

Development of Technique for Visualizing Floods Using VR Technology

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1. Introduction

In recent years, disasters caused by heavy rains have become both more frequent and more serious, heightening the importance of providing information which will lead to appropriate evacuation action during floods. As an effort in NILIM's "Flood Risk Visualization Project," we are engaged in research and development to communicate the urgency of river flooding during floods in real time and easily-understood terms. As a result, "Flood Damage Risk Lines," which representing the degree of flood risk of rivers with resolution of roughly neighboring land units, etc. have been applied practically. This article introduces research on visualization of flood risk by using virtual reality (VR) technology as an effort for more effective information dissemination.

2. Outline and status of efforts for VR display system

It is now possible for residents to obtain information on the degree of flood risk of familiar rivers in real time through webpages such as "River disaster prevention information" and "Flood damage risk lines." However, even assuming residents have this information, they cannot make a judgment to evacuate if the urgency of flooding is not conveyed correctly, and as a result, will delay evacuating and become victims. Therefore, as a measure for conveying the degree of flood risk to residents correctly and in real time, NILIM is developing a VR display system which provides flood prediction information. As shown in the accompanying **Figure**, the display of this system synthesizes a 3-dimensional river surface model created by a game engine on photographs taken at the site in advance and existing 3D geodetic data. The height of the river surface is based on the results of flood predictions obtained by a river water level simulation, and the condition of striking waves, water spray, floating driftwood, and the like is shown by animation to make the

river surface seem more real. Because the system shows the actual scenery in the background, including buildings, bridges and other structures, the difference from the normal condition which residents usually see is clear, and residents can easily form a concrete image of the degree of flood risk danger. Moreover, by using the VR display system, residents can understand the condition of the river in real time when the actual condition cannot be seen due to darkness or heavy rainfall.

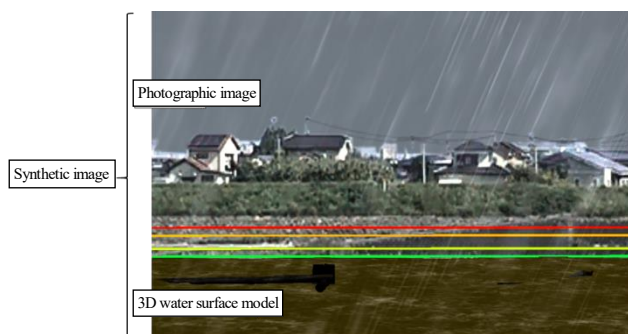


Fig. VR display system

At NILIM, we are also studying photographic techniques for use in the VR display system and techniques for expressing the river surface during floods with greater realism, focusing on model rivers, and we are currently preparing a manual envisioning application of this system to Class A rivers throughout Japan. In the future, we plan to construct a prototype system for model rivers based on the results of these efforts, and will conduct trials and improve the system aiming at practical application in the future.

☞ For more information:

1) NILIM, River Department, Water Cycle Division
<http://www.nilim.go.jp/lab/feg/index.htm>