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Application of UAV Technology in Practical Teaching of Marine Science

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ABSTRACT. *In recent years, with the continuous expansion of marine development, both the demand for and the contradiction between the use of the sea are very prominent, and the problem of marine infringement is constantly emerging, so it is urgent to have new technology that can carry out high-precision monitoring of the ocean all day long, so as to ensure the safety of the ocean and maintain the marine ecological balance. UAV is a new type of ocean monitoring technology, which is easy to operate, has strong adaptability to the environment, and has low application cost. It can quickly obtain high-resolution images, and monitor the pollution and risk of the ocean in real time, so as to improve the comprehensive development ability of China's ocean. This paper analyzes the monitoring status of UAV remote sensing technology, and focuses on the research of UAV remote sensing ocean monitoring technology, and analyzes the specific application of UAV remote sensing ocean monitoring technology to provide theoretical support for ocean management.*

KEYWORDS: *UAV remote sensing; Ocean monitoring; Application; Development*

1. Introduction

China has a vast territory and many islands. With the implementation of the strategy of "maritime power", the island area has become an important guarantee to alleviate the national economy, and also an important strategy to safeguard the rights and interests of the sea. At present, the overexploitation of islands leads to the change of coastline position and the deterioration of marine ecological environment, which seriously affects the sustainable development of island resources. The rapid development of marine economy intensifies the application of island spatial information, and new technology is urgently needed to monitor the current situation of the ocean. Due to the complex terrain and landform of the island, it is difficult to complete the task of geospatial acquisition by conventional manual measurement. The resolution of the existing satellite remote sensing technology is low, the cost of aerial remote sensing is high, and it is easy to be affected by the weather, which

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makes the terrain data of many island areas newer and slower. In recent years, UAV remote sensing technology has been developed and applied. UAV remote sensing technology has the characteristics of high timeliness and low cost. At the same time, it also has the support of high automation professional processing software, which can meet the requirements of obtaining geospatial information in the marine area, obtain the coastline changes and the current situation of the ocean, and has a bright application in marine monitoring.

2. Problems in Practical Teaching System of Marine Technology Undergraduate

2.1 For the experiment course of the corresponding course, there are some problems such as the disconnection between the experiment content and the theory, and the aging of the experiment content can not be updated in time

Marine technology belongs to high and new technology, which is characterized by rapid knowledge update. It may be the leading technology in this stage, and it will be replaced by the updated technology in a short period of time, because the knowledge learned by students needs to keep pace with the times, which requires teachers to constantly learn and update the teaching content. For the course design, the practical content should be an expansion based on the corresponding course teaching content and experimental course, but at present, some contents of the course design and the experimental course content of the corresponding course are separated from each other and lack of integrity[1].

2.2 Some Deviation between the Construction of Practice Base and the Comprehensiveness of Marine Technology

In order to achieve the goal of “understanding the ocean process, meeting sound, light and electricity”, five national off campus cognitive practice bases with high starting point have been established in the cognitive practice link of the practical teaching system. Several students have successively practiced in these practice bases and achieved good cognitive practice results, especially in the work of the national marine technology center. As a leader in the research and development of marine technology in China, students can broaden their horizons and understand the latest research progress of marine technology in China. However, in practice, it is found that in addition to the National Center for marine technology, the rest of the practice bases are mainly based on remote sensing, which is easy to make students think that remote sensing technology is an important part of marine technology, so it is biased towards remote sensing, which is not conducive to the cultivation of all-round development of undergraduate talents[2].

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2.3 Extracurricular Scientific and Technological Activities Do Not Reflect the Characteristics of Marine Technology Major

At present, the form of extracurricular activities of this major mainly stays at the school level, without combining with this major, forming a standardized form of extracurricular scientific and technological activities facing professional personnel training[3].

2.4 In the Practice of Undergraduate Thesis, the Current Practice of Undergraduate Thesis is Generally Carried out in the Second Semester of the Senior Year

There are some problems in this operation mode, for example, the time for students to finish their graduation thesis is too short, so it's difficult for students to arrange time to obtain scientific research data by themselves; in the process of completing the thesis, if students find problems, they don't have much time to think and learn to solve them; in addition, due to the short time, the title of graduation thesis is often determined by the instructor, and students passively go Completion is not conducive to the cultivation of students' innovation ability and scientific literacy[4].

3. UAV Remote Sensing Technology

UAV is to use radio intelligence to control the unmanned aircraft and complete the monitoring task. It can be controlled by computer intelligence. It has low requirements for space, convenient operation, low cost, will not be affected by the environment, has strong adaptability, and is suitable for tasks with high risk coefficient. Compared with satellite remote sensing technology, UAV can collect high-resolution impact data, which will not be affected by bad weather, making up for the disadvantages of traditional satellite remote acquisition. As a new detection technology, remote sensing technology, supported by the electromagnetic wave theory, can observe the situation of the object from a long distance, collect the ultraviolet activity of the monitored object, and integrate the data, so as to complete the identification of the monitored object. Through remote sensing technology, it can quickly query the high-resolution impact data, integrate and transmit the collected information, and combine it with UAV, so that it can be applied in the monitoring of the marine field, and better realize the management of the ocean[5].

