

China Meteorological Radar Network

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ABSTRACT

This paper will mainly introduce the construction of China Meteorological Radar Network. China began to build a new generation weather radar network in the late 1990s. Considering to China's climate distribution, the network consists of more than 200 radars working in S and C bands and plays an important role in weather disaster monitoring. The next step of expand will focus on adding Cloud Radar and lidar to this network to expand the monitoring capability, so as to establish a radar network which can observe kinds of climate such as clear sky, cloudy and rain.

Introduction

Meteorological radar includes weather radar, wind profiler, lidar, millimeter wave cloud radar, etc. Because of the irreplaceable roles in rapid monitoring of various weather processes, they are highly valued by most countries in the world and international organizations in meteorology, hydrology and other related disciplines, in which including the World Meteorological Organization. China is a country which frequently suffers from meteorological disasters, the damage and impact of meteorological disasters on economic construction and people's lives are increasing day by day, which seriously affects the sustainable development of China. In order to mitigate the impact of meteorological disasters, it is strongly needed to improve the ability of monitoring of disastrous weather and make early warnings. So, China began to build a new generation of Meteorological Radar Network in the late 1990s. Togethering a radar support and training system which rapidly improved the radar data applicate ability has been established. Until now, the network has played an important role in disaster weather monitoring and early warning services and achieved outstanding social and economic benefits.

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1. New Generation Meteorological Radar Network

China started the construction of a new generation Meteorological radar network in 1995. By the end of year 2015, 216 new generation weather radars approved by the National Development and Reform Commission has been basically completed. The single-point radar station working space is generally about 200 km, and it is about 150 km when service in key service areas and economically developed areas.

In 2017, the National Development and Reform Commission approved the 13th Five-Year Plan. China began the construction of dual-linear polarization radar, among which 37 new dual-polarization weather radars were added to the net, and carried out the technical transformation of 103 new-generation weather radars. After the 13th Five-Year Plan is completed, the number of weather radars will reach 270.

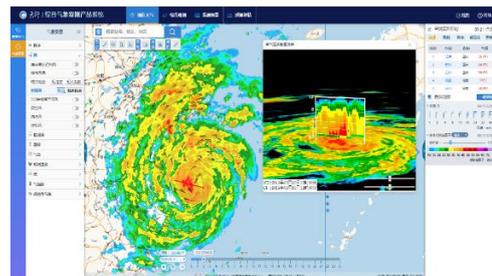


Figure 1 Radar echo of typhoon Lichma when it landed in

Zhejiang provinces

Meteorological Radar Network plays an important role in weather monitoring and forecasting because of its significant improvement of short-term proximity forecast ability. According to statistics from 2010 to 2014, meteorological departments issued about 90,000 rainstorm warnings, 120,000 lightning warnings, 5,000 hail warnings and 10,000 thunderstorm and gale warnings, which improved the ability of forecasting disastrous weather. It plays an irreplaceable role in the forecast of disastrous weather such as offshore typhoons, landing typhoons and heavy rains nationwide, as well as meteorological services for major events such as the Beijing Olympic Games and the Shanghai World Expo. Meanwhile, the weather radar detection products also play a significant role in weather modification operations. Fig. 1 shows the radar echo of typhoon Lichma when it landed in Jiangsu and Zhejiang provinces.

2. X-band networking test

In 2013, the first networked radar test platform was built in Nanjing. The network consists of four X-band radars, two of which are all-solid-state radars with dual linear polarization function and the other two are magnetron radars. The detection range of four networked radars is 60 km, which forms a diamond distribution. The distance between radars is about 40 km, and the distance library is 75 M.



Figure 2 Nanjing Networked Radar Test Platform

In 2017, a Meteorological radar network cooperative observation platform was built in Chengdu. The radar network consists of four X-band weather radars, two of which are all-solid-state radars

with dual linear polarization function. The platform realizes the cooperative observation of weather targets by multiple weather radars, and has two observation modes, automatic and manual

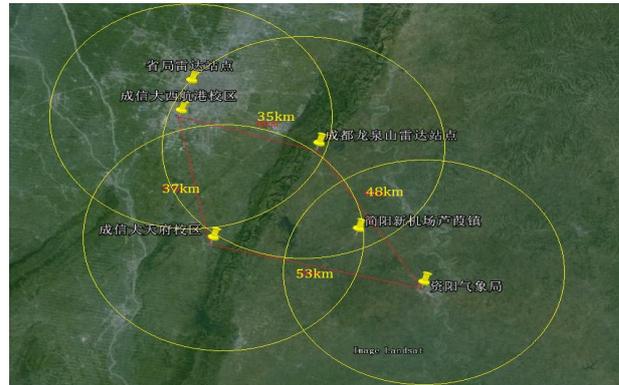


Figure 3 Meteorological Radar Network Cooperative Observation Platform in Chengdu

3. Development of Phased Array Radar Technology

In recent years, nine dual polarization phased array radar cooperative fine weather observation systems have been set up in Guangdong Province (Figure 4), and the phased array radar network has observed the internal fine structure of tornado for the first time in China.

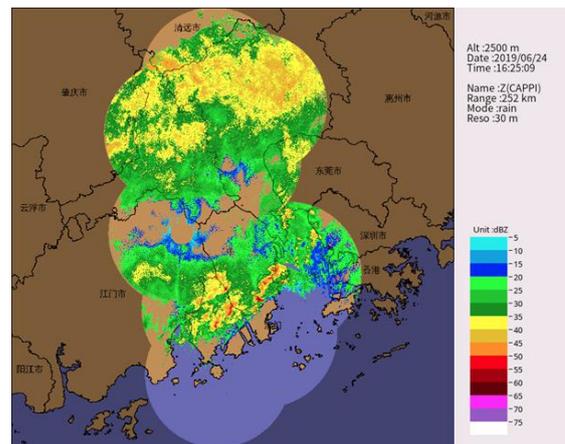


Figure 4 dual polarization phased array radar set up in Guangdong Province

In addition, X-band single polarization one-dimensional phased array weather radar system has been set up and operated in Changsha Huanghua Airport, Shanghai and Foshan City, which provided

the first-hand three-dimensional intensity and wind field data for the Central Meteorological Observatory when Typhoon Lichma launched in China (Figure 5).

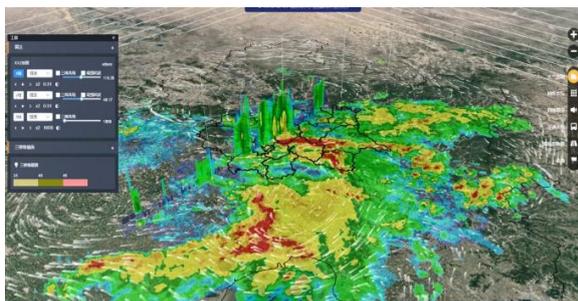


Figure 5 The three-dimensional intensity and wind field data when Typhoon Lichma launched in China

4. Conclusion

In the next step, China Meteorological Administration will improve the layout of the existing new generation weather radar network, upgrade new technologies such as dual polarization, build a national wind profiler network, carry out operational application tests of new radar such as millimeter wave cloud radar and lidar, and initially build a meteorological radar test base to form a meteorological radar sustainable development system. Improving the ability of data quality control and application of weather radar, realizing the comprehensive sharing of weather radar detection data, frequency resources and other industries.