

Outline of the results of the investigation into allegations of specific research misconduct that occurred at
Osaka University

1. Outline and Background

Osaka University received four reports (including other additional documentation), dated September 27, November 22, December 12 and December 27, 2017, on allegations of research misconduct on papers concerning the Kumamoto earthquakes, etc., against a former Associate Professor of the Graduate School of Engineering of Osaka University.

In response, Osaka University set up an Investigation Committee and conducted a formal investigation into the allegations following a preliminary investigation pursuant to the Regulations regarding the Promotion of Research Integrity at Osaka University.

2. Investigation

(1) Investigation Committee

An Investigation Committee consisting of eight members (two from Osaka University and six from external organizations) was established to conduct a formal investigation.

(2) Papers in question

According to complainants, research misconduct is alleged to have been committed on a total of 44 papers.

(3) Investigation period

February 17, 2018 to December 17, 2018 (The committee met ten times during this period.)

(4) Investigation method and process

The committee closely examined the reported allegations of research misconduct, the papers under investigation, and the preliminary investigation results, collected and analyzed relevant data, and sent questionnaires, etc., to the former Associate Professor and his co-authors.

3. Investigation Results

(1) Types of specific research misconduct determined to have occurred

Fabrication and falsification

(2) Details of the specific research misconduct determined to have occurred

Though the former Associate Professor claimed that he had installed a seismograph himself and collected the observation data shown in the papers under investigation, the Investigation Committee has determined that

he fabricated this data by manipulating data observed by seismographs installed by other institutes and by other means. (Papers No. 1 to 5 on the attached list)

The Investigation Committee has also determined that he falsified the theoretical calculation values to make the fabricated data look more convincing. (Paper No. 4 on the attached list)

(3) Papers for which determination is reserved

As a result of investigating the 17 papers (No. 6 to 22) on the attached list, the Investigation Committee has found that the theoretical values calculated from the ground data shown in the papers are not consistent with the values shown in the figures in the same papers, and that the observation data (waveforms) shown in the papers are almost identical to those obtained by other institutes at different locations. Accordingly, the committee has concluded that these papers are strongly suspected of either (1) falsification of calculation results or (2) fabrication of research data, both of which could constitute specific research misconduct.

However, the former Associate Professor died before the investigation into these papers started, so the committee was unable to examine raw data or interview him.

Accordingly, the Investigation Committee has concluded that determination as to whether the specific research misconduct was committed or not must be reserved.

Additionally, of the 44 papers in question, it was impossible to confirm the evidence gathered on the alleged misconduct of the remaining 22 papers during the preliminary investigation.

(4) Involvement of co-authors in the specific research misconduct

As a result of interviewing the co-authors during the preliminary and formal investigations, the Investigation Committee could not find proof that the co-authors had been involved in the specific research misconduct.

Similarly, the committee could not find proof of their involvement in the misconduct in the 17 papers for which determination is reserved.

(5) Research fund used for the specific research misconduct

The following research fund was used in one of the five papers for which specific research misconduct has been determined:

- Grants-in-Aid for Scientific Research from the Japan Society for the Promotion of Science (KAKENHI)
¥138,105 (paper publication fee)

The Investigation Committee has concluded that the Grants-in-Aid for Scientific Research other than the above paper publication fee was appropriately used for research in line with the research plan and no misuse was committed.

In addition, all the other research funds including basic expenses were appropriately spent, and no misuse was found.

4. Conclusion of Osaka University based on Investigation Results and Reason for the Conclusion

(1) Five papers (No. 1 to 5) for which specific research misconduct has been determined

Pursuant to Article 2 of the Regulations regarding the Promotion of Research Integrity at Osaka University (amended on April 1, 2018) (hereinafter referred to as “Osaka University Research Integrity Regulations”), the Investigation Committee has determined that specific research misconduct was committed in these papers after examining each allegation and comprehensively considering the following facts:

- Article 28 of the Osaka University Research Integrity Regulations stipulates that for matters not provided therein, the Guidelines for Responding to Misconduct in Research (Decision of the Minister of Education, Culture, Sports, Science and Technology of August 26, 2014) (hereinafter referred to as “Guidelines”) shall apply, and the Guidelines state: “If evidence was presented for the specific research misconduct, and the suspicion of specific research misconduct is not dispelled by the respondent’s explanations or other evidence, then specific research misconduct shall be determined. The same shall be true if the respondent does not present sufficient evidence to dispel the suspicion of specific research misconduct due to a lack of raw data, experimental and observation notes, test samples and reagents, etc., or other key components of research that should normally exist.”
- The Investigation Committee requested the former Associate Professor to submit raw data and explain how and in what manner he had conducted observations, but he failed to present objective evidence convincing enough to dispel the suspicion.

