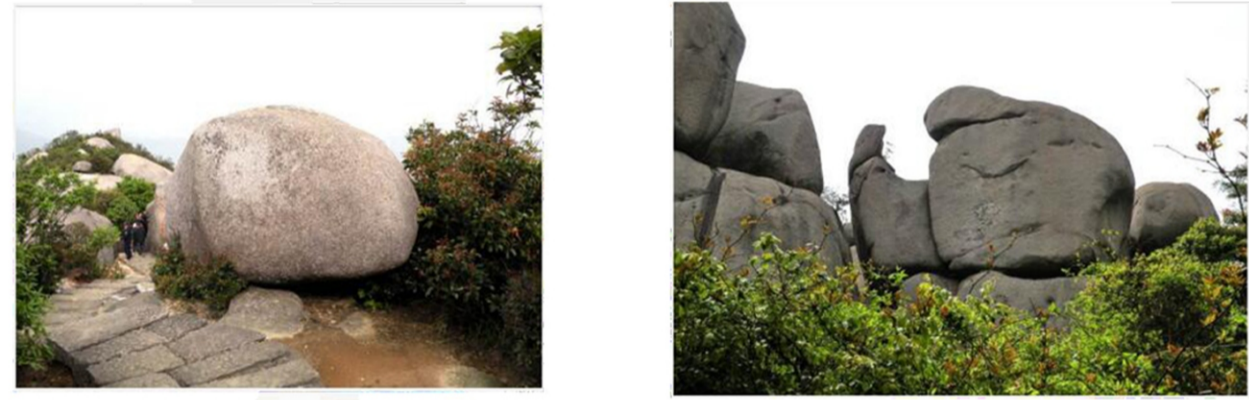


太姥山的石蛋花岗岩地貌

花岗岩地貌景观的一种代表性类型。原地或移位的花岗岩块体，外貌呈浑圆的蛋状地貌景观。是花岗岩风化壳弱风化管理中特有的风化结构，称为“球状风化”。在湿热气候条件下，强烈的化学风化作用沿花岗岩中的三组节理进行剥蚀，致使岩石呈浑圆状外形或同心圆状外观。山体的顶部或山坡的转折处，是石蛋最容易形成的处所。石蛋是原始花岗岩风化壳的弱风化层的典型代表，表明风化作用已全面进入花岗岩石块的四方六面，事实上已使此石块完全脱离了基岩母体，只是还没有位移而已。遍布的石蛋堆积地貌也是风化壳剥蚀的表现。太姥山石蛋地貌十分典型。

Granite Stone Egg Landform

It is a representative type of the granite landforms. The granite block in-situ or displaced has a round egg shaped landscape. It is a unique weathering structure in granite that is called "spheroidal weathering". Under the condition of hot and humid climate, the strong chemical weathering effect is denuded along three groups of jointed joints in granite, resulting in a round shape or a concentric round appearance. The top of the mountain or the turning point of the hillside are the places where the stone eggs are most easily formed. The stone egg is a typical representative of the weathering layer of the weathered crust of the primitive granite. It shows that weathering process has worked on the six sides of the Quartet of granite block. In fact, it has completely been separated from the base rock, but not been displaced. The stone eggs are also a manifestation of the weathered crust just being stripped off. Granite Stone Egg Landform in Taimushan is very typical.



宁德世界地质公园
太姥山花岗岩石蛋地貌
Stone egg landform of Taimushan,
Ningde UGGP



花岗岩构造节理和原生节理将花岗岩切割成豆腐块状的岩块

Structural joints and primary joints in granite cut the rock mass into sliced tofu-shaped blocks.



对比
Vs.

