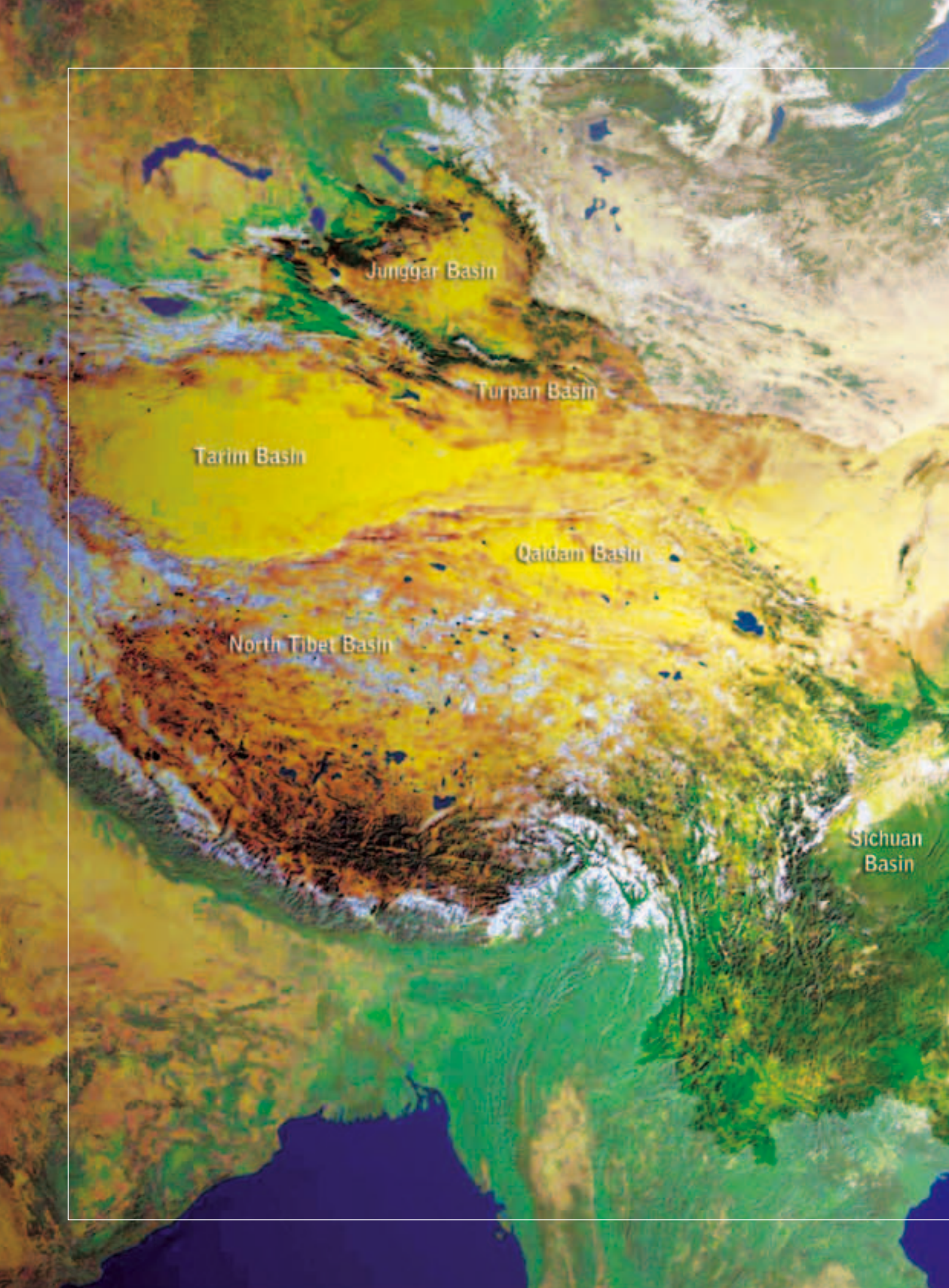
Sichuan Basin

China National Petroleum Corporation

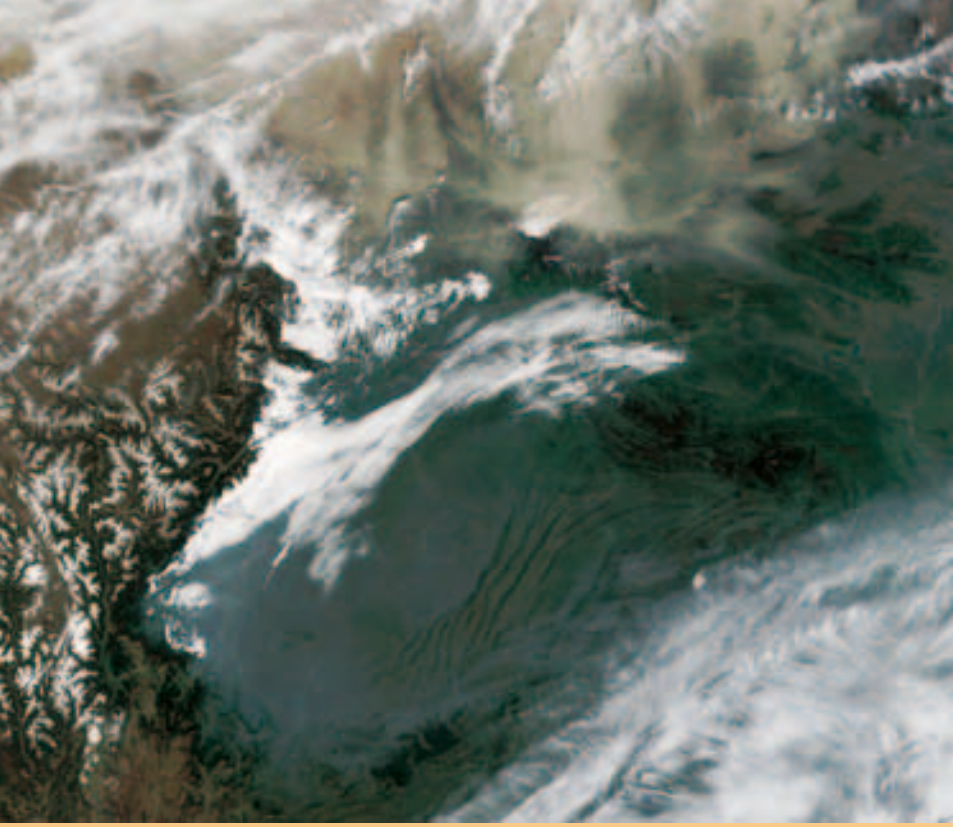

Junggar Basin
Turpan Basin
Tarim Basin
Qaidam Basin
North Tibet Basin
Sichuan Basin

Spread across the vast territory of China are hundreds of basins, where developed sedimentary rocks originated from the Paleozoic to the Cenozoic eras, covering over four million square kilometers. Abundant oil and gas resources are entrapped in strata ranging from the eldest Sinian Suberathem to the youngest quaternary system. The most important petroliferous basins in China include Tarim, Junggar, Turpan, Qaidam, Ordos, Songliao, Bohai Bay, Erlian, Sichuan, North Tibet, South Huabei and Jianghan basins.

There are also over ten mid-to-large sedimentary basins along the extensive sea area of China, with those rich in oil and gas include the South Yellow Sea, East Sea, Zhujiangkou and North Bay basins.

These basins, endowing tremendous hydrocarbon resources with various genesis and geologic features, have nurtured splendid civilizations with distinctive characteristics portrayed by unique natural landscape, specialties, local culture, and the people.

In China, CNPC's oil and gas operations mainly focus in nine petroliferous basins, namely Tarim, Junggar, Turpan, Ordos, Qaidam, Songliao, Erlian, Sichuan, and the Bohai Bay.



Featuring the most typical terrain, the southernmost position, and the lowest altitude among China's big basins, Sichuan Basin comprises the central and eastern portions of Sichuan Province as well as the greater part of Chongqing Municipality. Located at the upper reaches of the Yangtze River as the largest exorheic basin in China, it is about 500 meters above sea level and connected with the East China Sea via the Yangtze River.

Home to the majority of the population in Sichuan and Chongqing, Sichuan Basin is one of the most densely populated areas in China and in the world. With a great number of cities and towns, Sichuan Basin enjoys thriving economy, flourishing culture, pleasant climate, beautiful scenery, long history and abundant resources. A multiethnic area consisting of people of Han, Tibetan, Qiang, Miao and Tujia etc., Sichuan Basin presents a diversified culture that is colorful and attractive. Known as the "Land of Abundance", Sichuan Basin is the cradle of Ba-Shu Civilization.

