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Standardized Construction of Campus Popular Science Weather Station

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Abstract: *In 2017, Jiangxi Provincial Bureau of Quality and Technical Supervision set up, the project that Nanchang Meteorological Bureau drafted and published "Specifications for Construction of Campus Science Extension Weather Station". The local standard is formulated according to the ideas of unified standards, functions, site selection, specifications and equipment, which follows the construction method of meteorological department observation stations and makes clear requirements on site selection, size, specifications and instruments. The introduction to this standard makes the construction of campus weather stations rule-based and evidence-based.*

Keywords: *standard; Specifications for Construction; Campus Science*

1. Introduction

The construction of campus weather station in China can be traced back to 1930s,Mr,Zhu Kezhen founded the first campus weather station in Southeast University. In the 1990s, China put forward the important strategic decision of "rejuvenating the country through science and education", and all kinds of schools across the country set off the upsurge of "science and technology education". In 2005, China Meteorological Administration and China Meteorological Society formulated the National Meteorological Science Popularization Education Base Standard (Demonstration Campus Class), and proposed the construction of "Demonstration Campus Meteorological Station". Taking this as an opportunity, a considerable number of campus weather stations have been built in China, which has become an excellent carrier and platform for school science and technology education. At present, the campus weather station mainly provides meteorological science popularization [2],.It is reported that Jiangxi Province has carried out the activity of chief forecaster entering the campus, Hubei Province has integrated meteorological science knowledge into the daily classroom teaching of schools, and Fujian Province has cooperated with schools to build a popular science base of "Sunhua Campus Weather Station". Some qualified primary and secondary schools also carry out observation of basic meteorological elements such as temperature, humidity, wind speed, wind direction and rainfall. However, there are some problems in the practice of campus weather station construction and popularization, such as lack of standards and basis, nonstandard observation sites, various instruments and equipment, and the observation data of weather stations are not included in the meteorological monitoring station network system.

In view of the above problems, in 2014, the meteorological department of South Campus Chang carried out the construction of standardized meteorological disaster prevention and mitigation demonstration campus, and accumulated some experience and achievements in the construction of campus weather stations [3]. In 2017, Jiangxi Provincial Bureau of Quality and Technical Supervision set up, the project that Nanchang Meteorological Bureau drafted and published "Specifications for Construction of Campus Science Extension Weather Station". The introduction of this local standard makes the construction of campus weather station have rules to follow and evidence to follow.

2. Main contents of the construction standard of campus popular science weather station

2.1 Unified campus meteorological science observatory types

The Code for the Construction of Campus Popular Science Weather Stations was formulated according to the idea of unified standards, functions, site selection, specifications and equipment, and followed the construction mode of meteorological departments' observation stations, and made requirements for site selection, size, specifications and instruments.

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Campus science popularization weather station is composed of meteorological science popularization observation field and science popularization teaching studio,It is a place where primary and secondary schools, youth activity centers and universities carry out observation and teaching according to the needs of meteorological science popularization activities. Meteorological popular science observation field is divided into type I and type II, and observation is divided into automatic observation and manual observation. The observation of campus popular science weather station includes air temperature, temperature, air pressure, wind direction, wind speed, rainfall and other elements (see Table 1 for details).

Table 1 Observation elements of meteorological observation field

Observation mode	Observation mode	
	I	**II**
Automatic observation	Temperature, Humidity, air pressure, wind direction, wind speed, rainfall, visibility (optional)	temperature, humidity, air pressure, wind direction, wind speed, rainfall
Manual observation	temperature, humidity, rainfall, ground temperature(optional)	temperature, humidity, rainfall

Open ground should be selected for meteorological popular science observation field, and steep slopes, depressions and other areas that affect the representativeness of meteorological observation should be avoided as far as possible, There should be no high buildings within 5m of the surrounding area, which is in line with the overall layout of the surrounding environment. The site should be flat, with a uniform grass layer (except for areas where no grass grows), Lawn can also be laid, and the height of grass should not exceed 20cm. Type I meteorological science observation field is 12 m (north-south) ×8 m (east-west), and the overall layout is shown in fig,1 . Type II meteorological science observation field is 8 m (north-south) ×6 m (east-west), and the overall layout is shown in fig,2 .