豆腐块 Sliced Tofu

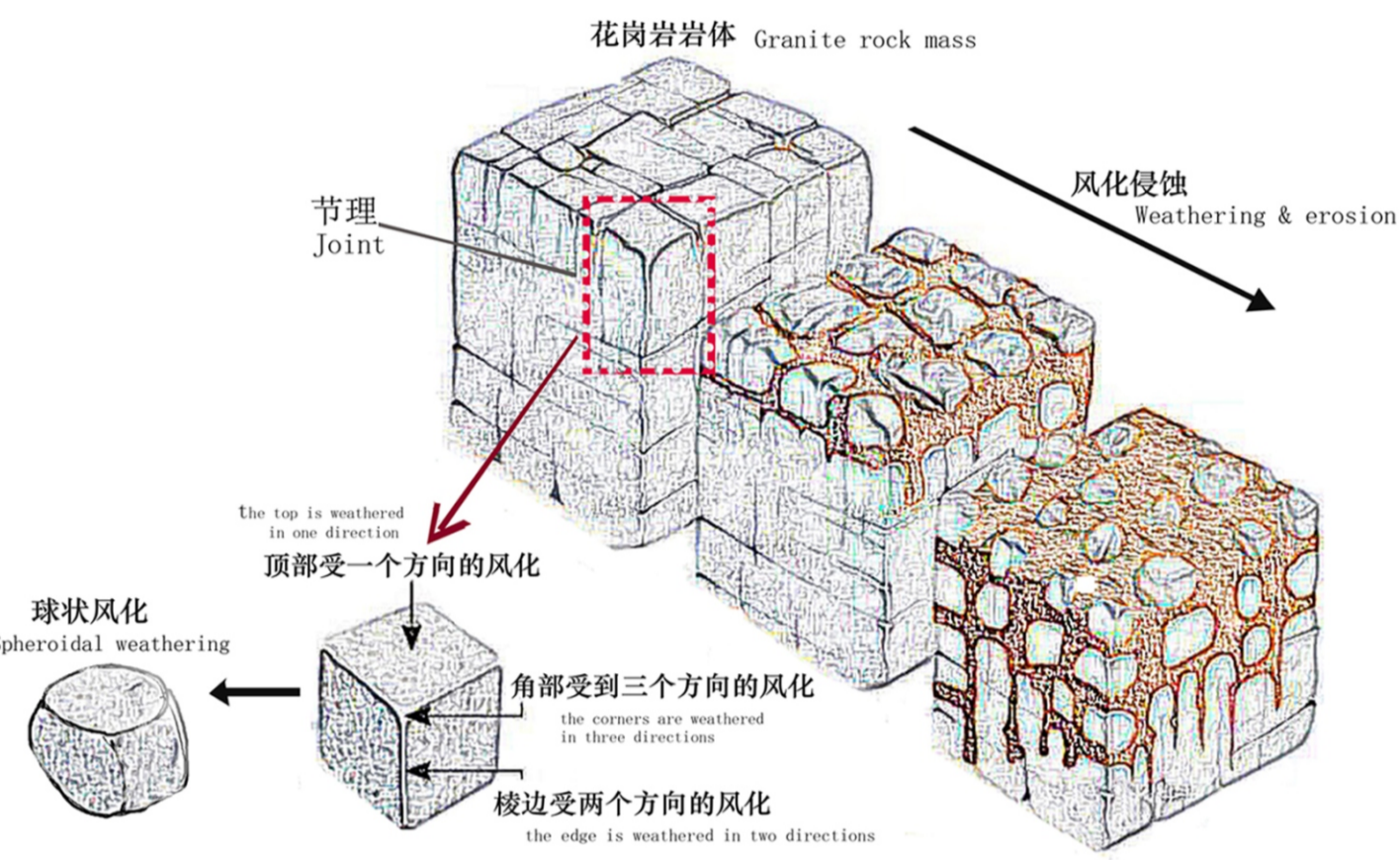
被节理切割成块状的花岗岩 Granite block dissected by joints

石蛋的成因:球状风化

当这些豆腐块一样的花岗岩接近地表或露出地表时，在阳光、空气、流水等因素作用下，会发生风化作用。水分顺着节理面不断地渗入和下行，通过风化作用，使得块状岩体棱角处的砂粒率先脱落，因为此处岩石的自由面积大（如下图所示，棱边接受2个方向的风化，角部接受3个方向的风化），故棱角逐渐缩减，最终趋向球形，也就是所谓的石蛋。这样的风化过程称球状风化。当地壳继续抬升后，外力作用尤其是流水作用就会把风化壳上层碎屑物质剥离，石蛋则就暴露于地表，在进一步的风化作用下就形成形状奇特、花岗岩石蛋地貌。

Spheroidal Weathering and Stone Egg Landform

When these tofu-like granites are close to the surface or exposed to the surface, weathering will occur under the influence of sunlight, air, flowing water and other factors. Moisture continues to infiltrate and erodes along the joint surface. Through weathering, the sand grains at the corners of the massive rock mass first fall off, because the free surface area of the rock is large (as shown in the figure below, the edge receives 2 directions of weathering. The corners are weathered in 3 directions. Therefore, the edges and corners are gradually reduced, eventually tending toward a spherical shape, which is the so-called stone egg. This weathering process is called spheroidal weathering. After the shells continue to rise, external forces, especially flowing water, will strip the debris from the weathering crust, and the stone eggs will be exposed to the surface. Under the effect of further weathering, strangely shaped granite eggs will be formed.



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太姥山花岗岩峰丛地貌

峰丛是太姥山最常见的一种花岗岩地貌。花岗岩山脊沿断层节理裂隙发生剥蚀，在大自然的长期雕刻下，绝壁层层，石峰林立，形成了千姿百态的花岗岩峰林、峰丛地貌。花岗岩峰丛是峰林地貌发育的初始阶段。峰丛底部一般互相结合，进一步被风化侵蚀，底部会分开，形成峰林地貌。

Granite peak cluster landform in Taimushan

Peak cluster is the most common granite landform in Taimushan. The granite ridge has been eroded along faults and joints. Under the long engraving of nature, the cliffs formed, developing granite peak clusters. The bottom of a peak cluster is interlinked. After being further eroded, the bottom of a peak cluster will be separated to form peak forest landform.