Sichuan Basin

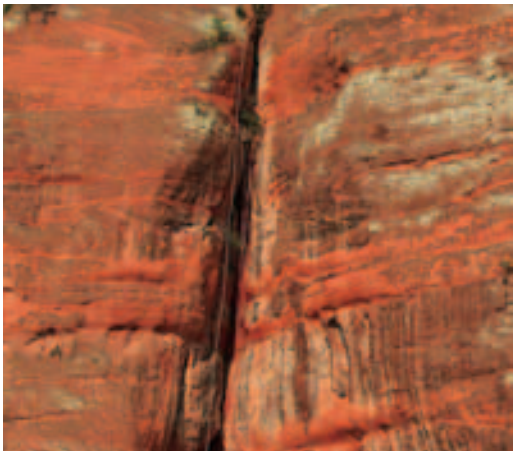
Geographical Landscape

Located within Sichuan Province and Chongqing Municipality in Southwest China, Sichuan Basin is close to Qinghai-Tibet Plateau in the west, Qinling Mountains and the Loess Plateau in the north, the mountainous regions in the western Hunan and Hubei in the east, and Yunnan-Guizhou Plateau in the south. Sichuan Basin is one of China's four largest basins with a total area of about 260,000 square kilometers, accounting for 46% of the area of Sichuan Province. The basin comprises two distinctive parts, mountainous regions on the edge and lowlands at the bottom, covering approximately 100,000 square kilometers and 160,000 square kilometers respectively.

Showing a geo-morphological diversity, Sichuan Basin is framed by mountain ranges that are 1,000 – 3,000 meters above sea level on all sides. The central part of the basin is 400 – 800 meters above sea level, consisting mainly of hills, except the Chengdu Plain in the northwest. In particular, flatlands, hills and low mountains account for 7%, 52% and 41% respectively. The major tributaries of the Yangtze River, i.e. Minjiang River, Tuo River and Jialing River run through the Sichuan Basin from the northwest to the southeast into the Yangtze River. Geographically, Sichuan Basin is almost completely closed.

By geographical distinctiveness, Sichuan Basin can be divided into three parts, i.e. the western Chengdu Plain, the central hills and the eastern paralleled ridge-valley areas. By orientation, it consists of five parts, i.e. Chuandong (the East), Chuanxi (the West), Chuannan (the South), Chuanbei (the North) and Chuanzhong (the Central).

The rocks here are basically reddish sandstones and purple shales which readily weather down into purple soils. Rich in calcium, phosphorus, potassium and other nutrients, purple soils are most concentrated in the Sichuan Basin, making it the most naturally fertile land in China.



Geological Features

Sichuan Basin belongs to Sichuan Terrace – an integral part of the Yangtze Terrace. It has since the Sinian Period been a large depression, where the crust is relatively stable. It was an inland lake basin as a result of the Indo-Chinese movement during the Late Triassic Period, covering a much larger area at that time. During the Mesozoic Era, purple sandstones and shales of 3,000 to 4,000 meters thick accumulated. During the late Mesozoic Era, the Sichuan Movement gave rise to folded mountains around the basin and subsidence in the central part, forming the outline of the basin and leading to a massive deformation in the internal strata. As a result, a set of northeast trending folds in the east ("Eastern Fold Belt"), a dome structure in the centre ("Central Dome") and a sinking area in the west ("Western Subsidence Zone") were formed, which later developed into three landforms in Sichuan Basin. During the Cenozoic Era, the Himalayan Movement caused further uplift in the surrounding mountains and further subsidence in the basin, especially the Chengdu region. Meanwhile, the Yangtze River dissected the Wu Mountain and flew east to complete the entire Yangtze River System, turning the endorheic basin into an exorheic basin. Hills and plains crisscross Sichuan Basin, featuring a terrain high in the north and low in the south.

Based on the morphological features, divided by Huaying Mountain and Longquan Mountain, the bottom basin consists of three parts:

i) in the east of the Huaying Mountain is the paralleled ridge-valley region comprising a number of strip-shaped mountains in a northeast-southwest orientation which are generally 700-800 meters above sea level. There are many low hills and flatlands, mainly 200-500 meters above sea level, in the valley areas, where agriculture is thriving and population is dense;

ii) the region between the Huaying Mountain and the Longquan Mountain covers flat-topped hills, 350-450 meters above sea level with a relative height mainly of less than 100 meters. Thanks to the deep soils of such flat-topped hills, terraced fields are built through the top of hills for farming purposes;

iii) west of the Longquan Mountain is the Chengdu Plain, or Chuanxi Plain, covering 6,000 square kilometers. It is the largest plain in Sichuan Basin and Southwest China as well, with an altitude of about 600 meters. The well-known Dujiangyan Irrigation System makes gravity irrigation possible in this region. The irrigation system, a warm climate, fertile soil and a developed civilization all contribute to the "Land of Abundance".

