

## **Researchers develop new tool to provide radiation monitoring in Japan**

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A team of researchers from the University of Southampton have designed a new tool to intelligently combine nuclear radioactivity data in Japan. The technology harnesses the power of crowdsourced radiation data; an innovative resource which became available after the 2011 Fukushima nuclear disaster.

During March 2011, the second-largest <u>nuclear emergency</u> since Chernobyl 1986 was caused by a magnitude nine Tsunami hitting the North-East coast of Japan and severely damaging the <u>nuclear power</u> <u>plant</u> of Fukushima-Daiichi. The consequent <u>nuclear accident</u> provoked radioactivity increases of up to 1,000 times the normal levels in the area of Fukushima with more than 488,000 people being evacuated from their homes for the risk of nuclear contamination.

In response, private individuals brought forward the unprecedented effort of deploying 577 <u>Geiger counters</u> across the country to help the public monitor the spread of the nuclear cloud. These sensors were mostly built using low-cost open hardware boards such as Arduino and were able to stream radiation data in real time connected through the Cosm <u>web platform</u>. This crowdsourced <u>sensor network</u>, also known as the Cosm network, came to life in less than two weeks after the Tsunami and provided very relevant data to both official authorities and local citizens for monitoring the evolution of the disaster. More recently, the network was extended to 1,024 sensors contributed by several other organisations such as Safecast and the Ministry of Education, Culture, Sports, Science and Technology of Japan (MEXT). All together, the



Cosm sensors provided more than 27 million readings since the day of the Fukushima disaster.

According to the researchers, a key element in order to incentivise people to take part in crowdsourcing projects is to help them understand these large quantities of data. To help people gain such an understanding, it is important to close the loop and feedback the results to the data contributors.

For this reason, the researchers have developed the Japan Nuclear Crowd Map (JNCM jncm.ecs.soton.ac.uk/): a web platform that combines into a single database the sensor readings provided from the three main crowdsourced radiation monitoring services: Cosm, Safecast, MEXT.

Matteo Venanzi, from the University of Southampton, who developed JNCM says: "The platform automatically collects raw radiation data from the online sensors and uses a non-parametric Gaussian process model to fuse the data into a single radiation map over Japan. The estimates are then shown to the users as a heat map and an intensity map, showing the average radioactivity in each prefecture. The users can also search by postcode to find out the radioactivity in their neighbourhood based on the latest predictions."

JNCM is also available for smartphones with the JNCM Android app. Through the app, the users can visualise the radiation heat map directly on their phones as data are collected and also know the radiation level at their current location.

Yuki Ikumo, also from the University of Southampton, who developed the JNCM Android app says: "JNCM aims to be one of the future technologies for disaster managements in which the large participation of people will play a crucial role in community-based sensing



crowdsourcing environmental monitoring tasks."

JNCM users can now perceive the usefulness of this technology by freely accessing a number of <u>radiation</u> monitoring services based on the data contributed by thousands of crowd members.

Provided by University of Southampton

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