花岗岩石瀑地貌

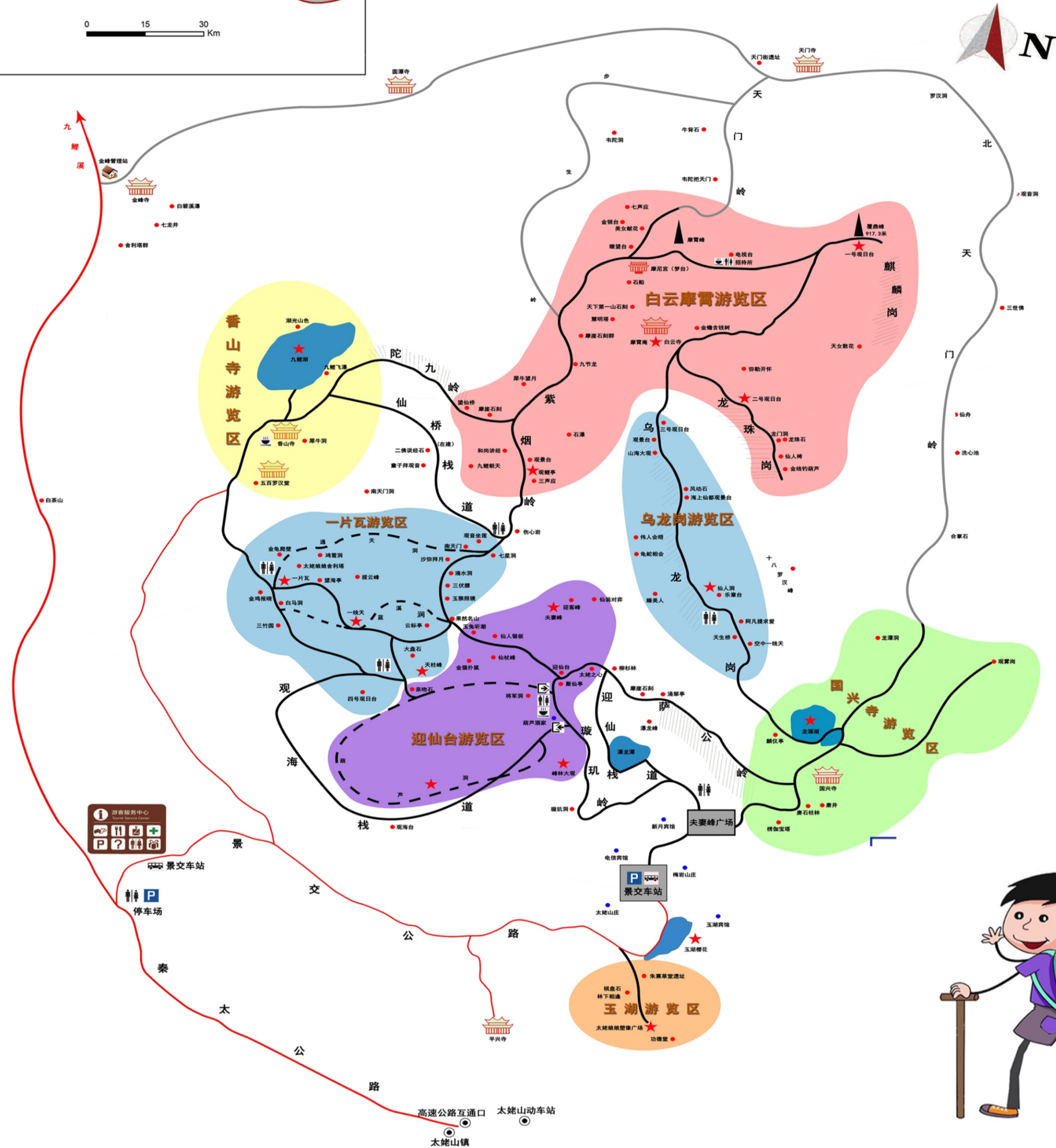
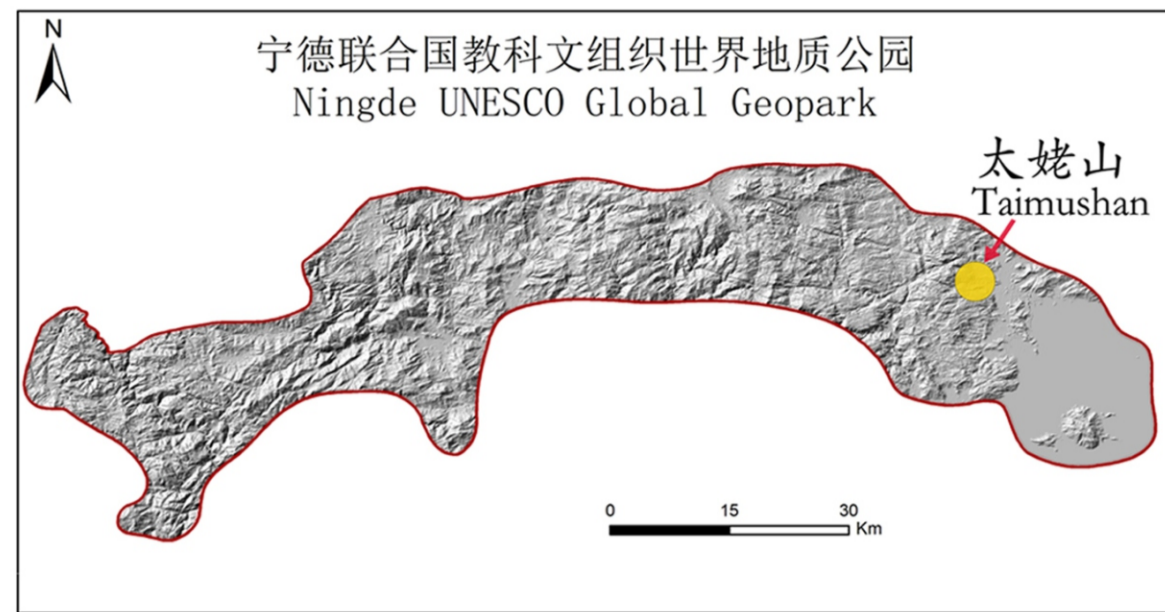
石瀑主要由水解作用形成，是一种独特的流水冲蚀现象。花岗岩主要含有钾长石和斜长石等矿物，这些矿物都易发生碳酸盐化作用，变成粘土矿物，因而花岗岩容易遭受风化而破坏。当花岗岩的垂直节理较发育时，沿节理由于上述作用造成的长石、石英等造岩矿物的水解流失，本地降雨丰沛，在长期雨水冲刷下，在风化面上形成了一条条褐色的回槽-流水冲刷槽。它们紧密排列壮观宏大，气流直下，范围很广，看上去就像瀑布一样，是太姥山最为独特的景观之一。

Granite stone waterfall landform

Stone waterfall is mainly formed by hydrolysis. It is a unique phenomenon of water erosion. Granite mainly contains minerals such as potassium feldspar and plagioclase, which are easy to carbonate and become clay minerals, so the granite is easily damaged by weathering. When the vertical joints of granite are more developed, the hydrolytic loss of rock minerals, such as feldspar and quartz are eroded. This area is rich in rainfall. Under the long term rainwater scour, a strip of water scour grooves are formed on the weathered surface, which look like a stone waterfall.