Danxia Landform

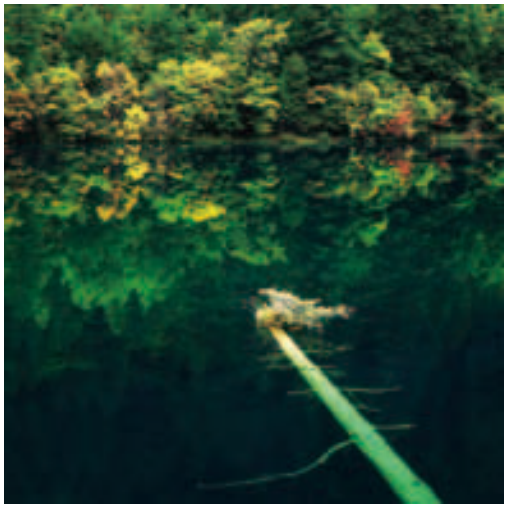
Warm and humid climate, abundant precipitation and dense river network in Sichuan Basin gave birth to the Danxia landform, which is a unique type of petrographic geomorphology formed in the distribution of huge and steep red and purple sandstones and conglomerates as a result of water erosion / dissolution during the development of faults and fractures.

The Danxia landform is mainly found at the piedmont areas in northwest, west and south of Sichuan Basin. The Danxia-forming sandstones and conglomerates are widely distributed, mainly in the Cretaceous formation, followed by the Jurassic formation, the Lower Tertiary formation, and in certain areas, the Lower Triassic formation. Jianmen Shudao, Mount Qingcheng, Leshan Giant Buddha, Shunan Zhuhai, Chishui River and Simian Mountain etc. are some of the attractions featuring Danxia landscapes in Sichuan Basin.

Karst Landscape

Karst topography, also known as dissolution landform, is a geological formation shaped by the dissolution of a layer or layers of soluble bedrock. In addition to dissolution, many mechanical erosion processes such as water erosion, subsurface erosion and slump can also contribute to forming of the landform. The main surface features of karst landform include clints, grikes, stone forests, foibes, sinkholes, disappearing streams, caves, karst depressions, blind valleys and vertical shafts to form the unique views of "spectacular peaks, mysterious caves, marvelous rocks and heavenly sinkholes".

In Sichuan Basin, the Jiuzhaigou Valley has a rich underwater landscape in many travertine-topped pools and flows like the Pearl Shoal Waterfall; Huanglong has the world's largest and most beautiful karst landscape comprising colorful pools, slopes and caves formed by calcite deposits; the stone arch bridge in Shizhu County represents the natural bridge landscape in karst-geology.



Jiuzhaigou Valley

Jiuzhaigou Valley, literally "Valley of Nine Villages", is a nature reserve and national park located in the Ngawa Tibetan and Qiang Autonomous Prefecture, Sichuan Province. It is known for its many multi-level waterfalls, colorful lakes, and snow-capped peaks. Its elevation ranges generally from 2,000m to 3,000m. Covered by virgin mixed forests, Jiuzhaigou's landscape is made up of high-altitude karsts shaped by glacial, hydrological and tectonic activities. The rock strata are mostly made up of carbonate rocks, such as dolomite and tufa, as well as some sandstone and shales. Jiuzhaigou is famous for its Jade Sea (mountain lakes), pools, colorful forests, snow-capped mountains and Tibetan customs and therefore is called the “Dream Land” or “Fairy World”.

Li Bing

Dujiangyan Irrigation System

Located in the Min River in Sichuan province, Dujiangyan is an important irrigation infrastructure built in 256 BC during the Warring States Period of China by Li Bing, the Sichuan Governor of the Kingdom of Qin. The 2,000-year-old Dujiangyan Irrigation System is the oldest water conservation project in use.

The Irrigation System has two main parts, i.e. irrigation head and irrigation network. The irrigation head consists of three constructions, namely Yuzui (Fish Mouth Levee to divide the water), Feishayan (Flying Sand Weir to drain out excess water) and Baopingkou (Bottle-Neck Channel to distribute the water to the farmlands). Other supporting constructions include inner and outer dikes, and herringbone dikes etc. Besides irrigation, the system is also used for flood control, sediment removal, water transportation and urban water supply. In 2000, the Dujiangyan Irrigation System was listed as a UNESCO World Heritage Site for "being the oldest and only surviving no-dam irrigation system in the world."

