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Editorial

This special issue is the outgrowth of a symposium held in Tokyo in May 2017 to mark the retirement of Robert (Bob) Geller as Professor of Geophysics at the University of Tokyo (called "Todai" in Japanese). Bob got his education at Caltech, and after six years at Stanford moved to Todai as associate professor in 1984, where he became the first tenured non-Japanese faculty member in Todai's history. He was promoted to full professor in 1999, and retired in March 2017 (as is mandatory at Todai at the end of the academic year in which faculty reach age 65). He is now professor emeritus at Todai.

Dave Yuen, who unlike everyone else calls Bob "Jimmy," after his middle name, James, was the driving force behind this special issue. Bob and Dave go back far in time and share many common experiences. They both grew up on the upper west side of Manhattan in New York City in the heady days of the 1950s and 60s, and both went to Caltech as undergraduates, with Dave three years ahead of Bob. Dave was a grad student at UCLA when Bob was a grad student at Caltech, and they have continued to interact over the years.

The 2017 symposium covered a wide swath of topics, including earthquake seismology, tsunami generation, seismic risk, slab dynamics, volcanic eruptions, and newer topics such as machine learning and visualization. Almost all of these topics are in or related to areas where Bob has worked. Only one of Bob's major research areas, seismic wave propagation and waveform inversion for 3-D Earth structure, was not covered by talks at the symposium or papers in this special issue.

This special issue contains nine papers.

Wang et al. present a new interactive computational virtual reality (VR) visualization framework for geophysical Big Data and models for the development of immersive collaborative virtual reality applications. Their framework includes a high-performance scalable persistent storage solution for the spatial analysis of Geospatial Information System (GIS) data, which uses an engine based on efficient in-memory computing.

Dye and Morra apply machine learning as a method for detection of Strombolian eruptions in infrared images. They demonstrate a new method that trains a convolutional neural network to automatically categorize eruptions in infrared images obtained from the rim of the crater above the Ray lava lake atop Mount Erebus.

Zhu et al. applied deep learning techniques to seismic phase detection and picking in the aftershock zone of the 2008 M_w7.9 Wenchuan Earthquake. Unlike other convolutional neural network (CNN)-based approaches that require millions of training samples, when the off-line training set size of these authors' CNN-based Phase-Identification Classifier (CPIC) is reduced to only a few thousand training samples the accuracy stays above 95%.

Tanioka and Gusman present near-field tsunami inundation forecast methods assimilating ocean bottom pressure data and conduct a synthetic test for the 2011 Tohoku-oki tsunami. Their results indicate that accurate tsunami inundation forecasts using pressure data from numerous ocean bottom sensors are now available.

Salditch et al. conduct a case study of issues in the analysis of historical intensity data for estimation of source parameter of the 1952 Kern County, California, earthquake. They show that comparing the observed intensity distribution to intensity-prediction models based on modern calibration events allows the magnitude to be more reliably estimated for many historic earthquakes.

Neely et al. ask whether we have seen the largest earthquakes in eastern North America. They show that, due to the relatively short period covered by presently available earthquake catalogs, the parameter M_{max} cannot always be reliably estimated. Note that the senior author of this and the above paper, Seth Stein, is Bob's brother in law.

Xie et al. conduct a tsunami hazard assessment for atoll islands inside the South China Sea, considering the case of the Xisha Archipelago. In contrast to previous deterministic assessments, they investigate the uncertainties caused by bathymetric resolution and rupture complexities, and find that using excessively coarse grids may lead to inaccurate estimates of tsunami hazards around mid-ocean atoll islands.

Yin et al. study seismicity in the Yunnan region using a multidimensional stress release model. Comparisons between the seismicity rates at the epicenter locations immediately before and after strong earthquakes show that the seismicity rates in the vicinity of the epicenters significantly decrease after strong earthquakes.

Bao et al. study the shallow structure of the Tangshan fault zone using data from a dense seismic array analyzed by horizontal-to-vertical spectral ratio methods. They show that the Tangshan fault zone has been significantly ruptured and modified by strong earthquake activity since the Quaternary. Their method is useful for probing active faults buried by thick sediments in densely populated urban settings, where seismic investigation with explosive sources is too hazardous to carry out.

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