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宁德联合国教科文组织世界地质公园 Ningde UNESCO Global Geopark

太姥山

Taimushan

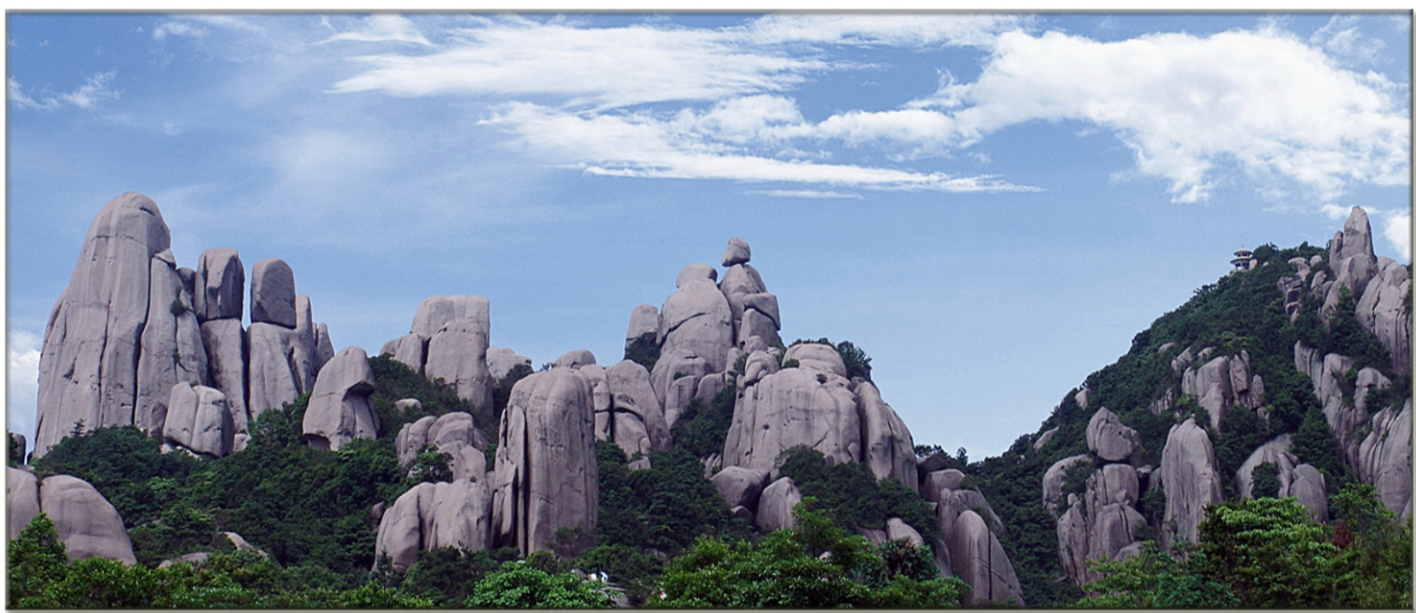


太姥山简介

Introduction to Taimushan of Ningde UNESCO Global Geopark

太姥山景区位于宁德联合国教科文组织世界地质公园东北部，融山、海、川、岛和寺、寨、堡于一体，素有“海上仙都”、“山海大观”之美誉。由石峰、石堡、石柱等组成的峰丛与千姿百态的石蛋构成了一幅绚丽多姿的画卷，疏密相间、错落有致，与之相伴的线谷、巷谷、峡谷和洞穴景观也独具特色。区内港湾优美，海域壮阔、岛屿奇特。历代建造的古寺佛塔，别具风情的俞寨风光，使人文景观多姿多彩。由石峰、石堡、石柱等组成的峰丛与千姿百态的石蛋构成了一幅绚丽多姿的画卷，疏密相间、错落有致，与之相伴的线谷、巷谷、峡谷和洞穴景观也独具特色。区内港湾优美，海域壮阔、岛屿奇特。历代建造的古寺佛塔，别具风情的俞寨风光，使人文景观多姿多彩。

Taimushan situates in the northeast of Ningde UNESCO Global Geopark, integrating landscapes of mountain, sea, stream, island, temple, camp, town and fortress. Thus, it enjoys a fair name "fairymetropolis at sea" and "grand sight of mountain and sea". The peak cluster consists of stony peaks, fortress, walls and pillar sand stony eggs in different poses and with different expressions, together making up a gorgeous and colorful painting, which arranged in a proper distribution with uneven density. Moreover, the landscapes of slot canyons, lane valley, canyon and cave are distinctive too. There are beautiful bay, broad sea area and peculiar island in this area. The unique scenery of She Minority villages all contribute to the colorful cultural landscape.



