

# Last Two Year's Activities of WDC– Ionosphere and Space Weather

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The National Institute of Information and Communications Technology (NICT) has had a history of operational ionospheric observation with ionosondes since the International Geophysical Year (IGY) in 1957. In the beginning, we had four domestic observatories: Wakkanai, Akita, Kokubunji, and Yamagawa. Later Akita closed and Okinawa then joined, and we have operated these four observatories continuously. In addition, NICT has been observing ionosphere since IGY via Syowa station in Antarctica. As the World Data Centre for Ionosphere and Space Weather, we have ingested many ionospheric data obtained by foreign institutes.

The present ionosonde system, named 10C, provides digital images of ionograms. However, all previous systems provided analogue images and recorded them on film. Loss of data through corruption of these films has become a serious problem in recent times. The only solution has been to digitize the images on the films, but the cost is usually very high. We have thus searched for a way to keep the cost low while maintaining image quality for future analysis, and discovered a method called ribbon scanning. In this method, we keep the entire data from one film in a single digital file, which ensures that the cost is low and avoids data loss due to frame skipping. In trials examining the resolution of the digital image, we could confirm that the quality was of the same level of the original image.

We have already had some fruitful research results utilizing the generated data archive with Maruyama et al. [1] showing statistical ionospheric variation after large earthquakes. Other than these types of study, we expect the archive will be useful in discussing long-term variation of ionosphere with climate change. However, to improve the use of the dataset, we need to solve another issue. Digitized film images are suitable for manual scaling with the naked-eye, but we cannot use these data automatically because the axes vary in each image. To solve this issue, we will attempt an image analysis to detect the axes automatically.

## Reference

1. Maruyama, T., Tsugawa, T., Kato, H., Ishii, M., & Nishioka, M. (2012) Rayleigh wave signature in ionograms induced by strong earthquakes. *J. Geophys. Res.*, DOI: 10.1029/2012JA017952