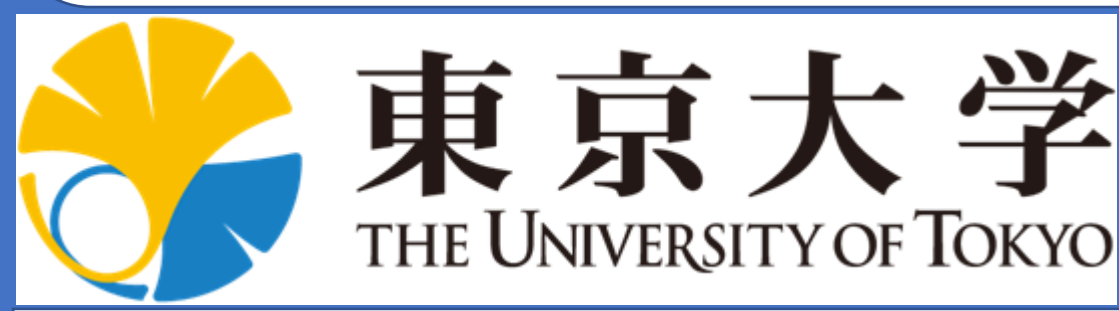


Evaluation of Suffusion Potential for Different Gap-Graded Soil Compositions and the Possibility of Delayed Scour

配合の異なるギャップグレード珪砂からの細粒分の吸出し現象および遅れ洗掘の発生可能性の評価



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Introduction:

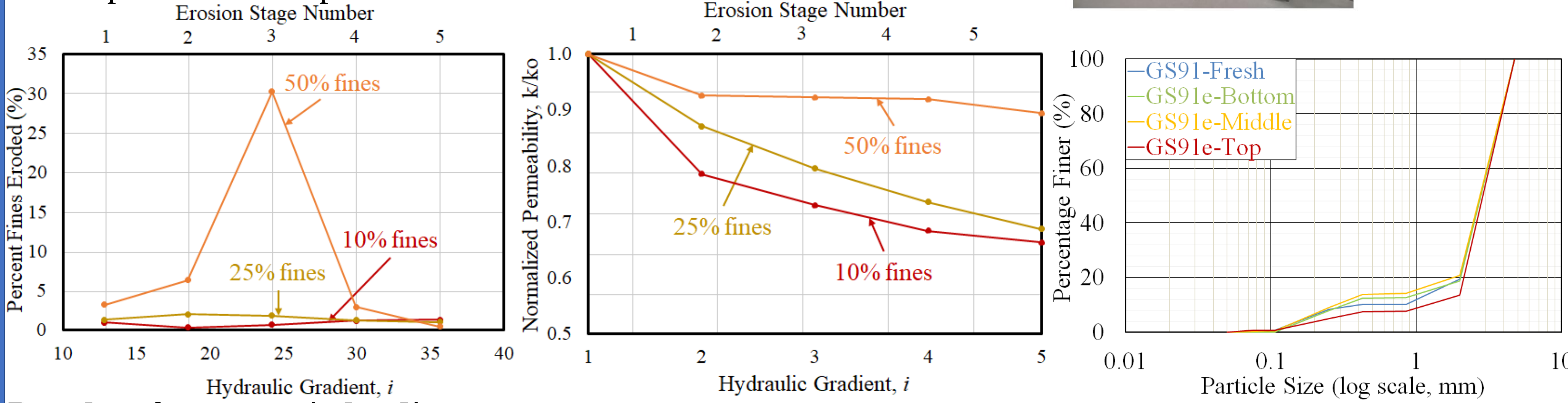
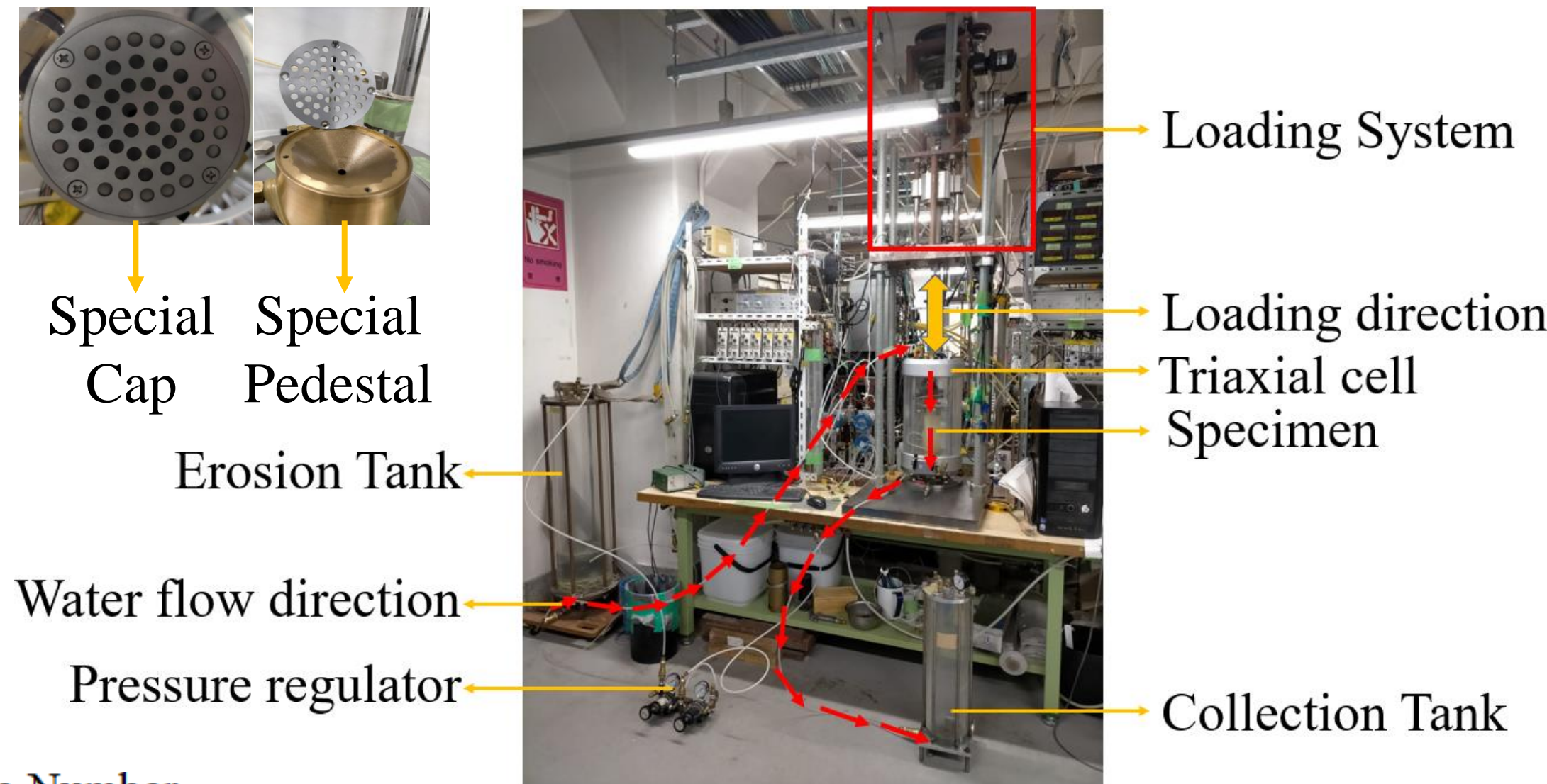
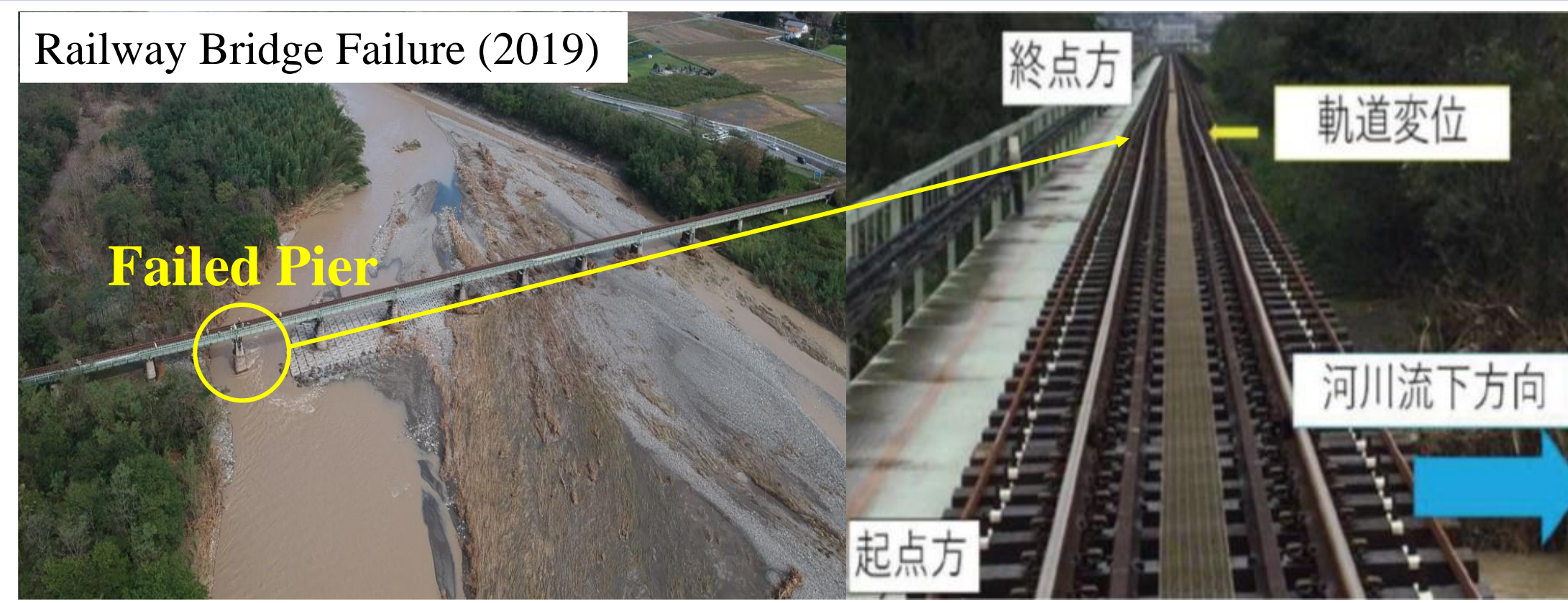
Suffusion is seepage induced fine mass loss from the soil mix. In Japan, many bridge piers with shallow foundations have failed because of it. This study is aimed at understanding suffusion and the conditions which leads to “delayed scour”, causing failure of structures several days after the heavy rainfall, as it is almost impossible to detect and predict.