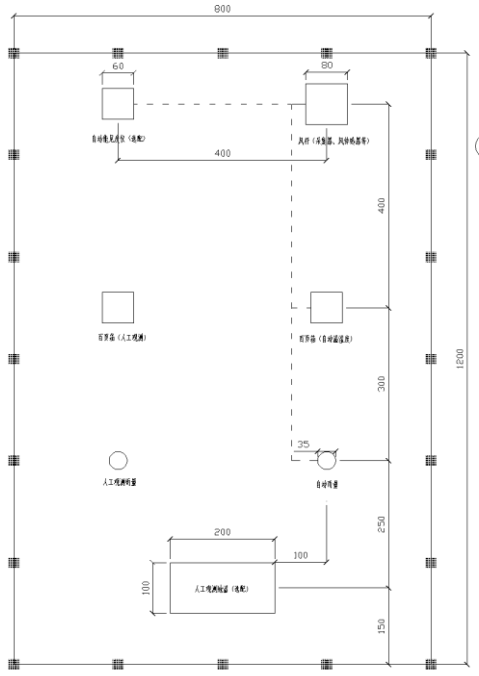

Figure 1 Reference map of type I meteorological popular science observation field

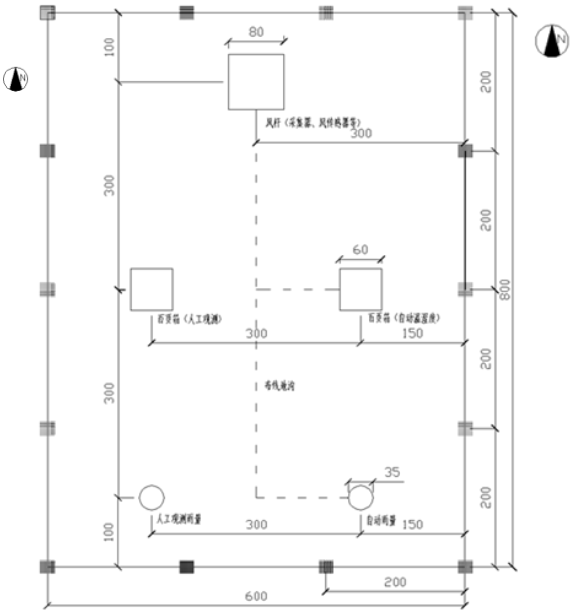

Figure 1 Reference map of type II meteorological popular science observation field

2.2 Meteorological science observation field standard infrastructure

The basic construction of meteorological science observation field includes paths, lightning

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protection facilities, fences, signs and display screens (optional). Special paths are generally not laid in meteorological science observation fields. When laying a path, the width of the road surface should be less than 50cm. The construction of lightning protection facilities in meteorological popular science observation field conforms to the provisions of Technical Specifications for Lightning Protection of Surface Meteorological Observation Field (Room) (GB/T 31162-2014). Sparse fences should be set around the meteorological science observation field. The fence should be made of strong, beautiful, non-reflective or weakly reflective materials, and the height can be determined according to the requirements of safety protection and should be coordinated with the surrounding environment. The layout of the fence door should be based on the principle of facilitating the entry and exit of meteorological observation and instrument maintenance personnel and popular science activities personnel. Signs should be set up in the conspicuous position of the fence of meteorological science observation field. The content of the signboard should include the name, longitude and latitude, altitude and station building time of the campus popular science weather station. The size of the sign should be 800 mm×600 mm or 600 mm×400 mm, and the material should be stainless steel or PVC. The surface of metal plate should be treated with anti-corrosion, and baking varnish technology should be adopted. Screen printing should be adopted for the contents of the signage. The size, installation position and height of the display screen should be coordinated with the surrounding environment.

