R&D item



Here begins our new MIRAI

3. Impact Assessment of Typhoon Control

Progress until FY2023

1. Outline of the project

Typhoon control may cause climatological impacts, reduce damage, and other social impacts. It is necessary to quantify these impacts to assess social acceptability. First, estimating the secondary effects of typhoon control on the climate system is necessary. Typhoon damage includes not only human damage but also economic damage. Estimating typhoon control's economic damage reduction effects requires developing models to convert meteorological forces like wind speed and rainfall into structural or other countable damage. The impact assessment group has developed an integrated wind and flood damage assessment model for typhoon control. We are also analyzing the impact of typhoon control on other long-term socio-economic activities.

2. Outcome so far

For climatological impacts, the relationship between typhoon intensity and environmental fields was assessed using large ensemble numerical experiments using a global nonhydrostatic model. The precipitation and the probability of strong precipitation events are reduced when typhoon intensity is weakened.

For damage estimation, damage estimation models were developed for wind, storm surge, and river flood disasters,

and their simple impact assessment on typhoon control effects were evaluated in FY2023.

For wind damage, a prefecture-level area averaged risk assessment model has developed. Then, the effects of the reduction of wind speeds and related damage loss by typhoon control were analyzed with a resolution of about the prefectural level. Figure 1 shows an example of the analysis. It was confirmed that an increase/decrease of 5% in wind speed can roughly increase/decrease of 50% of damage loss. For storm surge disasters, a storm surge inundation model was developed and validated to estimate the amount of damage by the storm surge inundation. For river floods, a water hazard impact assessment model was developed based on algorithm to estimate the flood inundation area ratio. Then, a coupled meteorological and hydrological damage forecasting system was developed and validated. Figure 2



shows an example of this system. It was estimated that a 50% reduction in precipitation would result in almost zero inundation.

3. Future plans

Advance the climatic impact of typhoon control using global atmospheric models, and advance the sophistication, regionalization, and integration of various types of wind and flood damage for damage estimation. This theme will further develop the impact of typhoon control effects on the damage loss based on the results of the climate control group.