晶洞花岗岩——形成太姥山地貌的物质基础

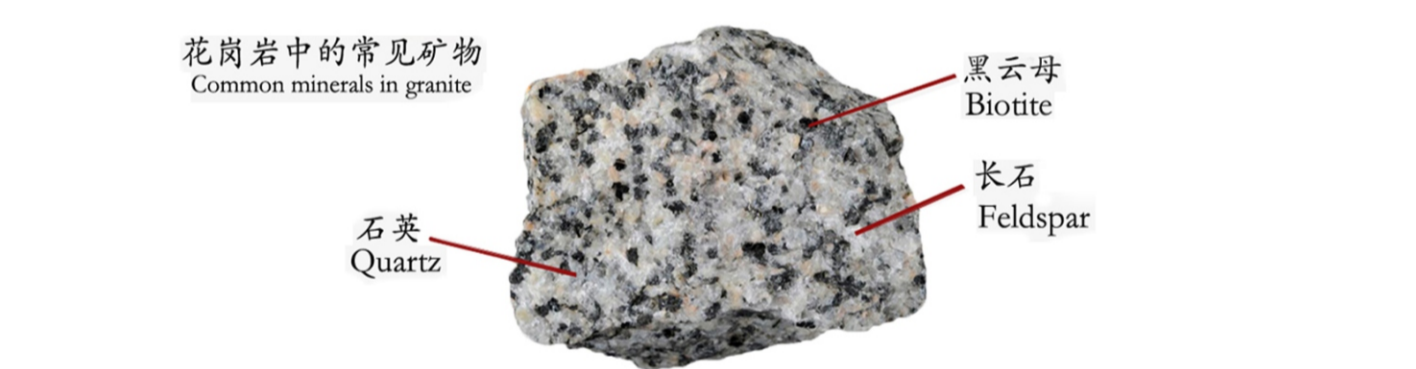
花岗岩是一种岩浆在地表以下冷却形成的火成岩，主要成分是长石和石英（二氧化硅>66%），在花岗岩中肉眼可以看到这些矿物颗粒。花岗岩按结构构造可分为细粒花岗岩、中粒花岗岩、粗粒花岗岩、斑状花岗岩、似斑状花岗岩、晶洞花岗岩等。太姥山岩体是典型晶洞碱长花岗岩，岩石呈肉红色，具有晶洞构造。花岗岩是一种常见类型侵入性火成岩。

Miarolitic Granite - the foundation forming Taimushan Granite landform

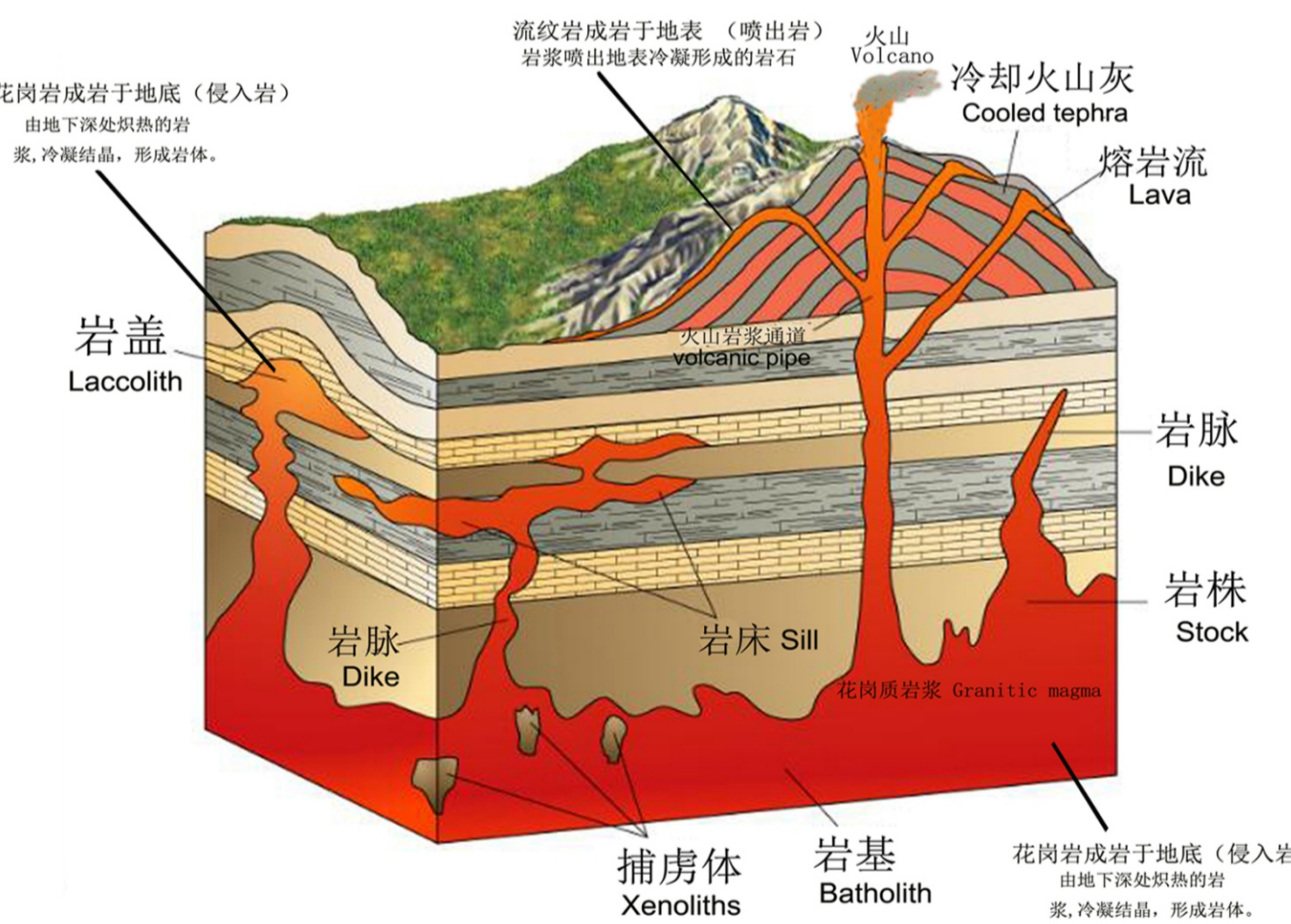
Granite is a common type of intrusive igneous rock that is granular and phaneritic in texture. It is formed within the crust of the Earth when Felsic magma, that is magma that is rich in Silica, cools down without reaching the surface. The common minerals in granite are feldspar and quartz (silica> 66%).