In addition, the former Associate Professor's co-authored book, *Revealing Strong Ground Motions during Damaging Earthquakes: with Digital Data of Estimated Ground Motions* (September 13, 2016, Osaka University Press), contains an abstract and digital data compiled from estimations of earthquake waveforms taken from Paper no. 5 (from the list of papers of alleged misconduct).

This paper was presented by the former Associate Professor in March 2012 before he was employed by Osaka University, but the book was published after he became an academic staff member of the university. For this reason, the book was investigated pursuant to the Osaka University Research Integrity Regulations. The misconduct was committed extensively and for a long time and thus has serious adverse impacts on the scientific achievements and trustworthiness of Japan’s earthquake studies. In this light, the Investigation Committee has determined that the misconduct was committed with highly malicious intent.

(2) 17 papers for which determination was reserved (Papers No. 6 to 22)

In the case of these 17 papers, the Investigation Committee was unable to interview the former Associate Professor or examine raw data as mentioned above, and thus has reserved determination as to whether specific research misconduct was committed or not as a result of consideration pursuant to the Osaka University Research Integrity Regulations and the Guidelines, though these papers are strongly suspected of specific research misconduct.

5. Actions Taken by Osaka University

- Suspension of competitive research funding

The former Associate Professor resigned from Osaka University on December 28, 2017. Accordingly, the

university submitted a notice to discontinue the research project he conducted with KAKENHI granted in AY2017 to the Japan Society for the Promotion of Science and obtained its approval.

6. Causes of the Specific Research Misconduct and Measures to Prevent Recurrence

In September 2006, Osaka University drew up the General Outline regarding the Compliance of Research Integrity at Osaka University and the Regulations of the Research Integrity Committee at Osaka University and has since amended existing relevant regulations as necessary in line with the Guidelines and worked to prevent research misconduct and enhance awareness of research integrity throughout the university. However, the occurrence of the specific research misconduct has made the university aware of insufficient compliance by researchers with the code of conduct, research ethics, and procedures for handling research data.

To prevent the recurrence of research misconduct, Osaka University will take the following measures:

- (1) Make renewed efforts to raise awareness of the necessity of attending training sessions and courses to deepen understanding of research ethics among all researchers and produce and distribute handouts calling for the prevention of research misconduct.
- (2) Ensure all researchers have a full understanding of the appropriate storage of research data specified in relevant regulations of the University and its divisions as well as the Guidelines, and prepare to launch university-wide initiatives to monitor the handling of research data.

List of papers for which specific research misconduct has been determined (including reservation of determination)

