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Introduction of NICT ionospheric data archive system

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NICT has a long history of operational ionospheric observation with ionosondes since IGY 1957. On the beginning, we had four domestic observatories, Wakkanai, Akita, Kokubunji and Yamagawa. After that Akita was closed and Okinawa joined and we operate these four observatories continuously. In addition, Syowa station in Antarctica has been observing ionosphere by NICT since IGY, too. In addition as the World Data Center for ionosphere, we have a lot of number of ionospheric data obtained by foreign institutes.

The present ionosonde system named 10C provides digital image of ionogram. However, all other previous systems provide analog image and recorded on films. Now it becomes a serious problem to lose data by corrupted of films. The only solution of this issue is to digitize the film image but usually the cost is very high. We search the way to keep low cost and comfortable quality for future analysis and find a method named ribbon scanning. In this method we keep whole of one film data in one file, which makes cost low and avoid losing data by frame skipping. We had trial of resolution of digital image and confirm the quality is same level of original image.

We already had some fruitful results using these data archive. Maruyama et al. [2012] shows the statistic results of ionospheric variation after large earthquakes. Other than these kinds of study we expect the archive is useful for discussion of long-term variation of ionosphere with climate change. For improving the use of these dataset we need to solve another issue. Film-digitized images are suitable to manual scaling with naked-eye but we cannot use these data automatically because the axes vary in each image. To solve the issue we need to try image analysis to detect the axes automatically.

Reference

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

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