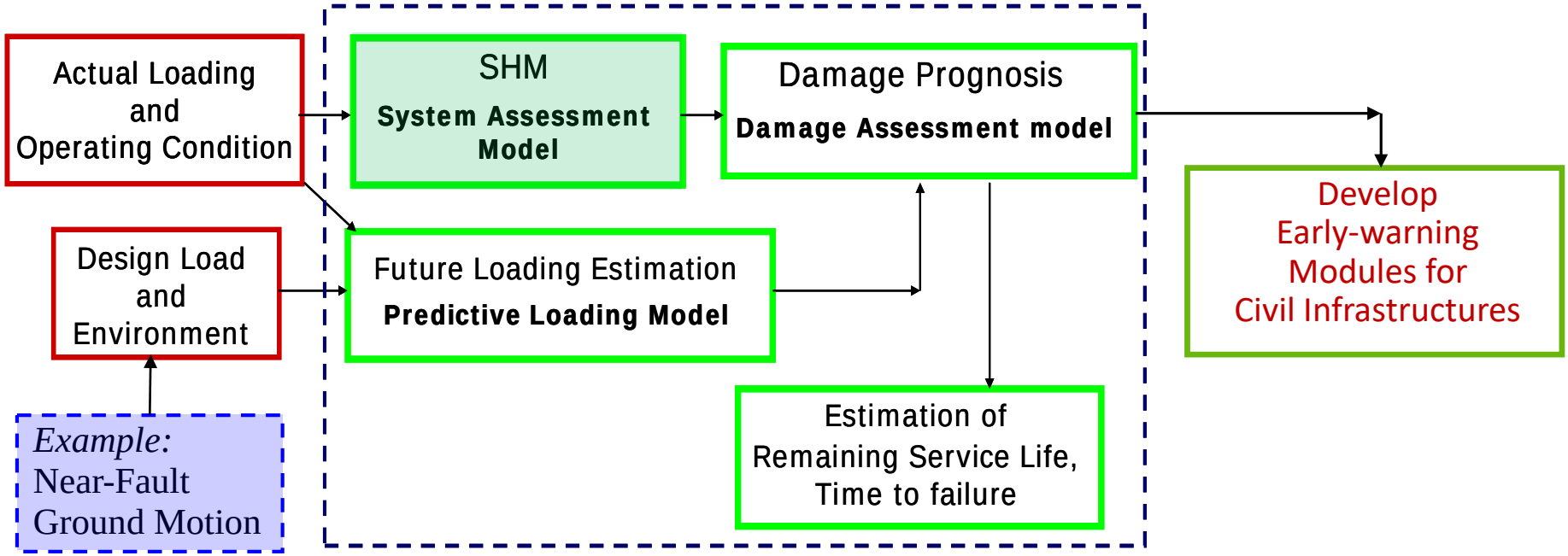
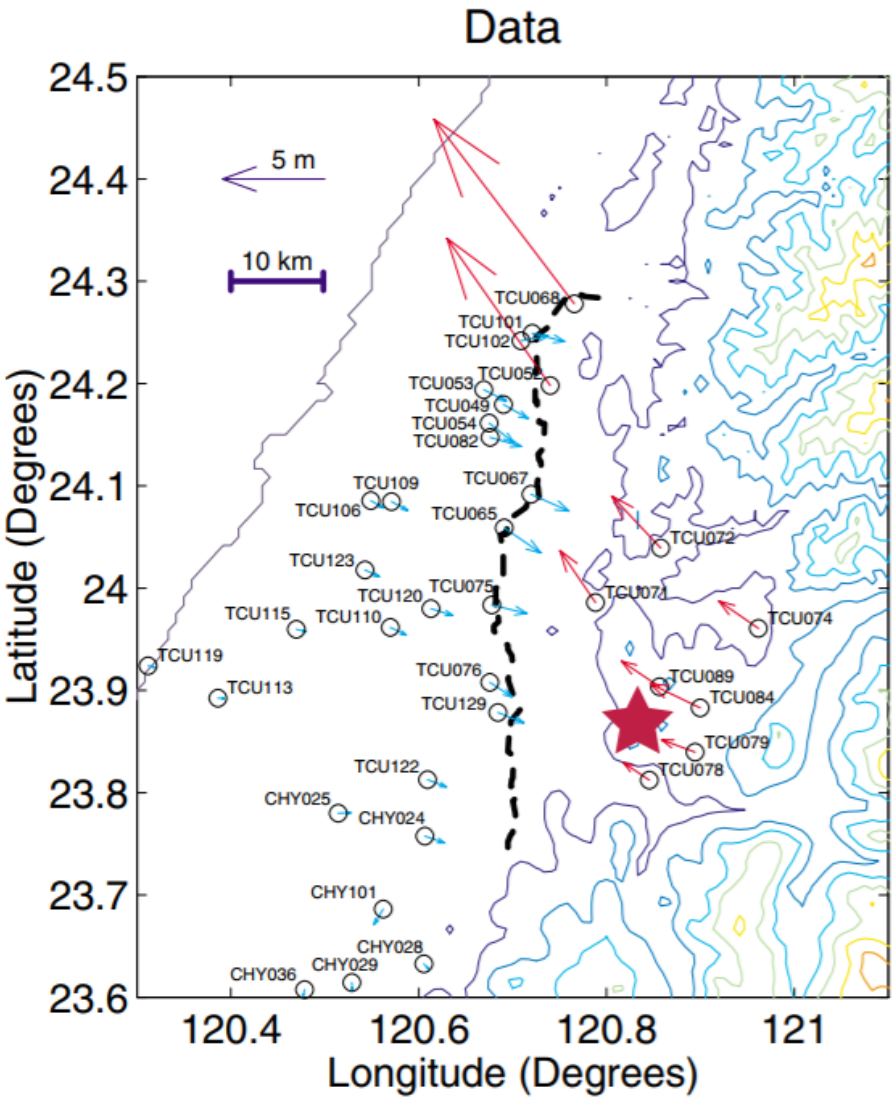
Structural safety under near-fault and/or multiple hazards threat, and disaster mitigation strategies for enhancing resilience.