1

Granite can be divided into fine-grained granites, medium-grained granites, coarse-grained granites, porphyric granites, porphyritic granites, and miarolitic granite. The Taimushan rock mass is a typical miarolitic alkali-long granitoid. The granite of Taimushan are redish in color and have miarolitic structure.



花岗岩是常见的一种侵入岩：
Granite is a common type of intrusive igneous rock:



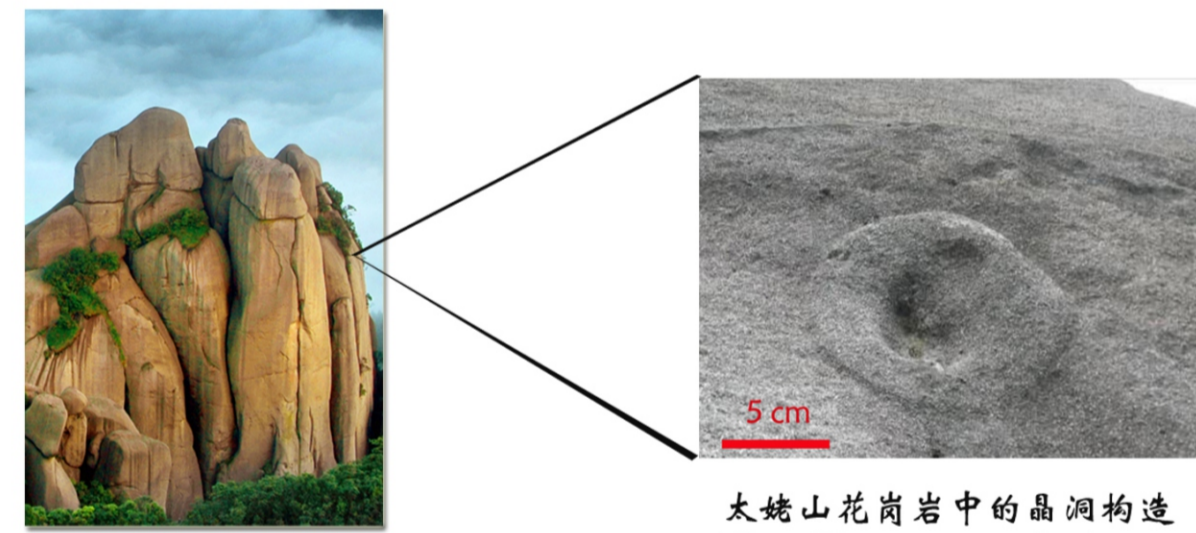
晶洞花岗岩的形成

形成太姥山的花岗岩是距今约9千万年前由于岩浆活动形成一种特殊类型的花岗岩。在形成太姥山的花岗质的岩浆中，二氧化硅含量大于76%，使得这种岩浆非常粘稠，岩浆中还溶解有挥发性气体（主要有二氧化碳、二氧化硫、水蒸气），在上升过程中，压力逐渐减小，上升到一定部位，压力减小使得溶解在岩浆中的挥发性气体从中逃逸出来，在粘稠的岩浆中形成气泡，后期岩浆在地下冷却，凝固形成花岗岩，这些岩浆中的气泡成了花岗岩中的原生孔洞，结构被保留下来，形成了晶洞构造。太姥山地区的晶洞洞径小者约3mm，大者可达10cm以上。

