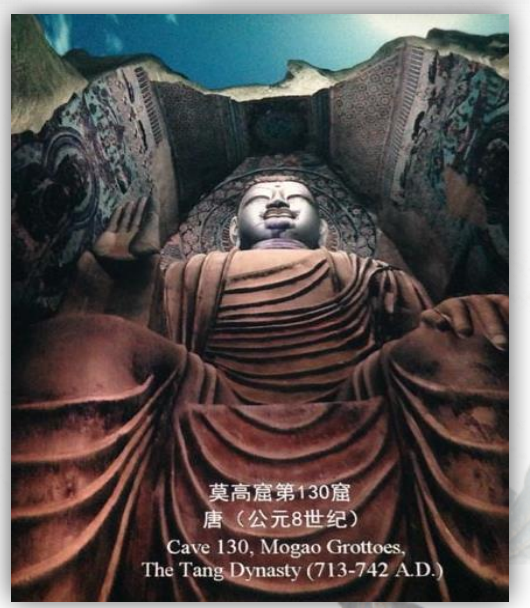
Mogao Through the Ages / The Dreamlike Palace of Buddhism

洞窟数字化采集
Digitalization of the Grottoes

高精度球幕CG渲染
High-precision Dome CG Rendering

影片后期
Film Post-production





四、遗产利用方式拓展

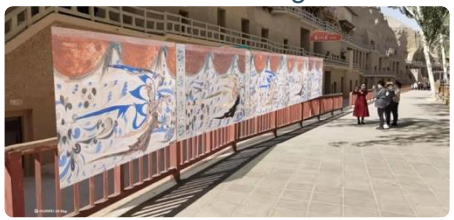
4. New Ways to Experience Heritage

“飞天”专题游一方面是基于**“数字敦煌”的海量数字**资源，结合华为河图的厘米级空间定位、虚实融合的技术，在莫高窟创造**了一个虚**拟孪生世界，实现了窟内文物窟外看的又一次新的尝试。

The Flying Apsaras thematic tour, on the one hand, draws upon the massive digital resources of “Digital Dunhuang” and, leveraging Huawei Cyberverse’s centimeter-level spatial positioning and virtual–real fusion technologies, creates a virtual twin world at the Mogao Grottoes — marking yet another innovative attempt to enable visitors to view the cultural relics inside the grottoes from outside the grottoes.

基于敦煌学研究的丰硕成果，实现了敦煌壁画中飞天艺术的广泛传播。这是敦煌研究院在科技与文化融合发展中的又一次创新，也是敦煌石窟当代文化价值传播途径和展示方式的最新探索。

Building on the rich achievements of Dunhuang Studies, the tour has also facilitated the wide dissemination of the art of the Flying Apsaras as depicted in the Dunhuang murals. This represents yet another innovation by the Dunhuang Academy in the integrated development of science, technology and culture, as well as the latest exploration of the channels of dissemination and modes of display for the contemporary cultural value of the Dunhuang Grottoes.







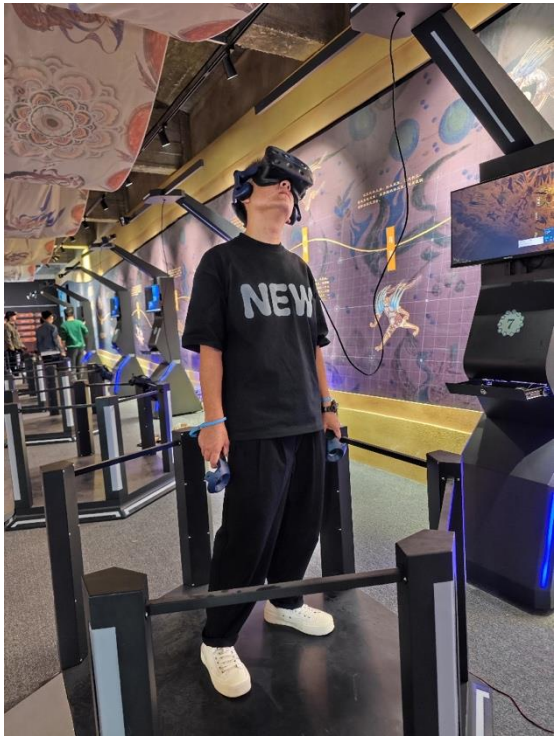




数字敦煌沉浸展：莫高窟第285窟

Digital Dunhuang Immersive Exhibition: Grotto 285





在国家文物局“互联网+中华文明”行动计划指导下，数字敦煌资源库首度为用户打造深度文化知识互动产品，围绕莫高窟第285窟，推出“寻境敦煌”线上知识讲解互动及线下VR深度体验。

Under the National Cultural Heritage Administration’s “Internet + Chinese Civilization” initiative, Digital Dunhuang developed its first in-depth interactive cultural learning experience. Centred on Grotto 285, “Exploring Dunhuang” combines online interpretation and interaction with an immersive VR experience on site.

数字化赋能，千年石窟“活”起来

Digital Technology Brings Ancient Grottoes to Life







深度文化探索、壁画纤毫毕现

Explore the culture in depth and see the murals in fine detail

谢谢！

Thank you

