

## Geological evidence for extreme wave events on the Sagara coastal lowland facing the Tōkai segment of the Nankai-Suruga Trough

Philipp Kempf<sup>1</sup>, Osamu Fujiwara<sup>3</sup>, Yosuke Miyairi<sup>4</sup>, Yusuke Yokoyama<sup>4</sup>, Atsunori Nakamura<sup>3</sup>, Ed Garrett<sup>2,1</sup>, Marc De Batist<sup>5</sup>, \*Vanessa Mary An Heyvaert<sup>1,5</sup>, QuakeRecNankai team

1. Geological Survey of Belgium, OD Earth and History of Life, Royal Belgian Institute of Natural Sciences, Jennerstraat 13, 1000 Brussels, Belgium, 2. Department of Geography and Institute of Hazard, Risk and Resilience, Durham University, United Kingdom, 3. Geological Survey of Japan, National Institute of Advanced Industrial Science and Technology, Japan, 4. Atmosphere and Ocean Research Institute, University of Tokyo, Japan, 5. Department of Geology and Soil Science, Ghent University, Belgium

Located close to Japan's densest concentrations of people and industry, the easternmost region of the Nankai-Suruga subduction zone has long been the focus of attempts to forecast future earthquakes. Historical records of the region attest to the occurrence of great earthquakes and subsequent tsunamis that may have originated from the Tōkai segment. However, past rupture zone extents and recurrence intervals remain poorly understood. Coastal stratigraphy has the potential to record the occurrence of both tsunami inundation and coseismic vertical land-level change over timescales far exceeding the historical record, with important implications for refining understanding of future hazards. Here we present results from an extensive coring survey of the lower reaches of the floodplain of the Sagara River, close to the town of Sagara, Shizuoka Prefecture. The site lies at an altitude of ~1 –5 m and is within the anticipated inundation zone of future worst-case tsunami scenarios. Typhoon-driven storm surges and river floods are also likely to have inundated the site, complicating the interpretation of potential tsunami deposits. Using X-ray fluorescence scanning, X-ray computer tomography scans, multi-sensor core logs and radiocarbon dates, we evaluate sedimentary processes to be able to distinguish between extreme wave events and fluvial deposits. Where possible, we assess methods to differentiate between storm surges and tsunami deposits. Finally, we evaluate the potential for the site to provide a long and continuous record of extreme wave events and highlight the probable influence of changing thresholds of evidence creation and preservation over time.

Keywords: tsunami history, floodplain sediments, XRF scanning, CT-scans