Sensing and diagnostic of impending structural failure



- SHM should be able to provide reliable information pertaining to the safety and integrity of a structure, which is considered very important to infrastructure management
- By incorporating the collected information in maintenance or management strategies, SHM can enhance the life-cycle performance of civil infrastructures, verify and improve design methodologies,

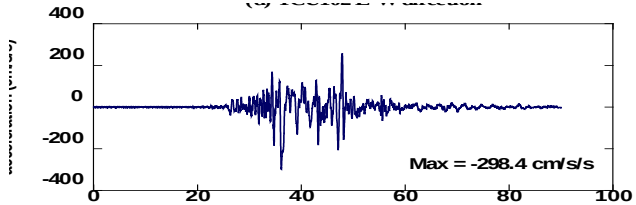
Structural safety under near-fault and/or multiple hazards threat, and disaster mitigation strategies for enhancing resilience.

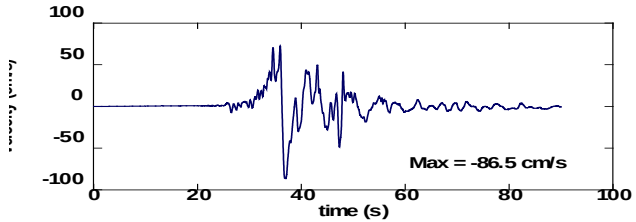


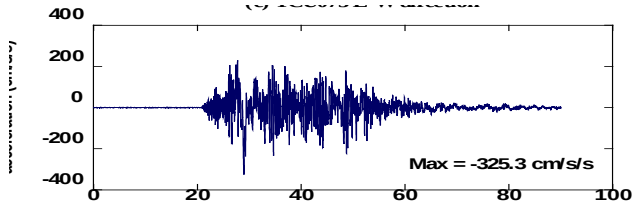
Structural safety under near-fault and/or multiple hazards threat, and disaster mitigation strategies for enhancing resilience.

