SIMULATION OF HISTORICAL RAINFALL OVER INDOCHINA PENINSULA

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An opportunity for PUB (Prediction in Ungauged Basins) exists in the assessment of causes of flood risk increase over the South-East Asia such as the lower Mekong river. The lower Mekong experienced massive deaths and serious damages by six floods in 1991, 1994, 1995, 1996, 2000 and 2001 in the last decade, while it experienced only once in 1984 in 1980ÃÔ. The increased flood damage may be caused by increased frequency of floods due to climate variation, landuse/landcover change, or artificial control of water, or by other human activities such as urbanization. Scientific assessment of causes of increased flood damage is the basic knowledge for decision-making, but poor data has prevented assessment. PUB will be the breakthrough technology for providing the knowledge base.

PUB comprises rainfall prediction as the first step and flow prediction as the second step. Public Works Research Institute of Japan and the University of California at Davis jointly developed a downscaling model named IRSHAM (Integrated Regional-Scale Hydrologic Atmospheric Model) to reconstruct historic rainfall over ungauged basins. Downscaling requires a sophisticated integrated hydro-meteorological model that requires no parameter fitting, and it is one of the key technologies in PUB (IAHS PUB initiative web site). The downscaling approach has the advantages of (1) the applicability to any basins in the world, because all necessary input data can be obtained from world available database, (2) the availability of reanalysis data; and (3) the applicability to completely-ungauged basins, while remote sensing always requires a few ground rainfall data.

This reconstruction technology is now being applied to reconstruct rainfall over the South-East Asia and to scientifically assess frequent-occurring flooding in the past years. In this research, the authors carried out a numerical simulation to reconstruct historical rainfall over the South-East Asia on the 0.1-degree mesh. In this simulation, a non-hydrostatic numerical model has been improved and developed based on IRSHAM. From the standpoint of numerical simulation, a highly accurate non-hydrostatic numerical model is required in the reconstruction technology at the scale of 0.1-degree (mesoscale). To verify the simulated rainfall data, ground-based observed rainfall at about 800 points in the ChaoPhraya river basin (162,800km2) of Thailand will be used.