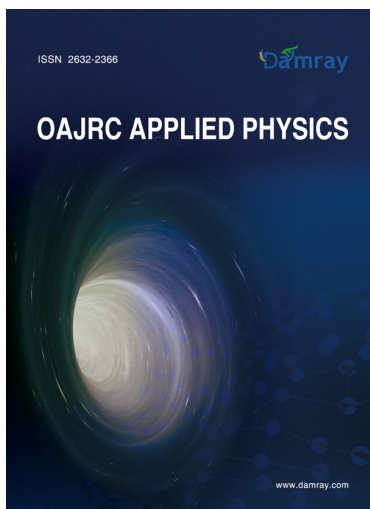


Application of geophysical methods in environmental monitoring



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Abstract

Environmental geophysics is a discipline based on geophysics and environmental science. It uses the basic principles and methods of geophysics to detect and study environmental problems. This article briefly summarizes the development and application of environmental geophysics , and makes a preliminary discussion on the slow development of environmental geophysics.

Keywords

Environmental earth, physical method, environmental monitoring, status quo

<https://oajrcap.damray.com/>

OPEN ACCESS

DOI: 10.26855/oajrcap.2021.12.001

Received: October 16, 2021

Accepted: November 15, 2021

Published: December 12, 2021

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Introduction

Due to the development of people's social activities , more dangerous chemicals have flowed into the natural environment , and are continuously discharged and leaked into the surrounding environment . These pollutants have already exceeded their own capabilities , thus endangering people's health to a certain extent. life and development. In order to solve the problem of environmental protection , many disciplines have also invested in the scientific research of the environment , and it is against this background that environmental geophysics was born. The earliest research was carried out in the United States . In 1985, the US Geological Survey took environmental geophysics as a separate major to carry out annual work , forming the basic year of environmental geophysics. In 1988 , Professor SH Ward of the University of Utah in the United States opened the first course on environmental geophysics , and published a landmark

monograph "Soil Engineering and Environmental Geophysics" in 1990 , and published it in 1992 Founded "EEGS " at SAGEEP Annual Meeting.

1. Development status of environmental geophysics in my country

The Development Committee of the Department of Environmental Geophysics refers to the "Professional Committee of Environmental Geophysics" established in the Geophysical Society. To the present, the development of environmental geophysics is very slow[1]. They encountered many obstacles. The general content is as follows : Land physics experts in the country and universities have not done in-depth research on dealing with regional social problems, resource social problems and solving environmental social problems ; using environmental geophysics methods to deal with environmental problems will only bring social benefits , but not economic benefits ; there are no relevant lectures in major cities and universities , and the training of high-level engineers is not enough ; on the basis of geophysics , our country has provided resources for dealing with environmental problems[2]. Huge amounts of money ; not the least of which is that environmental experts and geophysics experts are not well connected. The Department of Environmental Geophysics is still in the initial stage of exploration , and the development speed is relatively slow. There are not many studies in the field of international environmental monitoring research , but the research on environmental protection geophysics has achieved remarkable results in environmental protection supervision and management. We will use foreign science and technology and successful experience to develop environmental protection geophysics , and make efforts to alleviate the current serious environmental protection problems. At present , environmental geophysics is still in the initial stage of development , and the progress made is very slow[3]. However , in developed countries , using geophysical technology to carry out environmental monitoring and management has achieved outstanding results. In terms of scientific research on natural geophysics , foreign technology and experience should be used for reference , and unremitting efforts should be made to solve the current environmental protection problems.

2. Advantages of geophysical methods in environmental monitoring

At present , environmental pollution monitoring is mainly to sample the polluted area , and judge the concentration and degree of pollution by testing the polluted area , but the specific location of the polluted area , the scope and method of pollution cannot be completely and accurately judged. For example , to use conventional monitoring methods to determine whether groundwater will be polluted , it is necessary to dig a deep well upstream of the water source , two places on the left and right , and then collect two water samples, which will consume a lot of manpower and material resources , and cannot accurately Determine the size of the contaminated area[4]. Because geophysical prospecting technology has the characteristics of low cost, fast speed, high accuracy, non-destructive, and no secondary pollution , it has obvious advantages to use geophysical prospecting technology to deal with the above problems.

