

# The Selection and Protection of Optical Astronomical Observing Sites in China

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Before 1950 there are two observatories, Shanghai and Purple Mountain Astronomical Observatories (SHAO and PMO), and two observing stations, Qingdao and Kunming stations in China. With the requirements of astronomical research, two observatories, Beijing and Shaanxi Astronomical Observatories (BAO and SXAO) and two artificial satellite stations, Urumqi and Changchun, were established about 1960. Based on the current management, now there are 4 observatories, SHAO, PMO, NAOC(National Astronomical Observatories), which was grouped from BAO, YNAO and 2 others, as well as XAO (Xinjiang Astronomical Observatory). The optical 1-2 m class telescopes are being operated at former four observatories. SXAO is changed as National Time Service Center. Because of city expansion as well as the traveling and economic developments, these observatories are suffered severe light pollution. For example, Zo Ce is located at the suburb of Shanghai city. A 40 cm double astrograph was installed in 1900 and a 1.56 m optical reflector have been operated since November 1987. In 1994 the seeing is better than 1 and the night sky brightness in V is about 19 mag/arcsec<sup>2</sup>, stars fainter than 20 mag with CCD are visibles. In 2007 a large playground was built in Zô Cè area. The light pollution is severe gradually. The night sky brightness has been increased to 15.8 mag/arcsec<sup>2</sup>. The other observatories have similar situation. New site surveys and found new stations to solve the problem. Except the solar and radio stations of each Astronomical Observatory, now there are 3 optical observing sites at PMO (Hong-He, Xu-Yi and Yaoan), 2 at SHAO (Zô Cè and Tian Huang Ping ) and 2 at YNAO (Kunming and Gao-Mei-Gu) as well as 1 optical observing site at BAO (Xing-Long). The best observing site is Gao-Mei-Gu, which is selected as the optical observing site of YNAO and where atmospheric turbulence distribution is 0.11 near ground with heights from 6.5m to 2.7m during night. Sky brightness in B and V band are 22.34 and 21.54. The extinction coefficient  $K \cdot bv$  and  $K \cdot v$  are 0.298 and 0.135. The seeing measurement is 0.72". In the recent years a new 2.4m telescope the second largest telescope in China, was installed there.

The protection of Optical Astronomical Observing Sites is carrying out in three ways: (a) conscious education through popular astronomy given by Planetarium, Astronomical museums and network; (b) making agreement between observatory and local government. For example, at Gao-Mei-Gu the first level protected area is radius of 5 km at the center of optical telescope. 75 watt lamps should be had suitable shade. Light source can not be seen out of 4 m. The second level protected area is between 5-20 km. There have no factories; (c) Special design for lamps along the road to mountain summit, such as inductive lamps are adopted as the illumination on the mountain load. Finally, each observatory has their own optical observing site in accordance with the optical observing condition. The current site survey program in China is being carried out in the provinces of Tibet, Xinjiang, Qinhai, Yunnan, especially in Ali area of Tibet about 5000m above sea level.