Zhuotong Well

The history of Zhuotong well can be traced back to nearly 1,000 years ago in the Qingli Reign and Huangyou Reign of China's Northern Song Dynasty. Salt workers in Daying county of Sichuan province became the first to scientifically exploit brine from deep under the ground and discovered oil and gas resources below the surface using a salt recovery technique of Zhuotong well drilling. Many brine wells sunk at that time also produced natural gas (fire wells). If gas was encountered during the sinking process, it was directed away from the well mouth, and was ignited at several upright bamboo pipes, or so-called "flaming tubes", which had the same internal diameter and length as one another. The gas flow was estimated according to the flame's height and the number of flaming tubes. This is why we say that the gas extraction and shaft-sinking techniques were closely related to the extraction of brine. In 1835, well Shenhai, the first one deeper than 1,000 meters in the world, was sunk in Zigong area of Sichuan Province.

Today, there are still 41 Zhuotong wells remained and distributed in an area of 6 kilometers round in Daying county of Sichuan province. Despite a history of nearly 1,000 years, the process flow of Zhuotong wells has been completely preserved, reflecting how ancient Chinese techniques have contributed to the mankind as significantly as the gunpowder, papermaking, printing, and the compass.

Mount Emei

Mount Emei is a mountain in Emei City in the southwestern Sichuan Basin. The Mount Emei Scenic Area covers an area of 154 square kilometers and the main peak – Wanfo Peak is 3,099 meters above sea level. The Yanshan Movement in the late Mesozoic Era gave rise to the geological structure of Mt. Emei, which emerged as a result of uplift of the Tibetan Plateau accompanying the Himalayan Movement in the Neotectonic Period. With a large expanse of Paleozoic basalts on its top protecting the rock formation thereunder and maintaining the height and due to the internal "strong dissection of torrents", steep canyons and ravines of 2,000+ meters high have been formed. One can see a number of natural monuments when trekking up the mountain, including limestone caves such as the Cave of Nine Saints, narrow and steep granite and metamorphic ravines, and basaltic lava flows at the summit.

One may enjoy four exceptional sights at Jinding ("Golden Summit"), i.e. sunrise, clouds sea, Buddhist Halos and Saint Lamps, among which the Buddhist Halos are the most spectacular. Also, it is a unique experience to find many monkeys asking for food along the mountain roads. As one of the Four Sacred Buddhist Mountains of China, Mt. Emei has 26 temples of which 8 temples are large and important, hosting a lot of Buddhist events. With diverse climate and rich vegetation, the flora here comprises more than 3,000 kinds of plants, including some rare species in the world.

On December 6, 1996, Mt. Emei, including Leshan Giant Buddha, was listed as a UNESCO World Natural/ Cultural Heritage Site.

Qutang Gorge

Wu Gorge

Xiling Gorge

Three Gorges

Comprising Qutang Gorge, Wu Gorge and Xiling Gorge, the Three Gorges region is located along the Yangtze River, stretching over 192 kilometers from Baidicheng in Fengjie, Chongqing Municipality to the Nanjin Pass in Yichang, Hubei Province. The Three Gorges, abundant with hydropower resources, are formed as a result of the uplift of the Earth's crust and the deep dissection of the Yangtze River.

Qutang Gorge, Wu Gorge and Xiling Gorge are praised to be magnificent, graceful and exceptional respectively. Edged by soaring peaks and steep cliffs generally 1,000 – 1,500 meters above the water surface, the ravines are sometimes less than 100 meters wide. Famous for imposing and steep cliffs, the Kuimen Gate is the entrance to the Three Gorges. The twelve peaks of Mount Wu along the Wu Gorge offer another breathtaking sight. Among the twelve peaks, the Goddess Peak is the most exquisite. The legend goes that the goddess helped the ancient emperor Da Yu control the waters and guided boatmen through the gorges. The Xiling Gorge consists of a number of smaller gorges such as the Military Book and Sword Gorges, the Bull's Liver, the Cattle Gorges and the Shadow Play Gorges.

Dazu Rock Carvings

The Dazu Rock Carvings are a series of mostly Buddhism-inspired carvings and sculptures located in Dazu County, Chongqing Municipality, and date back to the late Tang Dynasty and the early Song Dynasty. The most famous carvings are found on Mount Baoding and Mount Beishan.

Originally created in the first year of Yonghui Era, Tang Dynasty (650 AD) (carvings on the Cliff Jianshanzi) and expanded through the Late Tang Dynasty, Five Dynasties (907-959 AD), Song Dynasty (960-1278 AD), Ming Dynasty and Qing Dynasty (14th Century – 19th Century), the Dazu Rock Carvings show the outstanding art of rock carving in China and reflect the influences of three religions, i.e. Buddhism, Taoism and Shism. Representing the highest level of China's grotto art in the late stages, the Dazu Rock Carvings were listed as a UNESCO World Heritage Site in 1999.