3. Application of geophysical technology in environmental monitoring

(1) Air pollution monitoring

The sources of air pollutants are fuel combustion, coal consumption, and transportation pollution. In air pollution monitoring , geophysical means are rarely used at present. In 1995, the method of using X-ray method to detect sulfur in coal to avoid pollution of the atmosphere caused by sulfide in coal burning; he used neutron activation technology to measure trace elements in crude oil , thereby reducing the Pollution of harmful substances in the atmosphere. In 2000 it applied the neutron activation method to detect harmful gases in the exhaust gas of thermal power plants ; One of the petroleum combustion products measured by the neutron activation method. In 2008 ,the use of magnetic methods to monitor dust and dust pollutants (heavy metal particles) in the atmosphere . The goal is to track the movement of pollution particles and find the source of pollution[5-8].

(2) Monitoring of water pollution

With very few fresh water resources, and the per capita pure water resources are between 2400-2800 cubic meters , accounting for only 25% of the global average level . Certain hazards will not only cause a sharp reduction in edible fresh water sources , but also produce a large amount of toxic substances , which will also cause great harm to human health. At present, the most widely used water and geophysical measurement methods mainly include resistivity method, excitation and polarization method, water penetrating radar measurement method, electromagnetic method, shallow seismic method and radioactive analysis method. In the specific analysis , different geophysical means should be adopted according to different environmental pollution monitoring objects and according to the changing characteristics of their physical and chemical properties .

(3) Marine pollution

Sources of marine pollutants are through spills from crude oil tankers , polluted rivers , and exhaust and wastewater discharges from various ships. Once it exceeds its own purification capacity , it will cause huge damage to the ecology of the ocean , because the whole world is a whole , coupled with the influence of ocean currents , pollution will spread to the entire earth. Satellite monitoring technology for oil spill pollution in large water bodies has been widely adopted , and its main technologies include : using visible light remote sensing technology and laser radar technology. In remote sensing technology , due to the difference in albedo between seawater and lubricating oil layers , the spectral reflection coefficient of seawater is the largest at the blue light band (0.3-0.45 microns) , so the blue light band is used as the detection window ; Contains a large amount of polycyclic aromatic hydrocarbons , so most of them are based on fluorescent substrates , so the use of laser radar with fluorescent spectra can quickly monitor the oil spilled area[9].

(4) Soil pollution monitoring

The sources of pollution include three categories: industry, agriculture, and biology. After pollutants intrude into the soil , they will also play a corresponding role in the composition, properties and biological composition of the soil , which will cause the soil to become hydrochloric acid ; soil erosion , rocky desertification ; the content of organic waste in the soil will further increase ; Compaction and deposition of non-ferrous heavy metals in soils. In addition , it is possible to detect soil contamination through geophysical methods. According to the aerial measurement methods proposed by people at present , such as: ground electrical method, geological radar, etc. , are all effective methods to determine the degree and depth of hydrochloric acidity ; with the salinity of soil , the apparent resistivity of the soil has increased , foreign countries A special avionics device for SAGMAP was developed , which can perform high-resolution detection of the apparent resistivity of ground soil[10].

(5) Solid waste pollution monitoring

An important category of solid waste , including industrial solid waste, hazardous waste, and urban domestic waste. At present , most of the domestic waste is transported to incineration, composting, and sanitary landfill . As of 2009 , there were 567 waste treatment plants, which are far from being able to solve the increasing domestic waste disposal . Most of them are simple landfill. The site selection and monitoring of garbage dumping areas are also the focus of current environmental geophysics research.

(6) Monitoring of radioactive pollutants

radioactive hazards caused by military weapons, nuclear industry, nuclear industry, medical equipment, coal and combustion materials, building materials, chemical fertilizers (mainly phosphate fertilizers) , etc. Currently used radioactive pollution monitoring techniques include activity detection, neutron activation analysis, and airborne energy spectrometer. In 2000 , Ge Shuangcheng mentioned in his paper that immediately after the Chernobyl nuclear leakage accident in the Soviet Union in 1986 , the aviation energy method was used to conduct large-scale and large-scale rapid monitoring to grasp the spread and trend of daily pollutants. Geophysical methods are also used in the monitoring of radon gas , because uranium can be converted into radon , so when monitoring radon gas , it is first necessary to use airborne energy spectrometry to determine the abnormal area of uranium[11].

Conclusion

In recent years , regarding the application of environmental geophysics in environmental monitoring and investigation , in environmental monitoring and investigation , because environmental monitoring and governance itself has no economic benefits , the development of environmental protection work is very slow. In order to better apply geophysical technology to environmental monitoring , it is necessary for all environmental protection organizations and personnel and geophysicists to work together; strengthen academic exchanges and cooperation with foreign countries ; cultivate environmental geology professionals ; in addition , strengthen The input of scientific research funds ensures the normal development of the project.

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