Sediment transport and channel changes
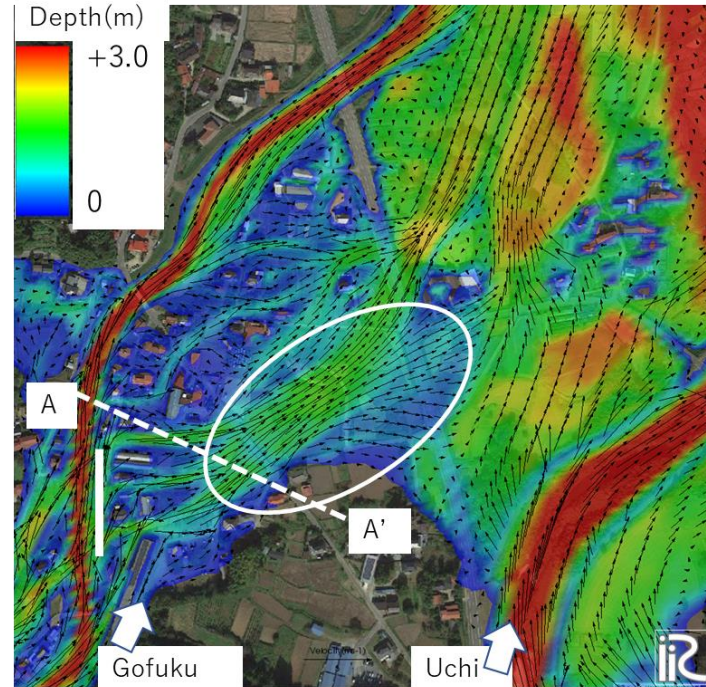
Meteorology, Hydrology

Flood flow with sediment

Basin scale Sediment transport

Catchment demarcation

x_j

y_j

x_{j+1}

Depth(m)

+3.0

0

A

A'

Gofuku

Uchi

Velocity: 5(m/s)

Gofukuya river flood disaster, 2019

Risk communication

VR contents

Hazard map

River planning

Experiment

Sediment transport model

Driftwood model

Bank erosion model

Akatani river, 2017

Gofukuya river, 2019
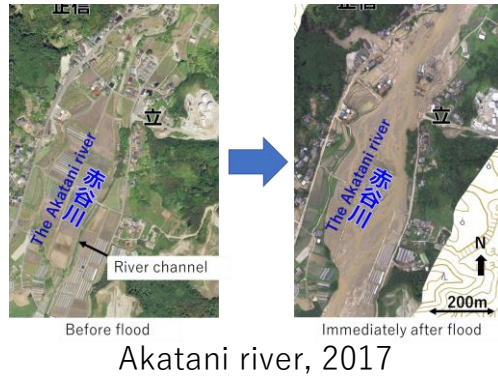
ICHARM has been conducting research on floods with a massive transport of sediment, which have been frequent in Japan in recent years, to clarify their mechanisms and phenomena and study effective methods for sharing information in the event of such disasters.

Development of methods to evaluate sediment and driftwood transport with flood flow
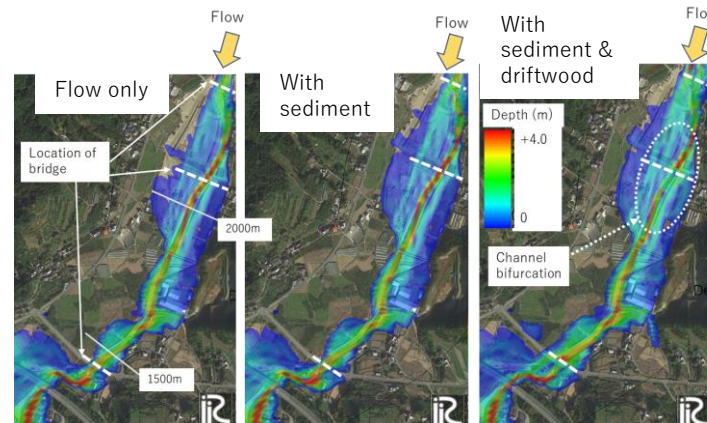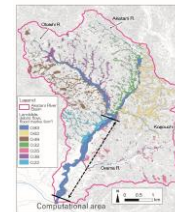
①Basin scale
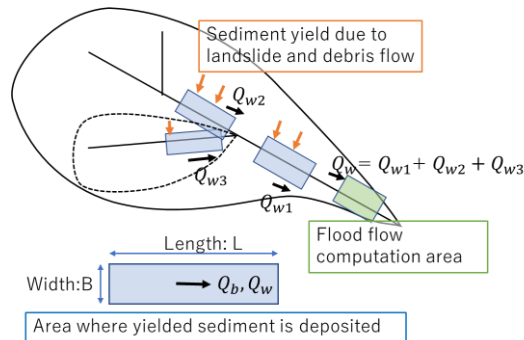
The wash load inflow supplied from the mountainous area to the basin is therefore evaluated as a summation of the wash load production from the respective areas indicated as blue rectangles.