Leshan Giant Buddha

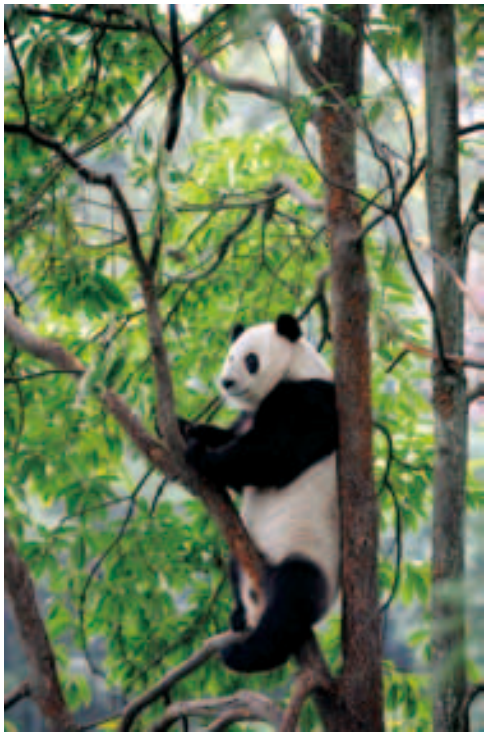
The Leshan Giant Buddha is carved out of a cliff face that lies at the confluence of the Minjiang, Dadu and Qingyi rivers near the city of Leshan. Being a master piece of cliff sculptures from the Tang Dynasty, it is the largest carved stone Buddha in the world. Construction was started in the first year of the Tang Xuanzong Reign (713 AD), led by a Chinese monk named Haitong, who hoped that the Buddha would calm the turbulent waters that plagued the shipping vessels traveling down the river. It took 90 years to finish the sculpture.

The statue depicts a seated Buddha of a dignified and solemn appearance, with his head level with the cliff top, his hands resting on his knees and the river flowing below his feet. The Buddha is 71 meters tall, his head 14.7 meters long and 10 meters wide with 1,021 hair rolls, his ears 7 meters long, nose 5.6 meters and eyebrows 5.6 meters wide, mouth and eyes 3.3 meters wide, neck 3 meters long, shoulders 24 meters wide, fingers 8.3 meters long, shanks 28 meters long and feet 8.5 meters wide. A foot of the Buddha is big enough for one hundred people to sit on.

Giant Panda

The giant panda, commonly known as "panda", is one of the most precious animals in the world. The giant panda is under the first-class state protection because of the small size of population. Native to China, this black-and-white mammal in the bear family is proudly called 'China's national treasure'. Giant pandas are mainly found in the mountainous regions in Sichuan and Shaanxi. There are approximately 1,590 pandas worldwide. Adult pandas measure around 1.2 to 1.9 meters long and weigh from 85 to 125 kilograms. The diet of pandas consists primarily of bamboo.

With WWF's support, the Chinese government has established 13 giant panda reserves and Wolong Natural Reserve is the most famous one in the world.



Golden Snub-nosed Monkey

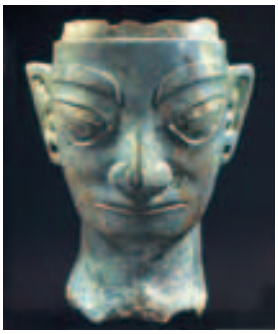
Golden snub-nosed monkeys have brightly-colored and soft hair. They live in mountainous forests. In China, there are three types of golden snub-nosed monkey, i.e. chuan (Sichuan) golden hair monkey, qian (Guizhou) golden hair monkey and dian (Yunnan) golden hair monkey. They are beautiful, elegant and gentle and therefore very popular. The chuan golden hair monkey is medium-sized. They have a blue face with upward nostrils but they don't have cheek pouches. The cheek and nape are red-brown and the body is covered with very long, golden guard hairs on the back and cape areas. The tail is as long as the body or even longer. Adult males have a body up to 680mm long and a tail up to 685mm long.