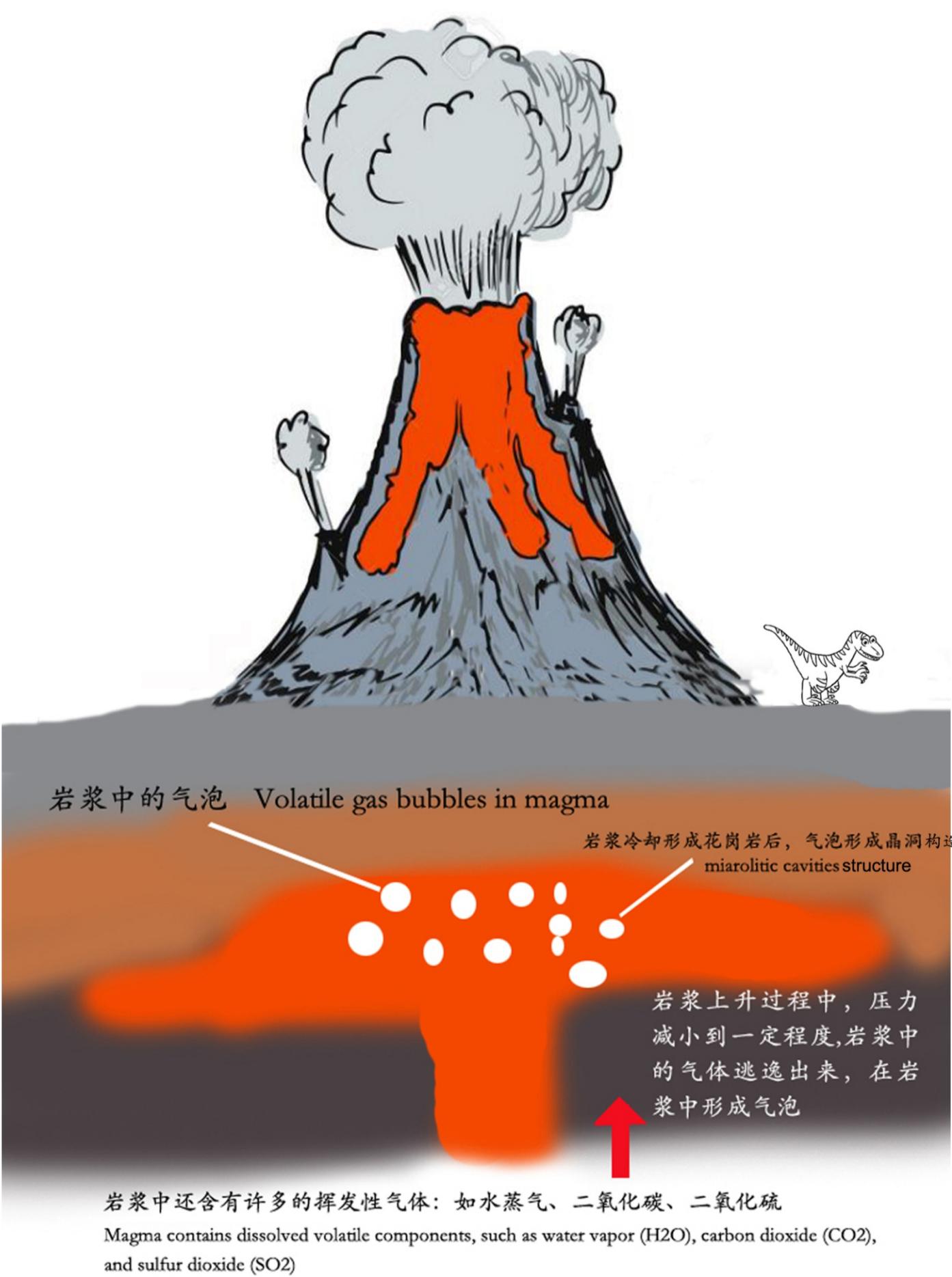
Formation of Miarolitic granite

The miarolitic granite in Taimushan is a special type of granite formed by magmatism about 90 million years ago. In the felsic magma, the silica content reaches up more than 76%, so it is very viscous. The magma also contains dissolved volatile gases (mainly carbon dioxide, sulfur dioxide, and water vapor). During the magma ascending, the pressure decreases to approach some region beneath the crust.

The volatile gases dissolved in the magma escaped and formed bubbles in the viscous magma. After cooling of the magma, these bubbles trapped in the granite have formed miarolitic structure. The small cavities in the Taimushan area are about 3mm, and the larger ones are more than 10 cm.



太姥山花岗岩中的晶洞构造
Miarolitic structure in the granite



2

太姥山地质科普游步道导览图

Geo-trail of Taimushan in Ningde UNESCO Global Geopark

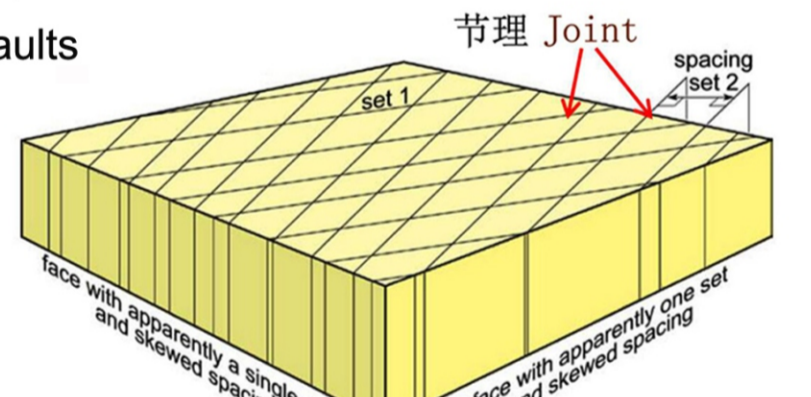
裂隙、断裂对太姥山花岗岩地貌发育的控制作用
花岗岩中的裂隙是形成我们今天看见的宁德世界地质公园花岗岩地貌的重要因素，受构造运动影响，花岗岩体产生NNE向裂隙（断层与节理），派生了两组NEE向、NNW向裂隙。两组裂隙、节理相交形成棋盘格状构造。这些岩石中的破裂，成为抗风化侵蚀能力的薄弱带，岩体沿着断层节理风化、崩裂、崩落，形成陡峭的峰丛。

The Control of Fractures on the Development of Taimushan Granite Landform
The fractures in granite mass are very important factor that has assisted shaping the landforms of the Ningde UGGP we see today. There has developed NNE - oriented fracture (faults and joints) group and later, evolved NEE- and NNW- oriented fractures due to neotectonic movement. The two groups of fractures were intersected each other and formed a chessboard fracture system, which are weaker zones in the rock mass with relative poor weathering and erosion resistance. The granite mass were weathered, eroded, and collapsed along these faults and joints and has formed into steep peaks and peak clusters.

