



Study on the Enhancement of Public Meteorological Service Ability for Agriculture in Shaodong City from the Perspective of Data Intelligence

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Abstract. Comprehensively promoting rural revitalization and innovating the public service guarantee system are the basis for developing the rural economy. In order to meet the diversified needs of rural revitalization, it is necessary to continuously improve the public meteorological service ability for agriculture, strengthen the construction of modern meteorological service system for agriculture, and provide support and guarantee for agricultural meteorological disaster early warning. In order to solve the problem of improving public meteorological service ability for agriculture in Shaodong City, the first task is to analyze the significance of public meteorological service to agricultural development, then analyze the impact of public meteorological service on rural economic development, and finally put forward the strategy of improving public meteorological service ability for agriculture to provide reference for relevant personnel.

Keywords: Public meteorological service; Meteorological service for agriculture; Agrometeorology; Rural revitalization.

1 Introduction

Article 14 of the Outline for High-quality Meteorological Development (2022-2035) points out that the implementation of meteorological actions to improve the quality and efficiency of agricultural services. In the Action Plan for Improving the quality and efficiency of Meteorological Services for Agriculture, four key tasks of meteorological services for agriculture have been formulated. First, strengthening meteorological services for agricultural production and improving national food security capabilities; Second, strengthen meteorological services for characteristic industries to help comprehensively promote rural revitalization; Third, strengthen the construction of smart platforms to expand the coverage and influence of meteorological services^[1]; Fourth, focus on strengthening joint scientific research to improve the scientific and technological content of agro-meteorological services.

Public meteorological service can provide timely and accurate meteorological information for agricultural production, help farmers arrange agricultural activities sci-

entifically, and improve the efficiency of agricultural production. For example, by providing meteorological data such as rainfall, temperature and wind, farmers can better understand weather changes and rationally arrange farming activities such as sowing, fertilization and irrigation, thus ensuring healthy crop growth and high yield. Improving the ability of public meteorology to serve agriculture is helpful to prevent and mitigate the impact of meteorological disasters on agricultural production. Shao-dong city is located in the changeable climate area, drought, flood, hail and other meteorological disasters occur^[2]. By strengthening meteorological monitoring and early warning, farmers can take preventive measures in advance, reduce disaster losses, and ensure the stability of agricultural production. With the development of modern agriculture, the demand for meteorological services in agriculture is increasingly diversified. The public meteorological service of Shaodong City needs to constantly innovate the service model and improve the service quality to meet the needs of different agricultural fields. This study aims to explore the ways and strategies to improve the public meteorological service ability for agriculture in Shaodong City, and put forward targeted improvement measures and suggestions through in-depth analysis of the current status and problems of public meteorological service in Shaodong City, in order to provide strong support for promoting the sustainable and healthy development of agriculture in Shaodong City.

2 Analysis on Current Situation of Public Meteorological Service for Agriculture in Shaodong City

In recent years, Shaodong Meteorological Bureau has carried out a series of meteorological service projects for agriculture, including providing weather forecast, disaster early warning and agricultural meteorological guidance. These services not only help farmers arrange agricultural activities scientifically, but also help them prevent meteorological disasters in advance and reduce losses caused by disasters. Shaodong Meteorological Bureau also carried out active innovation in agricultural meteorological service. For example, the Meteorological Bureau has laid a good foundation for agricultural meteorological service by strengthening ground observation, including rice crop observation, physical weather observation, soil moisture measurement, etc. At the same time, it also carries out meteorological service work for characteristic agriculture such as bayberry and yellow flower, and provides more targeted service content^[3].

The public meteorological service in Shaodong City has made some achievements in some aspects, but there are still some problems and challenges. On the one hand, the service content is relatively simple, mainly providing weather forecast and disaster early warning, and it lacks more in-depth agricultural meteorological service content, such as disease and pest prediction, soil moisture monitoring and so on. This limits the deep application of meteorological services in agricultural production. On the other hand, farmers' understanding and use of meteorological services are limited, leading to poor information transmission and affecting the effective use of meteorological services. In addition to the above problems, the current weather forecasting

technology and methods of Shaodong Meteorological Bureau are also facing certain challenges. Although the accuracy of weather forecasting is constantly improving, there are still some meteorological phenomena that are difficult to predict accurately, such as local precipitation and long-term climate change, which increase the uncertainty of agricultural production and bring certain difficulties to farmers' production decisions.