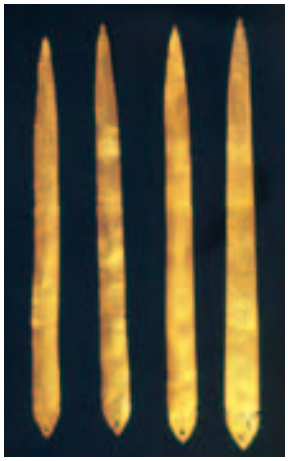
Sanxingdui

Sanxingdui is the largest and oldest archaeological site in Sichuan with the most beautiful excavations and the most remarkable historic significance. Archaeological excavations have confirmed that the site contains a culture dating back to the late Neolithic times and extending into the late Shang Dynasty and the early Zhou Dynasty. The former capital city of Shu Kingdom, this important and valuable site is recognized as a premium cultural heritage in the world.

During the six decades after its discovery, a great number of pottery, stone, gold, silver and jade artifacts have been unearthed here. In 1986, two large sacrificial pits containing thousands of exquisite artifacts from the Shang Dynasty were found, causing a worldwide sensation. These treasures include the world's oldest life-size standing human statue; China's largest and oldest bronze human statues; the "Gold Scepter" symbolizing the power of the ruler of Shu Kingdom; the world's oldest and tallest bronze tree; the gold foil masks; the bronze heads and mysterious masks, dozens of ivories and thousands of seashells etc.

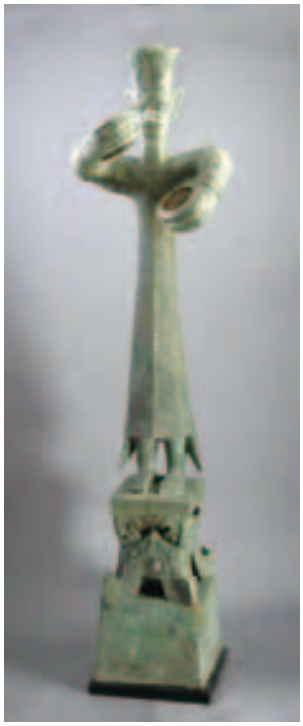
The archaeological finds at Sanxingdui unveiled the ancient Shu Kingdom in the Chuanxi Plain. Therefore, the history of the Shu Kingdom is traced more than 2,000 years backward, filling a number of gaps in China's archaeology, bronze culture and bronze art history.





Fish-shaped gold foil ornament

Bronze sacred tree



Large standing bronze figure

Gold scepter

Sichuan Opera

Sichuan Opera is a type of Chinese opera popular in Sichuan (central and east parts), Chongqing and some regions in Guizhou and Yunan. The five music styles of Sichuan Opera are Kunqu, Gaoqiang, Huqin, Tanxi and Dengdiao.

With a variety of Qupai (titled tunes), Gaoqiang is the main singing style of Sichuan Opera, featuring melodious and enchanting arias. The meaningful and fascinating forms of vocal accompaniment include leading, concord, choral, supporting and ensemble. The language used in Sichuan Opera is lively, humorous, colorful and local-flavored. Sichuan Opera has a number of breathtaking stunts such as face-changing, fire-spitting and sleeve performance. A well known stunt in Sichuan Opera, face-changing is intended to reveal the inner thoughts and feelings of the characters. It's really incredible that the actor can change his facial pattern 14 times successively in a blink.

Gaiwan Tea (Lidded-bowl Tea)

Gaiwan (lidded-bowl), also known as "sancaiwan", comprises a chagai (lid), a chawan (bowl) and a chachuanzi (saucer), representing the sky, the man and the land respectively. Enjoying tea from a Gaiwan can be a ceremony full of grace and meaning. One may use the lid to make sure that the tea is infused right in the bowl, i.e. brushing the water gently to get light-flavored tea or, otherwise, to get a stronger flavor.

Sichuan Cuisine

Sichuan Cuisine is a style of Chinese cuisine originating in Sichuan and Chongqing. The most distinguished feature of Sichuan Cuisine is "each dish has its own flavor". The three regional sub-styles of Sichuan Cuisine are Chengdu style, Chongqing style and Chuannan style. Sichuan Cuisine emphasizes choice of materials, unified specification, structured taste and harmonious appearance. It's known for rich materials, diverse flavor and versatile arrangement. The bold flavors of Sichuan Cuisine include pungency, spiciness, yuxiang (fish flavor) and guaiwei (seasoning mixture). The key cooking skills include stir-fry, fry, dry fry and dry stir.

Sichuan Hot-pot

Sichuan Hot-pot represents the inclusive nature of the Chinese cooking philosophy. The term "hot-pot" refers to the utensil as well as the cooking method and the dining style. The beef stock is carefully prepared with the bean sauce from Pi County, salted beans from Yongchuan, butter from Ganzi and peppercorns from Hanyuan, together with ground rock sugar, ginger, salt, fermented glutinous rice and small peppers. The materials, stock and cooking method are thoughtfully arranged to produce a wonderful full-flavored dish.