两种不同类型的裂隙：节理与断层

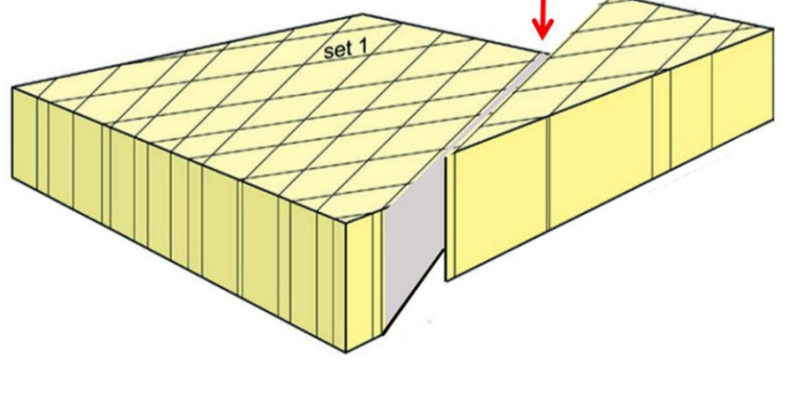
Two types of fractures: Joints & Faults

节理：是岩石中的裂隙，断裂构造的一类，指岩石裂开而裂面两侧无明显相对位移的裂隙
Joint: a fracture without measurable shear displacement (cracks or tensile fractures)



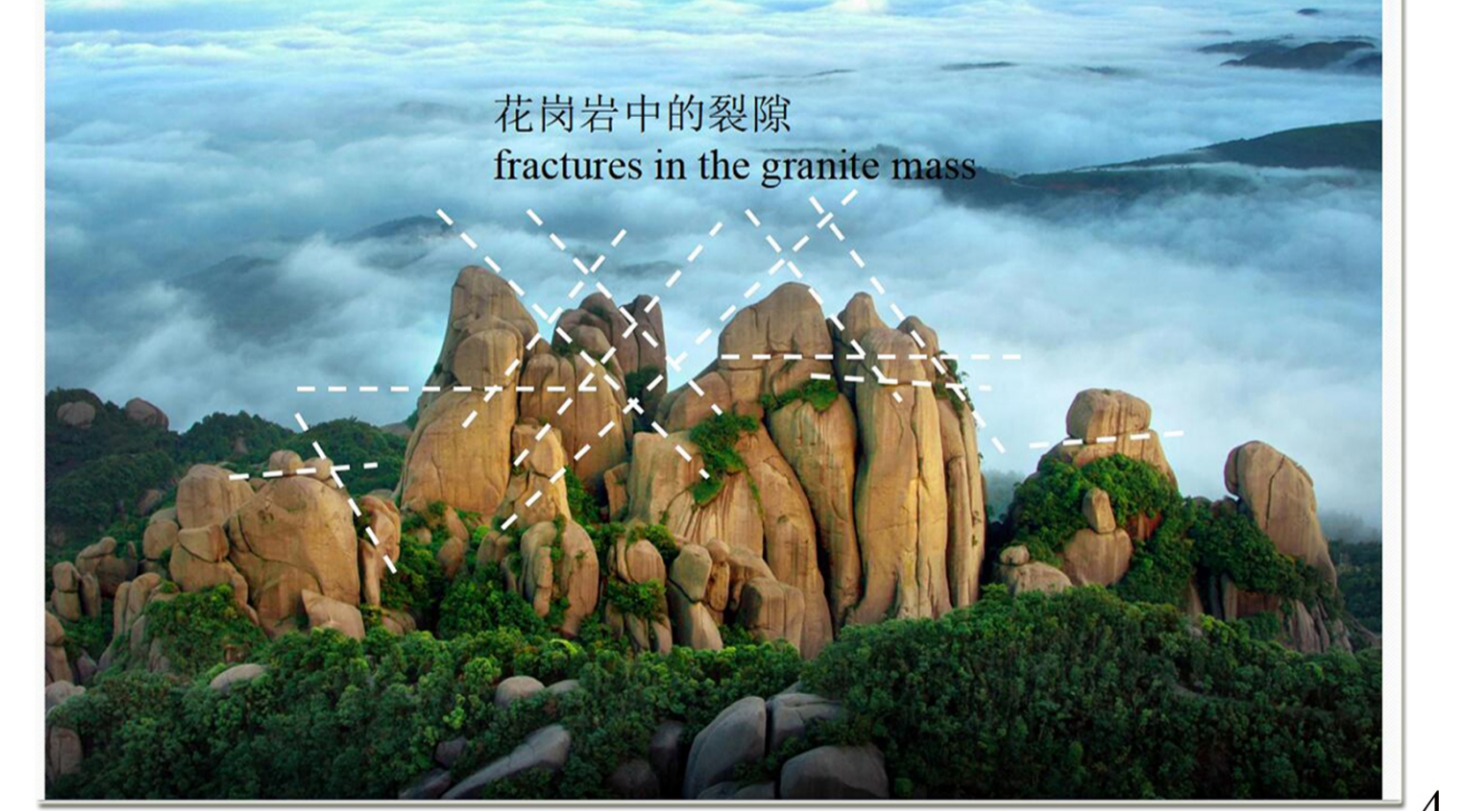
断层：是岩石中的裂隙，断裂构造的一类，指岩石裂开而裂面两侧有明显相对位移的裂隙

Fault: a fracture with measurable displacement



花岗岩中的裂隙是形成我们今天看见的宁德世界地质公园花岗岩地貌的重要因素

The fractures in granite mass are very important to shape the landforms of the Ningde UGGP we see today



3

花岗岩中的裂隙 fractures in the granite mass