②2D model

Analysis of the Akatani river flood disaster

Flow only

With sediment

With sediment & driftwood

Development of method to evaluate driftwood in terms of convection-diffusion equation
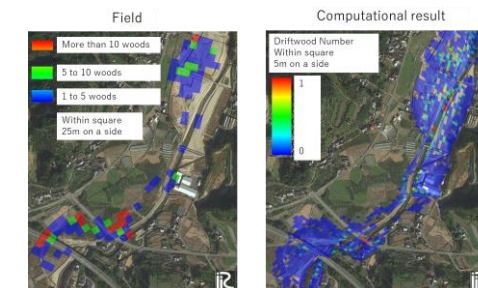
In case of: $\partial z/\partial t > 0$

$$\frac{\partial C_{drf}h}{\partial t} + \frac{\partial C_{drf}uh}{\partial x} + \frac{\partial C_{drf}vh}{\partial y}$$
$$= \frac{\partial}{\partial x}\left(\varepsilon_x h \frac{\partial C_{drf}}{\partial x}\right) + \frac{\partial}{\partial y}\left(\varepsilon_y h \frac{\partial C_{drf}}{\partial y}\right) - c_* \frac{\partial z}{\partial t} C_{drf} r(t,x,y) - v_n C_{drf} p_b \delta(x-x_i, y-y_i)$$

C_{drf} : Driftwood concentration

S : Driftwood volume in the riverbed
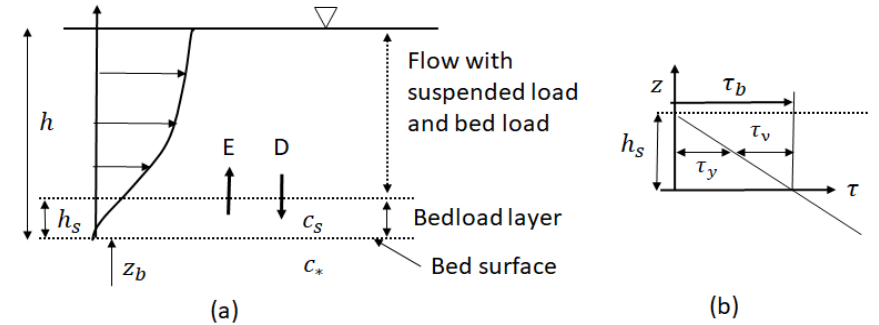
(Harada et al., (2019))

Driftwood computation

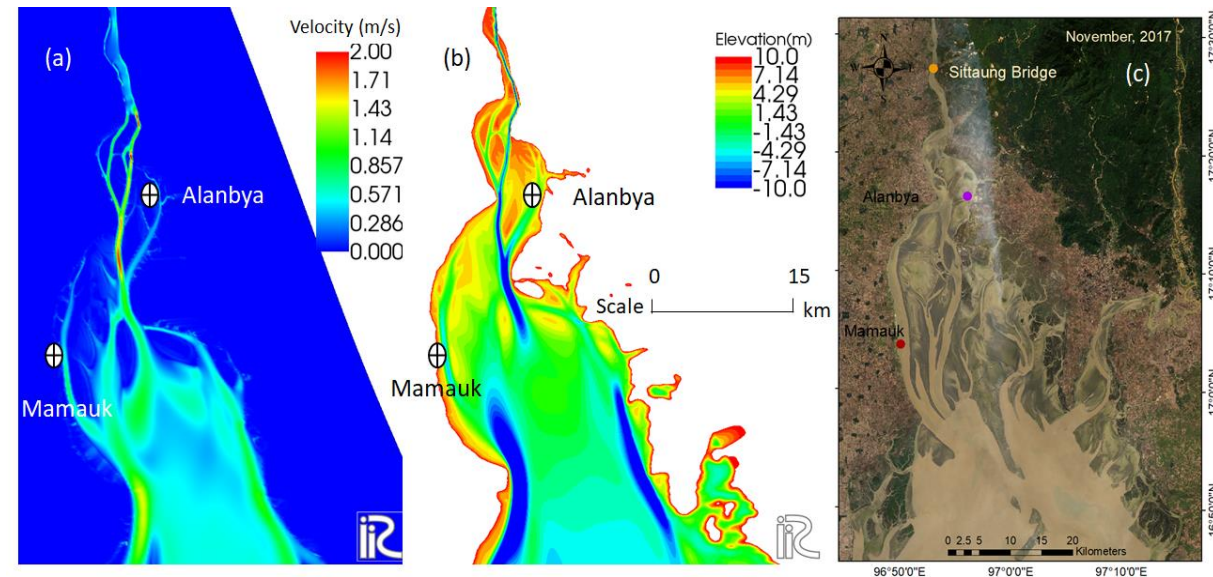# 2. Research in the Sittaung river, Myanmar

Field survey

Development of new sediment model

Channel change in the bay

Numerical simulation on the development of sand bar with bank erosion

February, 2015

Option A

Option A1

Option A2

Option AB_1