

# The main developments of Seismology and Earthquake Engineering since middle 1700's and the new challenges for a sustainable society

Ambraseys Lecture (September 2021)

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## SUMMARY

- A look to the evolution of both Seismology and Engineering Construction since mid-1700's until mid-1900's is presented to understand the main accomplishments achieved. Then, I perspective the new advancements towards future mitigation of earthquake impacts with a clear proposal in the direction of sustainability and ecological challenge.
- I will concentrate in the analysis of the phase 1755-1950, because not enough attention has been paid recently to this interesting period. Next, I jump to our days to look into a few great problems that require the involvement of the scientific, technical and political communities. In particular:
  - (i) I will look into the developments that Intensity Scales should pursue to reduce uncertainties, since more than 20 years have passed since the last upgrade and to the fact that today the information that results from new events is much more extensive and reliable than in the past. Several examples will be presented to illustrate how the frequency of motion should be included in the main categories (Building typologies and Vulnerabilities; Damage Grade; Quantity definition), and how it could be very helpful to add a few more descriptors to the Scale, namely shaking of objects and sloshing of water in recipients.
  - (ii) I will analyze the lines of development to mitigate earthquake impacts, responding to present and future needs, concentrating on the new scientific developments that are changing seismology from a "back-analyst" science (indirect contribution to earthquake engineering) into a more pro-active one, with direct contributions to reduce risk, such as the EEWS, and low-cost instrumentation. And changing earthquake engineering with the revolutionizing health monitoring, as a precautionary indicator of mal-function of structures, complemented with the citizen science. Finally, all these ingredients need to be merged into simple recommendations for which only data mining will be able to extract new reliable information.