4. Discussion of UAV Technology in Practical Teaching of Marine Science

4.1 Specific Application of UAV Remote Sensing Ocean Monitoring Technology

(1) Disaster monitoring

In recent years, marine natural disaster accidents occur frequently, such as storm surge, red tide, etc., which seriously affect the normal life of the residents in the

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coastal areas of our country, and bring huge property losses to the residents in the coastal areas. Using the technology of artificial monitoring to predict these disaster accidents can not be comprehensive, can not grasp the information quickly and timely, and is easy to cause the occurrence of the situation that the prediction is not timely, and the monitoring The measured data is not accurate enough, which is easy to cause processing deviation. The UAV remote sensing technology is used to capture the impact of disasters, and the impact equipment is used to record the ocean video to obtain the specific situation of disasters, which can obtain a more comprehensive situation of disasters, and the monitoring effect of pre disaster prediction and monitoring is excellent[6].

(2) Sea ice monitoring

Sea ice is one of the most serious disasters in winter. Sea ice remote sensing can determine different types of ice and their distribution, so as to provide accurate sea ice prediction. Sea ice can be divided into iceberg, ice block, new ice, one-year cake and other different types of ice age and its genesis are different. UAV technology can master the formation, growth, movement and extinction of sea ice. With these data, we can make ice forecast and provide sea ice parameters.

(3) Red tide analysis

In China, from the Bohai Bay to the South China Sea, there are many red tides every year in recent years. UAV remote sensing can monitor the range, time and location of some red tides, and report the red tides in real time according to the hydrological and meteorological data.

(4) Remote sensing observation of marine dynamics

Wind, wave and tide are the driving forces of shaping the marine environment. Modern ocean observation technologies such as RS and GPS can obtain the marine dynamic information quickly, accurately and directly in a large range. SAR can be used to detect the shallow sea area, and DEM can be established to provide data reference for the arrival of storm surge. When using UAV technology to monitor islands and reefs, we can get more information about seaway reefs, in order to better complete the monitoring of islands. In addition, the UAV remote sensing image is used to extract the information of the coast and port, combined with GIS technology, to analyze and predict the area and change of the ocean; the UAV is used to guide the reclamation project[7].

(5) Inversion of ocean parameters

When monitoring the global climate change, the ocean is the most important part. The sea surface temperature and the sea surface humidity are both important parameters that affect the global climate change. UAV remote sensing technology is an important means to obtain marine environmental parameters, which can monitor the ocean for a long time, provide detailed data on climate change and marine cycle, etc. UAV can also monitor the environment of key marine areas, which is an important auxiliary means of satellite remote sensing monitoring, and can provide information on Marine abnormal changes, biological environment changes and

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marine salinity changes. The specific data can provide data reference for marine research. At the same time, the marine environment parameters acquired by UAV can also provide data of corrosion resistance for offshore oil and gas platform construction.

(6) Maritime supervision

The UAV is equipped with high-resolution camera and automatic tracking equipment, which can search and rescue the ship causing the accident, locate the personnel in distress at sea, reach the scene of the accident quickly, predict the extent of the accident and the rescue situation, return the captured images, provide accurate reference information for the accident investigation and evidence collection, and provide the development of the accident. Monitoring is an important auxiliary tool for maritime supervision and rescue. UAV has good wind resistance and won't be affected by the external conditions. It can also search and rescue the accident ship in bad weather. Once there is a danger, it will not hurt the personal safety of the search and rescue personnel. It can avoid the occurrence of safety accidents to the greatest extent and is the most reliable equipment in bad weather[8].

4.2 Discussion of UAV Technology in Practical Teaching of Marine Science

UAV technology has high precision, flexible use, little affected by clouds and other characteristics, so the broad prospect of application. According to the knowledge reserve and teaching needs of marine science, it is very necessary to introduce UAV technology into the practical teaching. First of all, a suitable place of teaching should be chosen. Secondly, determine the drone model suitable for practical teaching of marine science. Third, carry out UAV flying practice; Fourthly, the data of UAV is processed. Fifth, output practical teaching results; Sixth, assess and evaluate the learning effect of students. The introduction of UAV technology into the practical teaching of marine science will help improve students' comprehensive ability of "integrating theory with practice" and promote the teaching effect.

5. Conclusion

UAV remote sensing ocean monitoring technology has high timeliness, high flexibility technology, application value is very high. With the continuous expansion of people's ocean development efforts, it is necessary to obtain detailed information in various aspects of the ocean field, and the demand for UAV is higher and higher. The application of UAV Remote Sensing Technology in the field of marine supervision is of great significance to the monitoring and management of the marine field, which can meet the requirements of marine monitoring under various conditions. With the continuous maturity of technology, UAV remote sensing technology and other communication technologies in marine supervision are combined to form a multi-functional monitoring equipment for real-time monitoring in the marine field, which will better serve the development of marine industry.

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