3 Data Intelligence Plays a Key Role in Improving the Ability of Public Meteorology to Serve Agriculture

3.1 To Achieve Refined Agrometeorological Services

The application of big data technology enables meteorological departments to collect, process and analyze massive meteorological data. Through in-depth mining and analysis of these data, meteorological departments can predict weather changes more accurately and improve the accuracy and reliability of meteorological forecasting. At the same time, big data can also help meteorological departments find the potential risks of meteorological disasters and provide a scientific basis for disaster warning and prevention. The application of artificial intelligence technology has further improved the intelligence level of meteorological services. For example, through machine learning algorithms, AI can automatically identify and analyze unusual patterns in weather data to more accurately predict extreme weather events^[4]. Artificial intelligence can also provide the public with more personalized and accurate weather services, such as intelligent recommendation of appropriate tourist attractions or travel routes according to the user's location, travel habits and other information.

3.2 Establish a more Complete Agricultural Meteorological Service System

The combination of big data and artificial intelligence is driving innovation in weather services. By using these advanced technologies, meteorological departments can develop more intelligent and automated meteorological service products, such as intelligent weather forecasting systems and disaster warning platforms. These products not only improve the efficiency of meteorological services, but also provide more convenient and efficient meteorological service support for all walks of life. The application of big data and artificial intelligence will also help increase the penetration and accessibility of weather services. Through the Internet, mobile applications and other channels, the public can more conveniently obtain real-time and accurate meteorological information, so as to better arrange production and life.

3.3 Reduce the Threat of Climate Change to Agriculture

By improving the level of meteorological observation technology, such as the construction of video reality monitoring systems and farmland microclimate stations, weather changes can be more accurately monitored and predicted, thus providing

more suitable planting time and conditions for crops. Remote sensing, meteorological, soil and other data can also be used to speed up the creation of agricultural production data intelligent scenes supported by data and models, which will help realize smart agricultural operations such as precision planting and precision breeding. The China Meteorological Administration has promoted the improvement of smart agrometeorological service capabilities nationwide, and plans to initially build a multi-scene agrometeorological business technology system by 2027, which will achieve breakthroughs in intelligent perception, analysis, production and decision-making. Such services not only improve the efficiency and quality of agricultural production, but also enhance the resilience of agriculture to extreme weather events, such as hail and drought. As shown in Fig. 1.

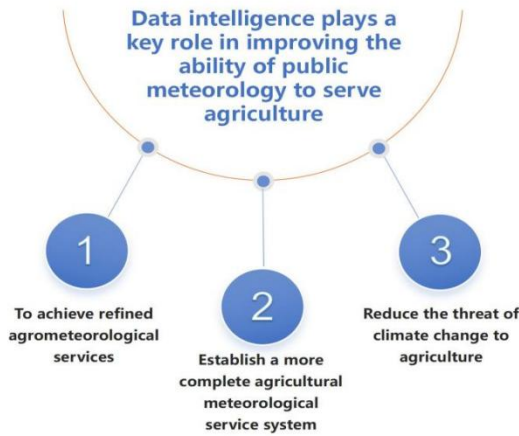


Fig. 1. Data intelligence plays a key role in improving the ability of public meteorology to serve agriculture

4 Shadong City Public Weather Service Ability to Improve the Strategy

4.1 Build a Public Meteorological Service System based on Big Data and Artificial Intelligence

(1) Data collection and integration. The primary task of building a public meteorological service system is to collect and integrate a large amount of meteorological data. This includes real-time observation data, historical meteorological data, remote sensing data, model prediction data, etc^[5]. These data come from a wide range of sources in different formats, and need to be uniformly standardized for subsequent analysis and application.

