

KAWAGUCHI LAB.

Spatial Structures as Architectures for Human Beings



Department of Human and Social Systems

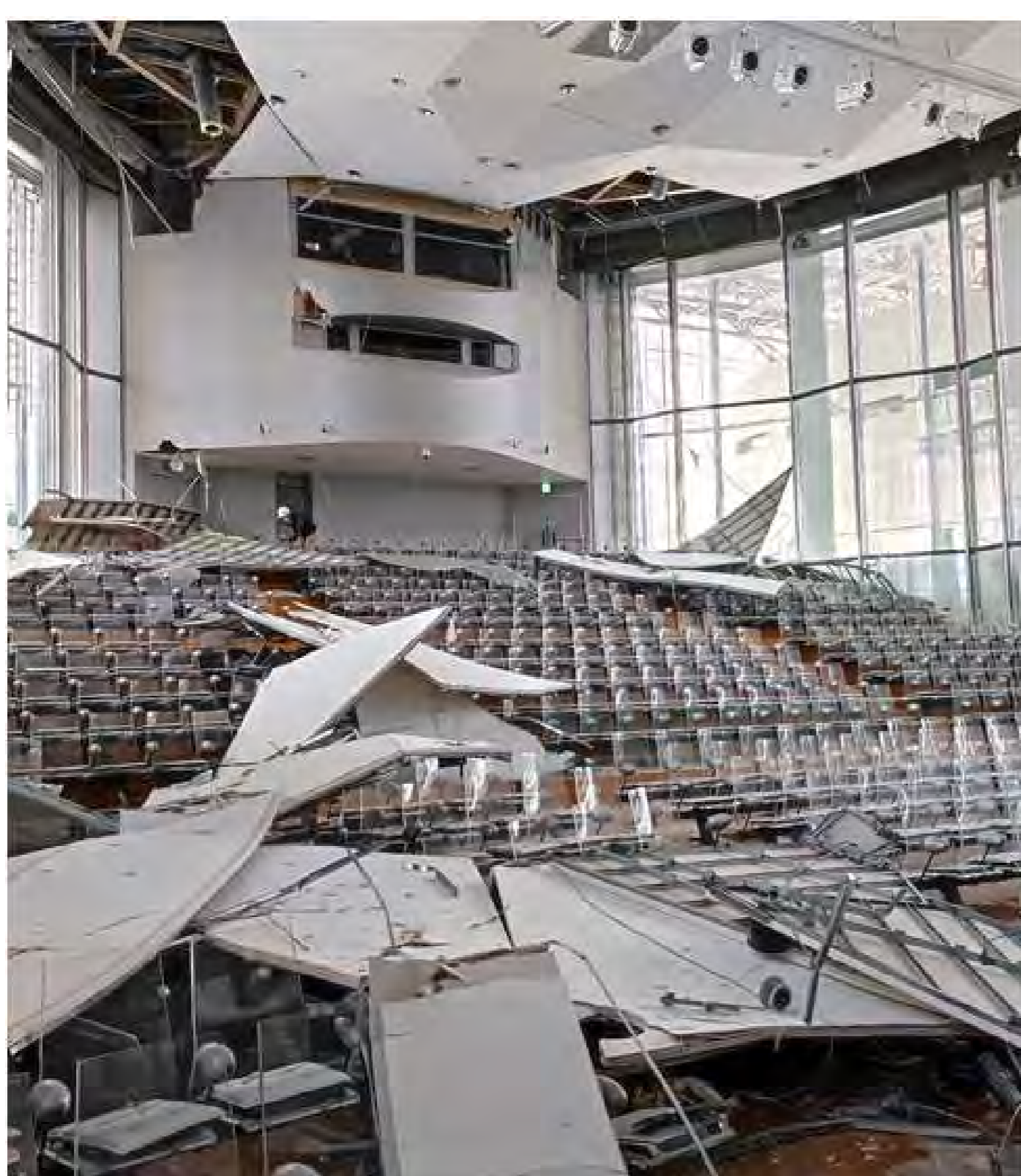
Building Structure, Spatial Structure
Department of Architecture, Graduate School of Engineering

<http://space.iis.tokyo.ac.jp/>

Safety of Large Roof Buildings

Ceilings in large roof buildings such as gymnasiums and halls tend to be high and large. In the buildings, however, falling of ceiling panels and lighting equipment have often occurred irrespective of earthquakes. If once small damage to the ceiling was found, the buildings cannot serve as shelters which are frequently requested functions during disasters.

Failures of non-structural components have occurred in many large roof buildings, not only during earthquakes. Harming people due to the falling of ceiling panels had occurred as well. We have been investigating the safety of large roof buildings and developing the method to prevent the falling of ceilings.