No.	Title of paper	Conclusion
1	Preliminary analysis of strong ground motions in the heavily damaged zone in Mashiki Town, Kumamoto, Japan, during the main shock of the 2016 Kumamoto Earthquake (Mw7.0) observed by a dense seismic array, Hata, Y., Goto, H. and Yoshimi, M., Seismological Research Letters, SSA, Vol.87, No.5, pp.1044-1049, September, 2016.	Fabrication committed
2	Evaluation of ground motions at damaged bridge sites along Kyushu Expressway during the 2016 Kumamoto earthquakes based on the temporary aftershock observations, Yoshiya Hata, Masaaki Yabe, Masaki Hashinoki, Yoshikazu Takahashi, Akira Kasai, Hiroshi Matsuzaki and Mitsuyoshi Akiyama, Journal of Structural Engineering, JSCE, Vol.63A, pp.251-264, March, 2017 (in Japanese).	Fabrication committed
3	Evaluation of ground motions at damaged bridge sites in Nishihara Village and Minamiaso Village during the 2016 Kumamoto Earthquake based on the temporary aftershock observations, Yoshiya Hata, Masaaki Yabe, Atsushi Nozu, Akira Kasai, Yoshikazu Takahashi, Hiroshi Matsuzaki and Mitsuyoshi Akiyama, Journal of Structural Engineering, JSCE, Vol.63A, pp.265-278, March, 2017 (in Japanese).	Fabrication committed
4	Recovery process of shear wave velocities of volcanic soil in central Mashiki Town after the 2016 Kumamoto earthquake revealed by intermittent measurements of microtremor, Hata, Y., Yoshimi, M., Goto, H., Hosoya, T., Morikawa, H. and Kagawa, T., Earth, Planets and Space, Vol.69:72, May, 2017.	Fabrication and falsification committed
5	Revealing Strong Ground Motions during Damaging Earthquakes: with Digital Data of Estimated Ground Motions, Yoshiya Hata and Atsushi Nozu, Osaka University Press, September, 2016 (in Japanese). (Original paper: Seismic waveform evaluation at the Fujinuma Dam for the 2011 off the Pacific coast of Tohoku Earthquake -Application of site effect substitution method to a huge subduction earthquake-, Yoshiya Hata, Susumu Nakamura and Atsushi Nozu, Journal of Structural Engineering, JSCE, Vol.58A, pp.250-263, March, 2012 (in Japanese)).	Fabrication committed
6	Seismic waveform estimation at damaged site of road embankment along national highway No.443 during the 2016 Kumamoto Earthquake based on the temporary foreshock observations, Yoshiya Hata, Fumihiro Minato, Hirokazu Kadota and Ken-ichi Tokida, Ground and Construction, Chugoku Branch of Japanese Geotechnical Society, Vol.34, No.1, pp.119-126, December, 2016 (in Japanese).	Determination reserved
7	Seismic waveform estimation at damage sites along Yamanami Highway during the 1975 Mid Oita Prefecture Earthquake based on the Pseudo Point-Source Model, Yoshiya Hata, Hirokazu Kadota, Ken-ichi Tokida and Koji Ichii, Ground and Construction, Chugoku Branch of Japanese Geotechnical Society, Vol.34, No.1, pp.153-159, December, 2016 (in Japanese).	Determination reserved
8	Continuous ground motion-tsunami damage simulation of a river dyke due to the 2011 Tohoku Earthquake, Yoshiya Hata, Ryusuke Tanimoto, Ken-ichi Tokida and Itsuro Tatekawa, Journal of JSCE, A1, Vol.70, No.4, pp.I_369-383, July, 2014 (in Japanese).	Determination reserved
9	Ground motion estimation at derailment site along Houhi Line during the main shock of the 2016 Kumamoto earthquake based on temporary aftershock observations, Yoshiya Hata, Takaaki Ikeda and Mitsuyoshi Akiyama, Journal of railway engineering, JSCE, No.21, pp.233-237, July, 2017 (in Japanese).	Determination reserved
10	Seismic waveform estimation at Takada residential cluster in Agano city during the 1995 Northern Niigata Prefecture Earthquake based on the pseudo point-source model, Yoshiya Hata, Fumihiro Minato, Masaki Yamaguchi and Yutaro Okawa, Proc. of the 37th JSCE Earthquake Engineering Symposium (CD-ROM), October, 2017 (in Japanese).	Determination reserved
11	Ground Motion Evaluation at Landslide Site in Proximity of Aso Bridge for the Main Shock of the 2011 Kumamoto Earthquake, Hata Yoshiya and Ichii Koji, Journal of Japan Association for Earthquake Engineering, Vol.17, No.5, pp.133-138, November, 2017 (in Japanese).	Determination reserved
12	Strong motion evaluation in tsunami attack area, Aonae district, Okushiri island, Japan for the 1993 southwest Hokkaido Earthquake based on microtremor measurements with high dense spatial location, Fumihiro Minato, Yoshiya Hata, Masayuki Yamada, Yasuko Kuwata, Maki Koyama, Tadayoshi Nakashima and Ken-ichi Tokida, Journal of JSCE, A1, Vol.72, No.4, pp.I_884-I_894, May, 2016 (in Japanese).	Determination reserved
13	Microtremor measurements with high density in Kushimoto Town, Wakayama Prefecture, Japan, Yoshiya Hata, Fumihiro Minato, Masayuki Yamada, Ken-ichi Tokida and Masaki Uotani, BUTSURI-TANSA, Vol. 68, No. 2, pp. 83-90, April 2015 (in Japanese).	Determination reserved