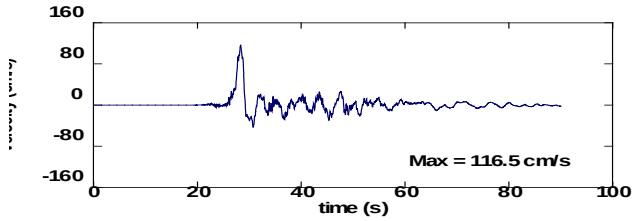
Near-Fault Ground Motion
(from Chi-Chi earthquake)

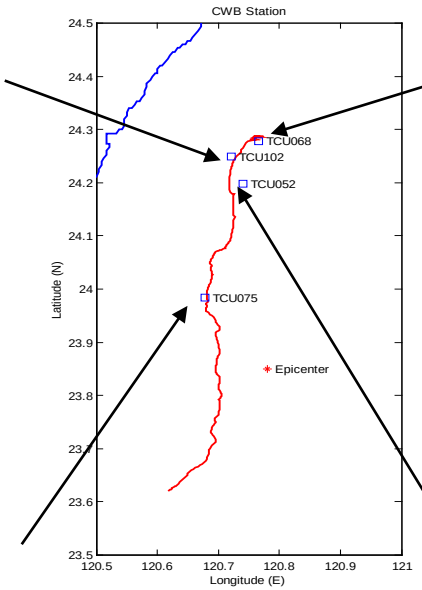
Station	PGA (cm/s^2)	PGV(cm/s)	Distance(km)	PGV/PGA	Pulse Duration
TCU052	348.7	181.8	2.34	0.521	5.54 sec
TCU068	501.6	280.2	0.49	0.559	3.85 sec
TCU075	325.3	116.5	0.43	0.358	3.08 sec
TCU102	298.4	86.5	0.81	0.290	7.69 sec