Failures of ceilings, Fukushima 2022



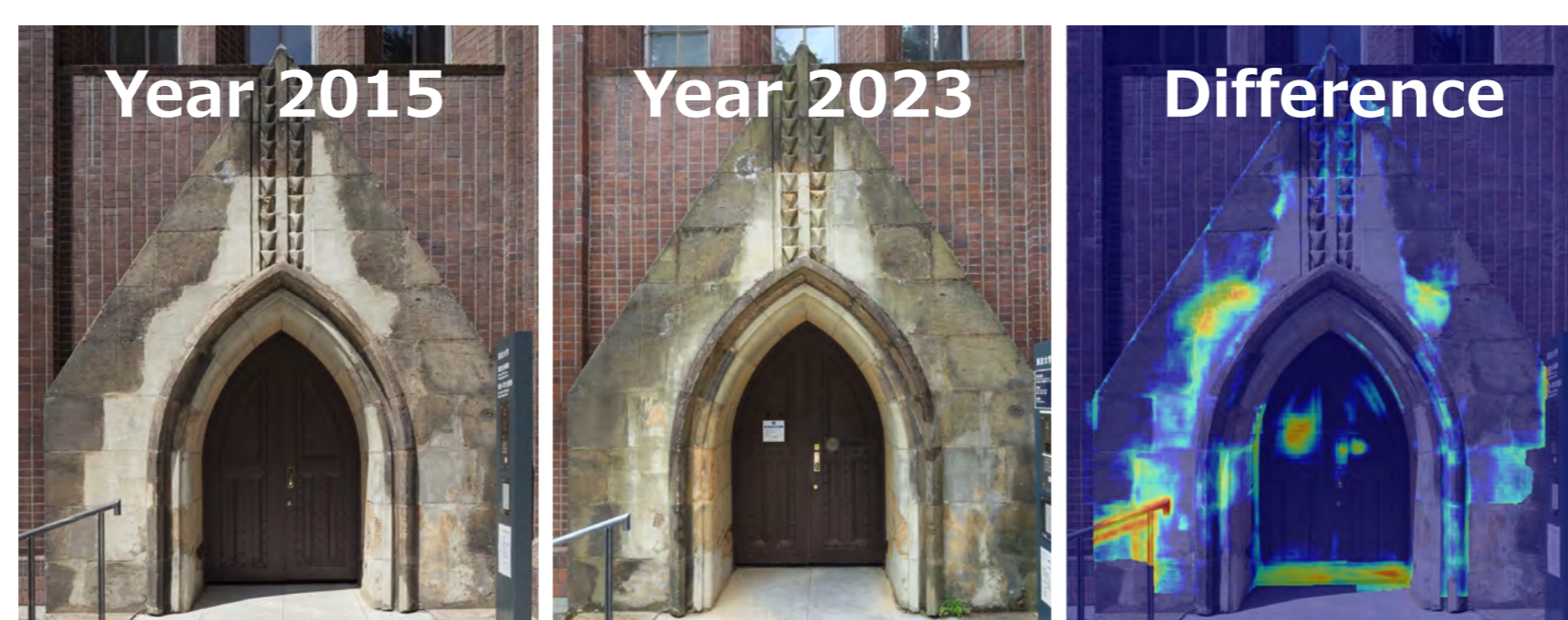
Tests of the safety net



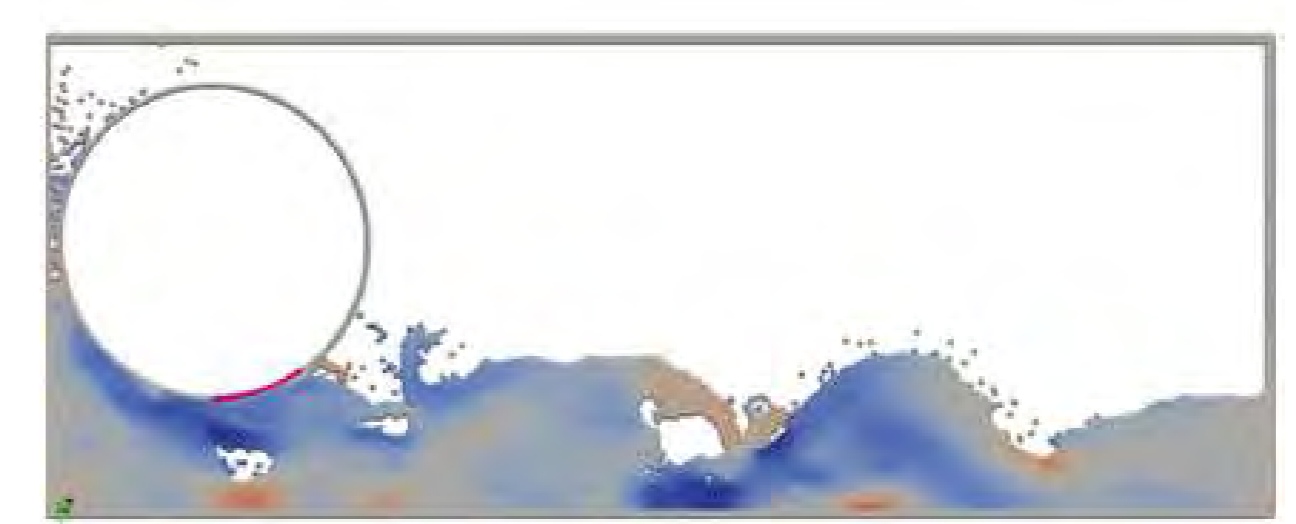
Ceiling reinforcement with cables



Air membrane shelter



Change-point Detection with image processing



Simulation of air membrane shelter using MPS method

Structural Performance of Buildings

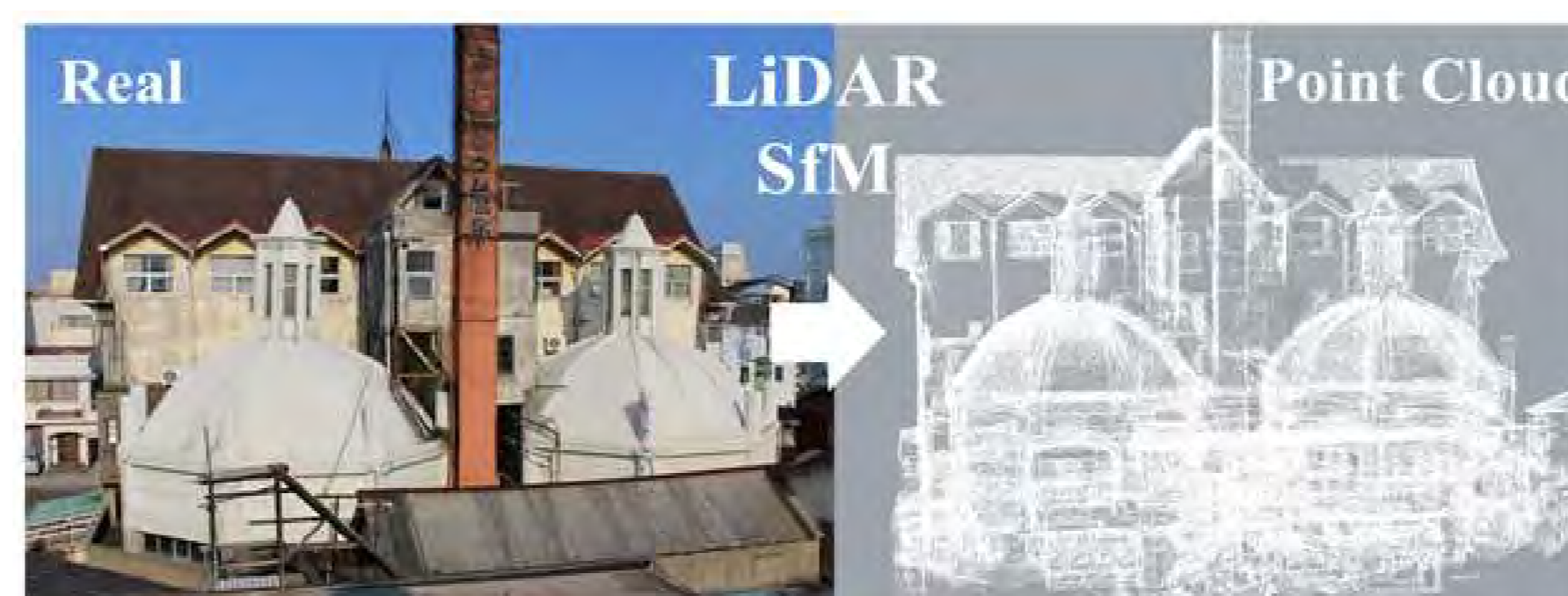
We have been researching and developing various buildings which practically use advantages of spatial structure. The application of living plants for building structures is also investigated.



Construction of tensegrity structures



Inoculation of trees



Extraction of significant data from point cloud



Pneumatically Prestressed Arch



Seismic damper devices for narrow walls