

Introduction and Analysis of Environmental Geophysics

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Abstract. Environmental geophysics, also known as the near surface geophysics, is environmental science and Geophysics integration and a borderline subject developed, to study the relationship between geophysical field and matter in the earth's physical characteristics and the living environment of mankind (including natural and artificial environment) using the theory and method of Geophysics, this relationship includes both the geophysical field of the human living environment and human health effects, including due to natural and anthropogenic environmental changes in the earth material properties and geophysical field changes. At the same time, this subject has applications in the field of chrome plating, such as geophysical exploration, environmental monitoring, groundwater monitoring and so on. Today, geophysics has become a new subject with great potential application value.

1 Introduction

With the development of society economy, people to the environmental emissions and leakage of harmful substances than the degradation ability of nature, these pollutants remain in nature, a serious threat to the human survival and development. In order to solve the problem of environmental pollution, many subjects involved in the study of environmental pollution control, the environment of the earth physics is in such a large background. Environmental geophysics [1,2], also known as the near surface geophysics, it is environmental science and Geophysics integration and a borderline subject developed, to study the relationship between geophysical field and matter in the earth's physical characteristics and the living environment of mankind (including natural and artificial environment) using the theory and method of Geophysics, this relationship includes both the geophysical field of the human living environment and human health effects, including due to natural and anthropogenic environmental changes in the earth material properties and geophysical field changes. At the same time, this subject has applications in the field of chrome plating, such as geophysical exploration, environmental monitoring, groundwater monitoring and so on. Today, geophysics has become a new subject with great potential application value.

2 The significance and application of the Geophysical purposes

2.1 Discipline significance

Geophysics is one of the major disciplines of Earth Science, is through the quantitative physical methods (such as: seismic elastic wave, gravity, geomagnetism, geoelectricity and geothermal and radiation can method) to the study of the earth and looking for mineral resources of the earth interior is a comprehensive subject, the scope of the study include the earth's crust, mantle and core and atmosphere. Geophysics has many branches of study, including: solid earth physics, geodynamics, seismology,

geodesy, geothermics, geomagnetism, hydrological geograph, oceanography, meteorology, core tectonics and Geophysics [3], Comparative Planetology, Tectonophysics and geodetic astronomy; the content of the research includes the internal structure of the earth, theoretical source, seismic wave propagation theory, characteristics of continental crust in large scale, such as plate subduction zone and the mid ocean ridge. Traditional geophysics mainly refers to solid earth physics, the study of modern geophysics extends to the phenomenon of the earth's atmosphere. Such as ionospheric dynamo and auroral electrojets and magnetopause current system [4] and even extended to the physical properties of the planets and their satellites.

2.2 Discipline application

At present, the application of the earth physics:

1. Engaged in geological exploration, scientific research work as the main direction, through a variety of geophysical methods in geological research.
2. To predict natural disasters, the digital seismic network and station observation data as the basis, combined with gravity, deformation and other geophysical observation means, the kinematics and dynamics of the source, near fault ground motion and variation of gravity field of research, for the earthquake occurrence mechanism research and earthquake prediction to provide theoretical guidance.
3. Engaged in engineering exploration, by geophysical methods, exploration project, construction of hydrogeology and engineering geology, urban environment and building foundation and underground pipelines laying of exploration, through the theory of engineering geology, shallow geophysical and geotechnical mechanics, experimental research and engineering practice and information integration, understanding of earth surface material, the structure, the state and in natural and engineering under the action of deformation and failure mechanism and process and evaluation of engineering rock mass stability and environment effect.
4. For prospecting oil and natural gas and geological tectonic coalfields, looking for metal and nonmetal mineral resources, coal, oil field, mine property, state-owned large and medium-sized enterprises related technical work.

5. The corresponding geophysical software programs are designed to do, geophysical instrument development, widely used in environmental protection, urban drainage, geology, metallurgy, health and epidemic prevention, commodity inspection, agriculture, fishery and education and scientific research fields[5].

3 The purpose and significance of Environmental Engineering

3.1 Discipline significance

Environmental Engineering is a scientific and technological research and the prevention and control of environmental pollution and improve the quality of the environment. Environmental engineering and biology, ecology, medicine and environmental hygiene and environmental medicine, and environmental physics and environmental chemistry. Since environmental engineering is in the initial stage, the field of discipline is still developing, but its core is the governance of environmental pollution sources.

3.2 Discipline application

Environmental monitoring is designed to realize the purpose of the past and predict the future by observing and analyzing the process of environmental change, understanding the environmental variable rate and its driving factors and mechanisms. So far, awareness of the issue of focus is still starting from the atmosphere, hydrosphere, pedosphere and lithosphere of some sensitive parameters for long-term observation and accumulation of work, summed up from the objective law of the environmental changes, concerning science, biology, agriculture and other disciplines[6].