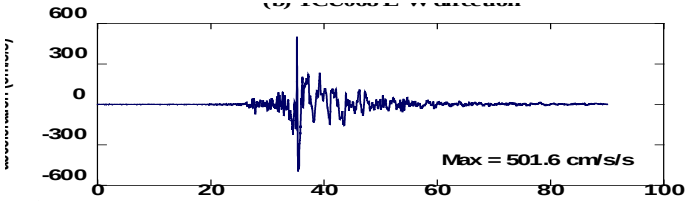


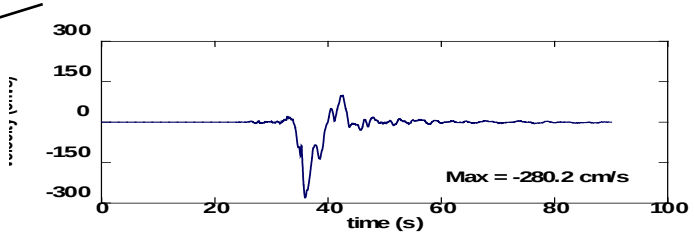


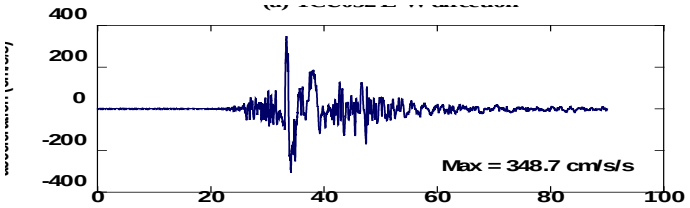


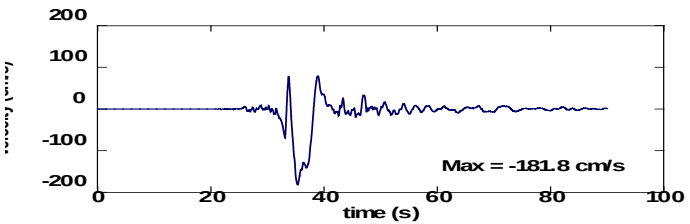












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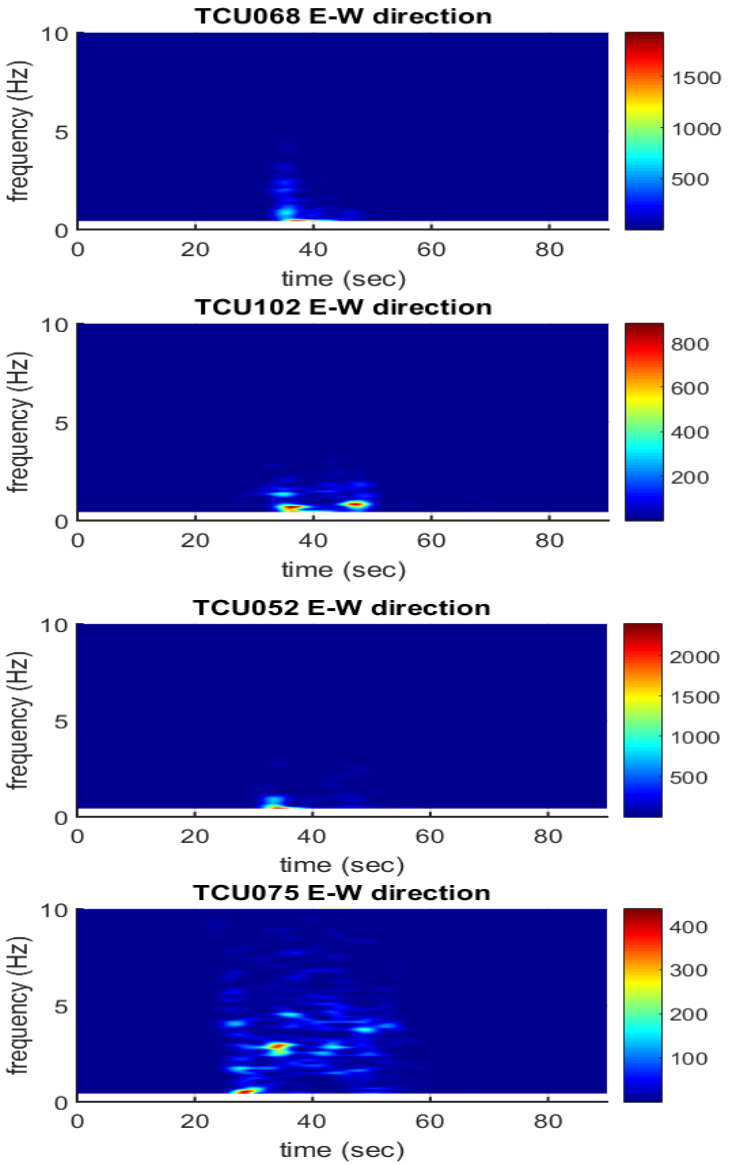