No.	Title of paper	Conclusion
14	Seismic performance evaluation of wasted railway embankment due to scenario earthquake with Mw 9.0 along the Nankai Trough, Toyoko Yoshikawa, Fumihiro Minato, Yoshiya Hata, Takahiro Yamada, Ken-ichi Tokida and Tetsuo Tobita, Proc. of Kansai Geo-Symposium 2015, pp.215-220, 2015 (in Japanese).	Determination reserved
15	Evaluation of ground shaking characteristics in an expected tsunami attack area, Kushimoto Town, Wakayama Prefecture based on the microtremor measurements with very high density, Fumihiro Minato, Yoshiya Hata, Masayuki Yamanda, Ken-ichi Tokida and Masayuki Uotani, Proc. of Kansai Geo-Symposium 2014, pp.95-100, 2014 (in Japanese).	Determination reserved
16	Seismic waveform estimation at the Nikawa landslide site during the Southern Hyogo Prefecture Earthquake in 1995, Yoshiya Hata, Yasuko Kuwata, Gonghui Wang, Toshitaka Kamai, Journal of the Japan Landslide Society, Vol.51, No.5, pp.23-28, September, 2014 (in Japanese).	Determination reserved
17	Seismic waveform estimation at the Nikawa landslide site during the 1995 Kobe Earthquake by use of observation records due to the 2013 Awaji Island Earthquake, Yoshiya Hata, Yasuko Kuwata, Gonghui Wang, Toshitaka Kamai, Ground and Construction, Chugoku Branch of Japanese Geotechnical Society, Vol.31, No.1, pp.13-20, December, 2014 (in Japanese).	Determination reserved
18	Evaluation of strong ground motion at Imagawa, Urayasu City, during the 2011 off the Pacific coast of Tohoku Earthquake, Hata, Y., Ichii, K., Nozu, A., Maruyama, Y. and Sakai, H., Soils and Foundations, Vol.54, No.4, pp.573-587, ELSEVIER, August, 2014.	Determination reserved
19	Ground motion estimation in Oyatsu residential cluster, Mashiki Town, Japan, during the main shock of the 2016 Kumamoto Earthquake based on high-dense microtremor measurements and temporary aftershock observation, Yoshiya Hata, Akira Murata, Fumihiro Minato, Ken-ichi Shibuya and Masakatsu Miyajima, Journal of JSCE, A1, Vol.73, No.4, pp. I_769-I_777, September, 2017 (in Japanese).	Determination reserved
20	Ground motion estimation at residential land in Mifune Town for the 2016 Kumamoto Earthquake sequence based on microtremor measurements and seismic observation, Yoshiya Hata, Masaki Yamaguchi, Toshitaka Kamai and Gonghui Wang, Journal of JSCE, A1, Vol.73, No.4, pp. I_981-I_987, September, 2017 (in Japanese).	Determination reserved
21	Evaluation of Strong Motion and Difficult Time for Tsunami Evacuation with High Density in Coastal Areas, Miyazaki City, Japan, during a Scenario Earthquake with MW9.0 along the Nankai Trough based on the SMGA Models considering Site Amplification and Phase Effects, Fumihiro Minato, Yoshiya Hata, Keisuke Murakami, Masayuki Yamada, Yasuko Kuwata, Maki Koyama, Tadayoshi Nakashima and Ken-ichi Tokida, Journal of Institute of Social Safety Science, No.29, pp.53-62, November, 2016 (in Japanese).	Determination reserved
22	Strong motion estimation in Oritate district, Sendai City, for the 2011 off the Pacific coast of Tohoku Earthquake based on extended site effect substitution method, Yoshiya Hata, Toshitaka Kamai, Gonghui Wang and Atsushi Nozu, Journal of JSCE A1, Vol. 69, No.4, pp. I_298-I_310, June, 2013 (in Japanese).	Determination reserved