4 The combination of Environment and Geophysics

Geophysics and environmental monitoring and protection exists between the dual relationship. On the one hand, geophysical field of energy flow to the earth's environment and biology, including has brought a significant impact on the health of human body. On the other hand, geophysical exploration methods[7] can be used to monitor environmental pollution, resource damage, to carry out the prediction of disaster, and to provide information[8] for the design of environmental protection facilities. The scientific history shows that science has experienced a process of integration, differentiation and integration. Modern science is not only highly differentiated and highly integrated, but also set the integration of scientific and integrated differentiation and integration, to achieve the overall scientific. Put forward the idea of environmental geophysics.

5 Present situation and development prospect

At present, the research and application of environmental geophysics mainly include[9]:

1. The influence of the physical field of the earth on the environment and the living world, especially to human health[10].

2. Monitoring of environmental pollution and its treatment process by geophysical method.

3. Using geophysical methods to monitor and forecast the damage and the disasters.

And in the next few years, the world wide engineering and environmental geophysics research work will be mainly concentrated in the following areas:[11]

1. Resistivity and electromagnetic wave imaging technology (including ground penetrating radar technology).

2. Surface wave exploration technology

3. Water and soil pollution monitoring survey technology

4. Environmental Remote Sensing Monitoring Technology

5. Mine geophysical technology

6. Underwater exploration technology

7. Nuclear geophysical technology

8. Seismic disaster evaluation technique[12]

9. Environmental effects of the geophysical field (artificial and natural)

10. Efficient and practical exploration instrument system

6 Application of environmental Geophysics

6.1 Environmental geophysical exploration

Environmental geophysical exploration[13] is the basis of the study of the effect of the earth's physical environment. In general, the detection of various geophysical fields in geophysics can be used as a method of environmental geophysics observation[14]. Observation of the earth's gravity field, electromagnetic field, geothermal field, and intensity of radioactive radiation. These observations[15] are generally carried out on the ground or in the air or underground. Some observation requirements are not satisfied with the general geophysical observation, such as indoor oxygen content measurement, it is required to produce a higher sensitivity of specialized instruments. Borrow Applied Geophysics study observations to study the environmental effects, of course, is the economic, but with deep research, dedicated to environmental effects of the geophysical exploration investment will be more and more.

6.2 Geophysical and environmental monitoring

Examples of physical environment and engineering of the earth and the methods to solve the problems, the environmental and engineering geophysical applications constantly expanding, covers construction, water resources and geothermal resources exploration[16], disaster evaluation

-ation and forecast, environmental pollution detection and monitoring, construction quality inspection, archaeologic-al research, the development and applications to ecologic-al agriculture, biological monitoring, more closely with people's daily life and national development together. On the existing problems of environmental and engineering geophysical exploration[17], many problems have been solved or to obtain specific ideas and methods to solve the problems, such as reservoir dam leakage, sandwich the detection problem, the tunnel wall forecast problems, active fault detection. Geophysical methods are mainly applied to the exploration of environmental pollution, which is a field of the development of geophysics. Water environmental geophysics is the theory, methods, geophysical technology into the hydrosphere, pollution monitoring. Water pollution not only reduces the available water resources, but also leads to a great harm to human health, therefore, the protection of water environment is not contaminated has become a very important work.

6.3 The application of geophysical method in groundwater monitoring.

Today, the groundwater pollution is serious, Large and medium sized enterprise waste water discharge is one of the important causes of groundwater pollution, and it should be monitored by the dynamic monitoring of the pollution level and scope of the earth. Monitoring of pollutant composition, need to identify the geological structure, determine the pollution channel, to control pollution sources, reduce pollution. Geophysical methods used to determine the scope of environmental pollution, both economic and rapid, but also to avoid drilling and water samples analysis, reduce pollution. At present, the degree of pollution in many underground water sources is mainly determined by the structure of the water bearing layer which is covered by the pollution. If the overburden faults are well developed or loose, then the industrial sewage and the living water will seep along the crack or the hole, causing the groundwater pollution. The application of geophysical methods can detect the structural characteristics of the overburden, the nature of the pollution channel, and the permeability of polluted water. On the other hand, it can monitor the speed and range of the pollution. Pollution of shallow water to the deep water, similar to the Shanghai deep water, ground back irrigation along the water channel to the underground leakage, resulting in deep water pollution[18], by geophysical methods can be dynamic monitoring, to guide the governance.

7 Summary and Outlook

Currently less studies on the application of environmental geophysics, from the perspective of literature in recent years, few of its application in environmental monitoring and survey have more in depth inquiry, because of environmental monitoring and governance itself is not the economy benefit, resulting in the geophysics in environmental protection work in progress is slow. Should strengthen the research on electromagnetic imaging,

surface wave exploration technology, remote sensing technology and mine geophysical technique, strengthen data processing combination of research methods and data acquisition equipment research, strengthen the combination of theoretical research and experimental research. To make geophysical method is better applied to environmental monitoring, environmental agencies and staff workers and Geophysics needs mutual cooperation, actively coordinate with and strengthen the international academic exchange and cooperation, disciplines to promote the sustained and in depth development, training physical talent of the earth's environment, to ensure the smooth progress of the research topic, for human science to make more contributions[19].

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