(2) Big data analysis and application. Big data technology plays a vital role in the meteorological service system. Through deep mining and analysis of massive meteorological data, the accuracy and timeliness of meteorological prediction can be im-

proved. For example, using big data analysis techniques, it is possible to identify key factors affecting weather change and optimize prediction models. In addition, big data can also provide strong support for disaster warning and climate assessment.

(3) Application of artificial intelligence technology. Artificial intelligence technology is the key to realize the intelligence of public meteorological service system. Through the application of machine learning, deep learning and other technologies, the automatic processing and analysis of meteorological data can be realized. For example, the use of artificial intelligence algorithms to identify and analyze weather images can extract useful information for prediction and early warning. In addition, artificial intelligence can also be used to build intelligent weather service systems, such as intelligent questions and answers, personalized recommendations, etc.

4.2 Improve Service Personalization to Meet the Needs of Different Users

(1) In-depth understanding of agricultural needs. It is necessary to have an in-depth understanding of all aspects of agricultural production, including planting, breeding, harvesting, storage, etc., in order to clarify the specific needs of meteorological services for agricultural production. Through regular communication with farmers, agricultural cooperatives, agricultural enterprises, etc., to collect their feedback and suggestions on meteorological services, we can more accurately grasp the needs of agricultural meteorological services.

(2) Customized meteorological services. Provide customized meteorological services based on the needs of different agricultural production links. For example, for the planting industry, it can provide meteorological forecasts for a specific crop growth cycle, including key elements such as temperature, humidity, and rainfall. For the breeding industry, it can provide the meteorological condition prediction of the epidemic of animal diseases to help farmers prevent in advance.

(3) Improve forecast accuracy and timeliness. Advanced technologies such as big data and artificial intelligence will be utilized to improve the accuracy and timeliness of weather forecasting. Through the collection and analysis of massive meteorological data, combined with the actual needs of agricultural production, a more accurate meteorological prediction model is built. At the same time, the use of modern means of communication, such as mobile phone APP, wechat public account, etc., to quickly transmit meteorological information to farmers.

4.3 Strengthen Cooperation with the Agricultural Sector to Improve Service Quality

(1) Establish a regular communication mechanism. Meteorological departments and agricultural departments shall establish a regular communication mechanism, hold joint meetings or teleconferences on a regular basis, and share meteorological information and agricultural needs in a timely manner. Through regular communication, the two sides can understand each other's priorities and needs, so as to adjust and optimize the content and manner of meteorological services.

(2) Carry out joint research and technological innovation. Meteorological departments and agricultural departments may jointly carry out research on meteorological service technologies for agricultural production and jointly promote innovation in meteorological science and technology. The quality and level of meteorological services will be improved through the development of new meteorological observation equipment, the optimization of numerical weather forecasting models, and the development of refined agrometeorological service technologies.

(3) Realize data sharing and interworking. Meteorological departments and agricultural departments should establish a data sharing mechanism to realize the interoperability of meteorological data and agricultural data. By sharing meteorological observation data, agricultural production data, market demand information, etc., the two sides can have a more comprehensive understanding of agricultural production conditions and market changes, and provide data support for providing more accurate meteorological services^[6].

5 Conclusion and Prospect

Shaodong City is an important agricultural production area in Hunan Province. Meteorological service plays a vital role in agricultural production. In recent years, Shaodong City has carried out a series of research and practice in public meteorological service for agriculture, and achieved certain results. Farmers' satisfaction with meteorological services has been increasing, and agricultural production efficiency has also been improved. At the same time, farmers' feedback on meteorological services is also more positive, which provides valuable suggestions for further optimizing services^[7]. Although Shaodong City has made some achievements in the public meteorological service for agriculture, it still needs to strengthen the research and practice, and constantly improve the quality and level of service. In the future, Shaodong City should continue to deepen cooperation with the agricultural sector, strengthen technological innovation and personnel training, and promote the development of public meteorological services for agriculture to a higher level.

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