2.3 Meteorological science observation field standard instruments and equipment

Meteorological popular science observation field consists of automatic observation area and artificial observation area. Automatic observation area shall be equipped with automatic weather station powered by solar energy. Automatic weather stations should be equipped with sensors of meteorological elements such as temperature, relative humidity, air pressure, wind direction, wind speed, rainfall and visibility, and supporting facilities such as louver boxes and wind poles according to the types of meteorological popular science observation fields. The measurement performance of the automatic weather station shall meet the measurement performance requirements of the corresponding meteorological elements in 5.1 of the Automatic Weather Station Observation Specification (GB/T 33703-2017). The artificial observation area should be equipped with artificial meteorological observation instruments such as dry wet-bulb thermometer, maximum thermometer, minimum thermometer, hand-held anemometer, rain cone and geothermal meter, and supporting facilities such as louver according to the type of campus popular science meteorological field. The technical performance of artificial meteorological observation instruments shall meet the technical performance requirements of corresponding instruments in 7.2 of General Rules for Surface Meteorological Observation (GB/T 35221-2017). Meteorological observation instruments shall be laid out according to fig,1 or fig,2, and the installation of instruments shall meet the requirements of corresponding instruments in table 2 of the general rules for surface meteorological observation (GB/T 35221—2017).

2.4 Specification for facilities of popular science teaching studio

Science teaching studio covers an area of 10m2, with good lighting and ventilation conditions, Meet the requirements of fire fighting and evacuation; Meteorological science popularization facilities such as desks, blackboards, meteorological observation books, file cabinets, meteorological publicity exhibition boards and computers should be provided; Equipped with 220V AC power socket, it is convenient to use electricity.

3. The main results achieved

3.1 Provide specifications for the development of meteorological science popularization

Through the construction of campus popular science weather stations, all the campus weather stations in 16 primary and secondary schools in Nanchang are equipped with automatic and manual observation equipment, among which automatic equipment is also included in the meteorological monitoring station network system. According to its own characteristics, the school has established a team of campus meteorological instructors mainly composed of school science and technology teachers, a team of small meteorologists mainly composed of primary and middle school students who love meteorological science and technology, and a team of community meteorological volunteers mainly composed of community masses, with a total number of over 300 people. Taohua No.1 Primary School in Xihu District, Nanchang is characterized by campus meteorological culture, and has set up campus

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meteorological corridor, meteorological proverb wall and meteorological activity room. The meteorological department regularly trains campus meteorological counselors, and sends outstanding counselors to participate in campus meteorological station training and study and exchange activities of China Meteorological Administration every year. Among them, the campus meteorological popular science class taught by a teacher from Taohua No.1 Primary School won the first prize of Nanchang Excellent Open Class. In 2019, five campus weather station counselors in Nanchang stood out and were awarded the title of "National Excellent Campus Weather Counselors".

3.2 Highly praised by the local government

The popularization of the campus popular science weather station has achieved remarkable results and has been fully affirmed by the local government. In 2015, "Nanchang Municipal Government Gazette" published the popular science development of campus weather stations in the form of colorful pages. Jiangxi Branch of Xinhua News Agency reported a series of special events such as meteorological science popularization on campus in Nanchang, which were reported by Jiangxi Daily, China Meteorological News, China Meteorological Network, China Weather Network, Jiangxi Morning News, Nanchang Evening News, Nanchang Daily and Nanchang TV Station, etc., and accumulated over 10 million readers, which made great social impact.

4. Conclusion

With the development of quality education, the proportion of meteorological science content in textbooks is increasing, and meteorological science education is becoming more and more important. The normative construction of campus popular science meteorological station will effectively enhance the awareness and ability of the public to defend against meteorological disasters and cope with climate change.

Acknowledgement

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