Methodology:

The triaxial apparatus modified for erosion tests was used to test different gap-graded compositions prepared between silica sand no. 2 and silica sand no. 7 by under-compaction method at same relative density of 79%.

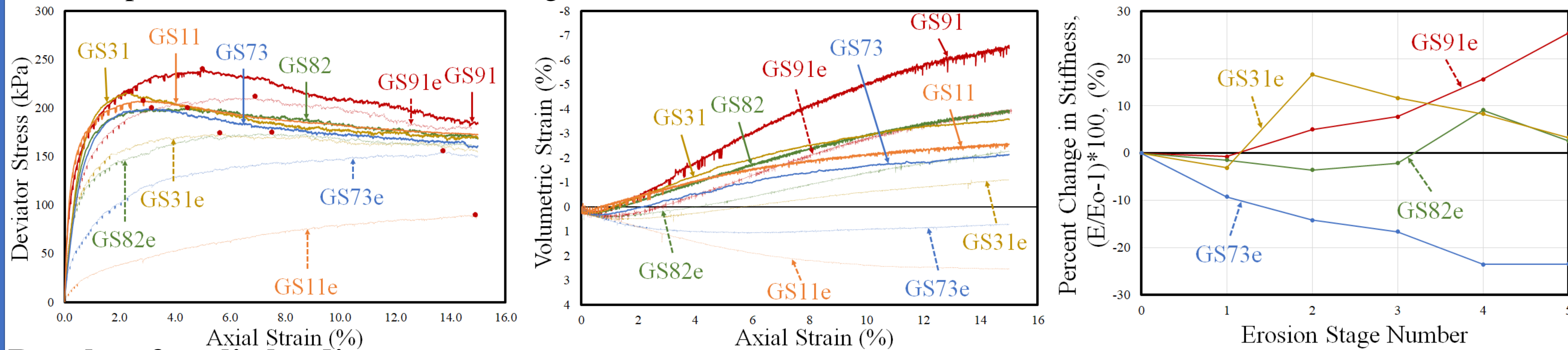
Results of erosion tests:

Under same erosion conditions, soil with higher fines content exhibits higher erodibility. The permeability of soil decreases as the erosion progresses due to the fine enrichment of the middle part of the soil specimen.



Results of monotonic loading tests:

The monotonic loading tests on eroded and non-eroded tests on different gap-graded compositions showed that the soil exhibit less strength and has become more contractive after erosion. The stiffness of low initial fines content specimen shows an increase while that of high initial fines content exhibits a decrease. The stiffness of medium fines content specimen fluctuates but on average remains unaffected. [GSXYe → X: Coarse fraction, Y: Fines fraction, e: Eroded]



Results of cyclic loading tests:

Cyclic loading tests on different compositions illustrates that when the “suffusion” is transformed into “suffusion”, there is large accumulation of strain under the cyclic loading. It is accompanied by a drastic decrease in the stiffness of the soil. It may be one of the reasons of the delayed scour observed at the actual site.

