

Seasonal change of the concentration of nitrate nitrogen in groundwater and groundwater level

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Introduction

In the investigation of the groundwater contamination, it is important to clarify the area in which exceeds environmental standards of groundwater and the density distribution of the contaminant in groundwater. There are a lot of cases of point source pollution, in case of groundwater contamination of the volatile organic compounds (VOCs). In those case, it is comparatively easy to clarify the area in which exceeds environmental standards of groundwater and the density distribution of the contaminant in groundwater. On the other hand, in the case of groundwater contamination of nitrate, it is difficult to clarify because in many case, it is non-point source pollution. Moreover, there were comparatively high concentration of nitrate nitrogen in the surrounding area in which exceeds environmental standards of groundwater. This suggests that a little change in the concentration of nitrate nitrogen greatly changes the area in which exceeds environmental standards. Therefore, it is necessary to clarify the concentration change mechanism of the nitrate nitrogen in groundwater.

The purpose of this study is to clarify the relationship between the seasonal concentration change of the nitrate nitrogen in groundwater and groundwater level.

Summary of investigation

In this study, the groundwater quality, stable isotope ratio of oxygen and groundwater level were investigated every month at deep wells of 10 points, shallow wells of 14 points, and springs of 2 points from June, 2006 to June, 2007 in the southern part of Miura peninsula. Moreover, to examine the relation between the change in the groundwater level and the concentration of nitrate nitrogen. Moreover, the hydraulic head and groundwater quality were observed at one shallow groundwater observation point using piezometers set up in three depth from the groundwater table to the vicinity of the well bottom.

Result and consideration

The average of the concentration of nitrate nitrogen in groundwater were 0.5 - 26.9mg/L in shallow groundwater, 0 - 16.1mg/L in deep groundwater, and 5.7 - 7.2mg/L in springs. In a lot of wells, the maximum concentration were observed from Aug.2006 to Oct.2006. On the other hand, there were different tendency between the groundwater level and the concentration of nitrate nitrogen. To clarify those relationships, the hydraulic head and groundwater quality were observed in Aug.2007. As a result, it was clear that the well is located in the discharge area. At this time, the concentration of nitrate nitrogen in the well water higher than the groundwater sampled from a piezometer in 4m in depth. In this area, it is thought that high concentration of nitrogen by fertilization has been accumulated in the soil water. In such a situation, it is guessed that the rise of groundwater level and leaching of soil water causes of the increasing of the concentration of nitrate nitrogen in the groundwater.

conclusions

The vertical variation of the concentration of nitrate in the soil water would be changed by the fertilization, nitrification, and other reasons. Therefore, it is necessary to clarify that the vertical variation of the concentration in the soil water and groundwater aquifer, and to investigate the soil water and groundwater movement and quality.