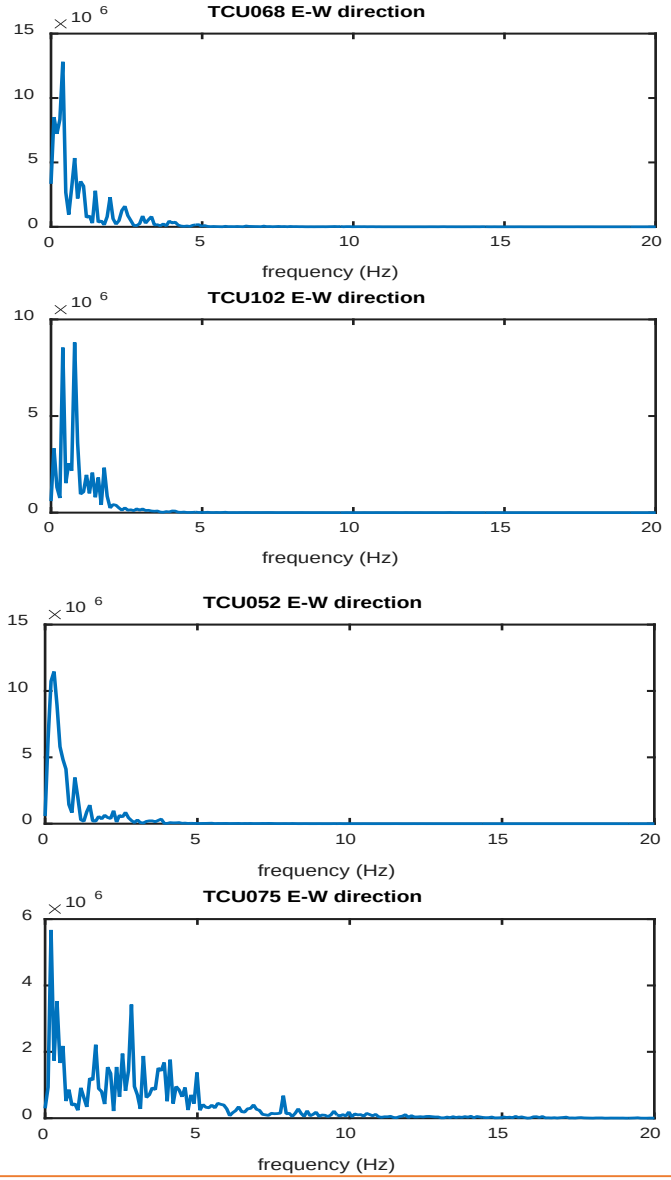

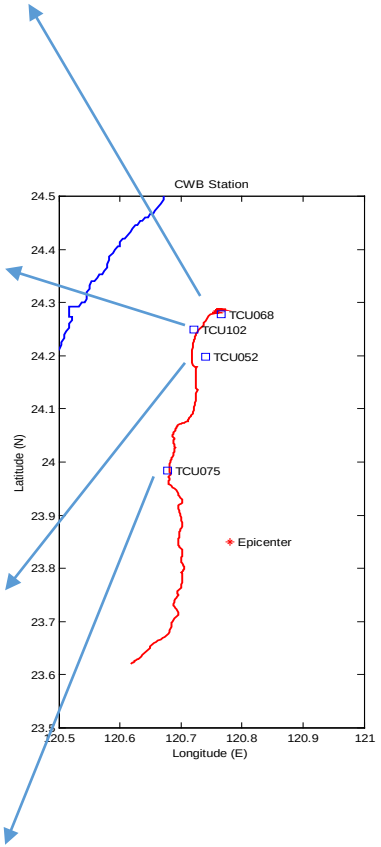

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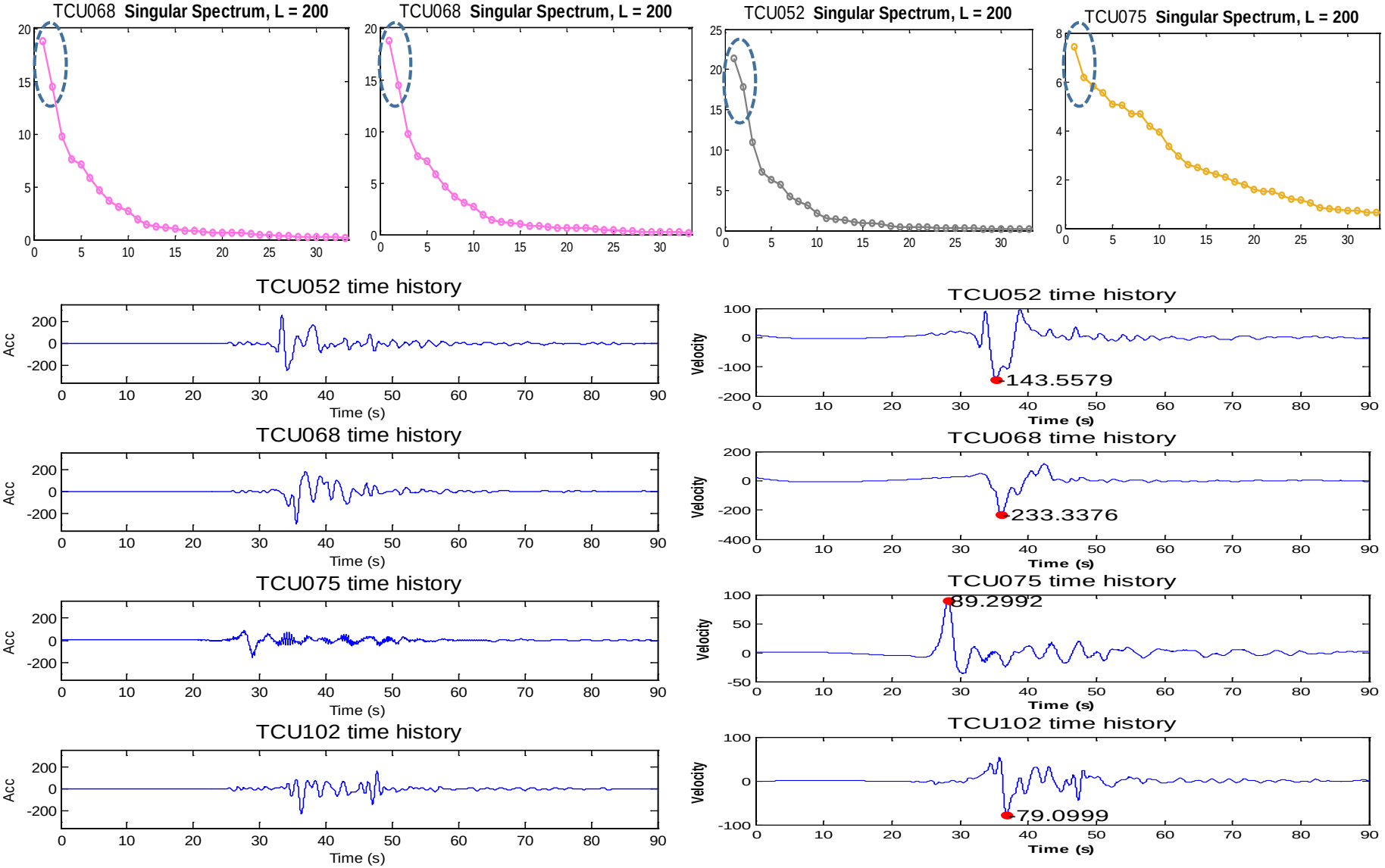

Challenges in SHM of Civil Structures

Civil Infrastructures

- Huge size (large scale) and vast mass of materials,
- Long service life (> 50 years),
- Harsh and varying environmental conditions
- In-place conditions different from the design assumptions

OMA based damage assessment

√ Develop measurement strategies,
√ Increase the number of excited modes,
√ Eliminate environmental influences,
√ Increase the sensitivity to local damages,

Damage detection (alarm level)

√ Explore more damage related dynamic features,
√ Consider statistically relevant deviation,
√ For permanent monitoring '**automatic system identification**' is mandatory,
√ Highly advisable for periodic monitoring,
√ Develop modal updating technologies (Optimization algorithm)