Risk evaluation and prevention of complex flood disaster with earthquake subsidence and storm surge in Kagami river of Kochi plain.

*kouhei yoshimura[1], Seigo Nasu[1]

1. Kochi University of Technology

After the Great East Japan Earthquake, it was widely recommended that disaster phenomena have to be evaluated as multiple integrated disasters with complexity. Flood prevention law has also revised to assume extreme flood event in response to recently frequent shiver flood. So we should change the assumption which has been thought of as a single event.
In this research, we simulated complexly integrated multiple disasters with flood. Sea surge and earthquake subsidence which is expected as Nankai Trough Earthquake by using discharge model and river channel model were integrated.
This model is including distributed discharge model and river channel model. In low yield area river channel, this model can represent the effect of seatide and sea storm surge.
According to this model, the effect of seatide and sea storm surge is severe for flood preventation. And flood risk is exacerbated by earthquake subsidence becoming a phenomena of lost river channel capacity. Earthquake is predicted, and the remaining time is small, so it is difficult to build new Flood control facilities to avoid this complex risk.
Now dam limits discharge as fixed rate according to operation rule. We suggest new operation rule that dam limit discharge strongly for sea tide and sea surge. This rule is effective to reduce sea-tide effect and disaster damage with the same flood control volume.
This method is reasonable from the aspect of “time”, because earthquake subsidence is temporary and permanent facilities can be wasted. Dam operation rule optimization is adaptive measure.
On the other hand, climate change is severe problem for flood risk. According to previous studies, maximum discharge may not increase but frequency of historical maximum level flood will increase in Kagami river basin.
If we consider only a single flood risk, “maximum discharge may not increase” is “good news” ,because flood control facilities is in place for historical maximum level flood, and these facilities can prevent flood damage.
But if we consider the risk of complex flood disasters, “frequency of historical maximum level flood will increase” is “bad news”. It is because the probability of floods when the flood control facilities lost function by the earthquake disaster.
This is new perspective that flood risk does not increase by only climate change, but risk will increase with complex disasters with earthquakes.

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