Sichuan Basin is one of the major petroliferous basins in China. The region is awash with gas resources, 98% of which are in the form of gas field. As early as 53 BC to 18 AD, the ancestors living here identified and explored natural gas deposits in the vicinity of Linqiong. In 616 AD, a “Fire Well” county was established in Linqiong. Later in 1041, cable-tool drilling was invented and a unique system was developed to extract and utilize natural gas. The artesian wells in Sichuan were drilled in an ancient gas field, where the history of using natural gas to boil thick brine down to salt dates as far back as 1600 AD.

There are four gas production zones in the south, southwest, northwest and east of Sichuan Basin. Currently, the gas production here accounts for nearly half of the nation’s total. As at the end of 2008, the proven gas reserve in the Sichuan Basin is 1.72 trillion cubic meters or 26.8% of the nation’s total, ranking second in China. The prospective reserve is estimated to be 7.19 trillion cubic meters or 12.8% of the nation’s total, ranking third in China. In particular, there are 14 large gas fields and 13 medium-sized gas fields, including Puguang, Weiyuan, Wolonghe, Zhongba, Guang’an, Datianchi, Hechuan and Luojiazhai, etc.

Chongqing Gas Field

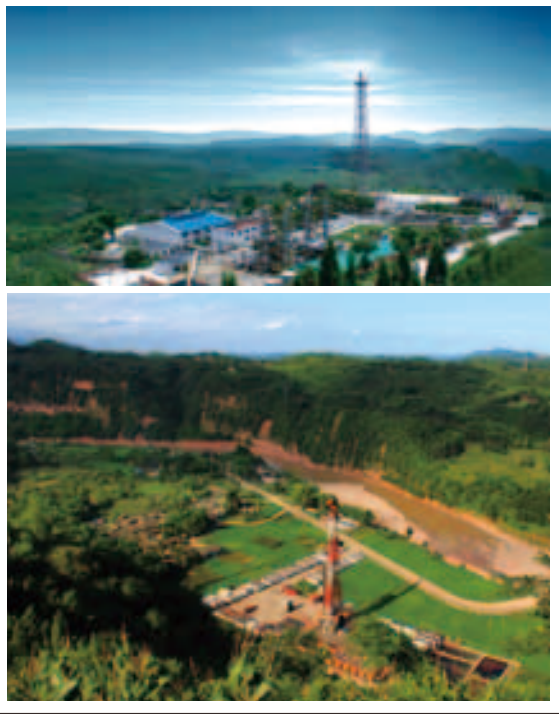
Chongqing Gas Field is located in the east of Sichuan Basin, covering an exploration and development area of approximately 28,700 square kilometers. The gas field has 426 production wells with a natural gas extraction of 7 billion cubic meters per year, i.e. 6 million tons of oil equivalent.

Shunan Gas Field

Located in the south of Sichuan Basin, Shunan Gas Field supplies natural gas to 160 industrial consumers and millions of households in Sichuan, Chongqing and Guizhou.

Chuanzhong Oil and Gas Field

Chuanzhong Oil and Gas Field is located in the central part of Sichuan Basin, covering 60,000 square kilometers. There are 20 oil fields and 4 gas fields in operation, producing 132,000 tons of crude oil and 750 million cubic meters of natural gas on a yearly basis.



Chuanxibei Gas Field

Chuanxibei Gas Field is located in the northwest of Sichuan Basin, covering 37,940 square kilometers. There are 7 gas fields with the total proven natural gas reserves amounting to 80 billion cubic meters and an annual production of nearly 1.5 billion cubic meters.

Chuandongbei Gas Field

Chuandongbei Gas Field is located in the northeast of Sichuan Basin, bordering on Chongqing in the east, Shaanxi in the northeast, and Nanchong and Bazhong of Sichuan in the west. There are 8 blocks in 6 gas fields, consisting of 63 production wells and producing 1.69 billion cubic meters of natural gas per year.

Zhongxian-Wuhan Gas Pipeline

Running from Zhongxian in Sichuan to Wuhan in Hubei, the Zhongxian-Wuhan Gas Pipeline comprises one trunk line and three branch lines through Hunan and Hubei. With a total length of 1,375 kilometers and a diameter of 711 millimeters, the pipeline is designed to deliver 3 billion cubic meters of natural gas under a pressure ranging from 6.3 to 7.0Mpa to more than 6 million users.

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