

## COMPARING LINGUISTIC MAPS FROM DIFFERENT SURVEYS

Chitsuko Fukushima

University of Niigata Prefecture, Japan

chitsuko@unii.ac.jp

### Abstract

There are four steps in the process of map-making using a computer: 1) Electronic data production, 2) Sorting and mapping data, 3) Comparing, integrating, superimposing, and linking data, and 4) Publishing linguistic maps. The third stage includes comparing linguistic maps from different surveys. In this paper, map comparison in this stage is focused and its examples are introduced to prove that the procedure is necessary to investigate detailed courses of linguistic change. First, linguistic maps of different surveys including the same area are compared to obtain interpretations from different perspectives. Second, linguistic maps targeted for different generation in the same area are compared to illustrate chronological changes shown as geographical distributions.

### Keywords

geolinguistics, linguistic maps, comparing and superimposing maps, minute linguistic maps, generational changes.

### 1. Introduction

The author reviewed the current trends in geolinguistics around the world as a commentator at an international symposium, prompted by papers read by geolinguists from various countries. The review has been already published as part of a report coauthored with David Heap in the first issue of *Dialectologia* (Fukushima and Heap 2008). In the description of current trends of geolinguistics, it is summarized that there are four steps in the process of map-making using a computer: 1) Electronic data production, 2) Sorting and mapping data, 3) Comparing, integrating, superimposing, and linking data, and 4) Publishing linguistic maps (Fukushima and Heap 2008: 142). Usually only the first and second steps have been practiced, but the recent trends of geolinguistics, especially the one called *dialectometry*, promoted the development of the third step of process.

Linguistic maps are compared in various ways for different purposes: 1) Comparing linguistic maps from different linguistic items, 2) Comparing linguistic maps from different surveys, and 3) Comparing linguistic maps with other kinds of thematic maps such as topographical maps and demographic maps. The first type of comparison is done to make a structural analysis of linguistic features. A group of linguistic maps are selected and compared to analyze a specific phonological, morphological, or syntactic feature and also to investigate a small lexical system such as kinship terms (Fukushima, 2000a, 2000b, forthcoming). The latest version of the third type includes applying to GIS (geographic information system) and superimposing maps (Onishi, 2007).

In this paper, the second type of comparison, comparing maps from different surveys, is focused, and how and why maps are compared is described by introducing examples of analysis. First, linguistic maps of different surveys including the same area are compared to obtain interpretations from several perspectives. Second, linguistic maps targeted for different generation in the same area are compared to show chronological changes shown as geographical distributions.

## **2. Comparing maps from different perspectives**

It is obvious that the information obtained from a linguistic map varies according to the surveyed area. W. A. Grootaers compared “wide area linguistic maps from a bird’s-eye view” and “minute linguistic maps” (Grootaers, 1976). He was convinced that “these two different types of linguistics maps have complementary meanings. In other words, we can learn a lot by combining these maps” (Grootaers, 1976: 49). The nationwide linguistic atlas such as *Linguistic Atlas of Japan* (LAJ) and *Grammatical Atlas of Japan* (GAJ) are examples of maps from a bird’s-eye view. *Atlas linguistique de la France* (ALF) is another typical example from the western tradition of geolinguistics. The linguistic distributions of such wide area atlases lead us to make an interpretation of centuries of or longer linguistic history in the area. On the other hand, the local linguistic atlas surveyed in a small area can guide us to examine specific, sometimes individual linguistic changes in the region. In the Japanese tradition of geolinguistics, the survey is made at every hamlet in the area as the ultimate style of a

thorough regional survey (we, so to speak, “comb the area”). These maps are what Grootaers called “minute linguistic maps” and equivalent to what K. Jaberg called “Kleinstatlantent” (Grootaers, 1976: 50). Of course, there are various levels of surveys in between these extremes: a prefecture (province)-level, a district-level, etc.

### 3. Comparison of wide area linguistic maps and minute linguistic maps

The author examined distribution patterns in linguistic maps of *Linguistic Atlas of the Five Provinces of West Japan* [LAFP] (Hiroto 1965), whose data were obtained from the linguistic survey made from 1955 to 1961. The atlas covers wide area but is district-level, middle size between national and local atlases. The surveyed area is located west to Kyoto, the historic capital of Japan, and the southern part of the area (San'yo) has more population and traffic than the northern part (San'in). Thus the main waves of new words spread from east to west and from south to north in this area (See Figure 1).

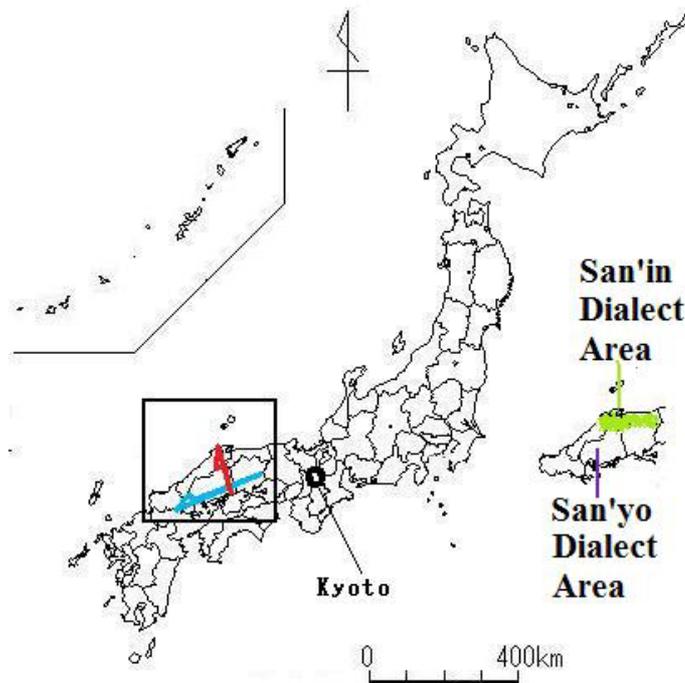


Figure 1. Surveyed Area of LAFP

Some maps in the atlas include word forms related with phonological changes of an old diphthong /au/. The diphthong became /o:/ in the southern part, San'yo Dialect Area, while it became /a:/ in the northern part, San'in Dialect Area. Some maps have clear isoglosses between the /o:/ area and the /a:/ area. These isoglosses of six maps were manually accumulated and the frequency of lines was shown as the width of the line (Figure 2). In some part, lines bundle, and in the other part, lines diffuse. It is expected that words in the southern dialect area spread to the northern dialect area along main roads connecting the south and the north.

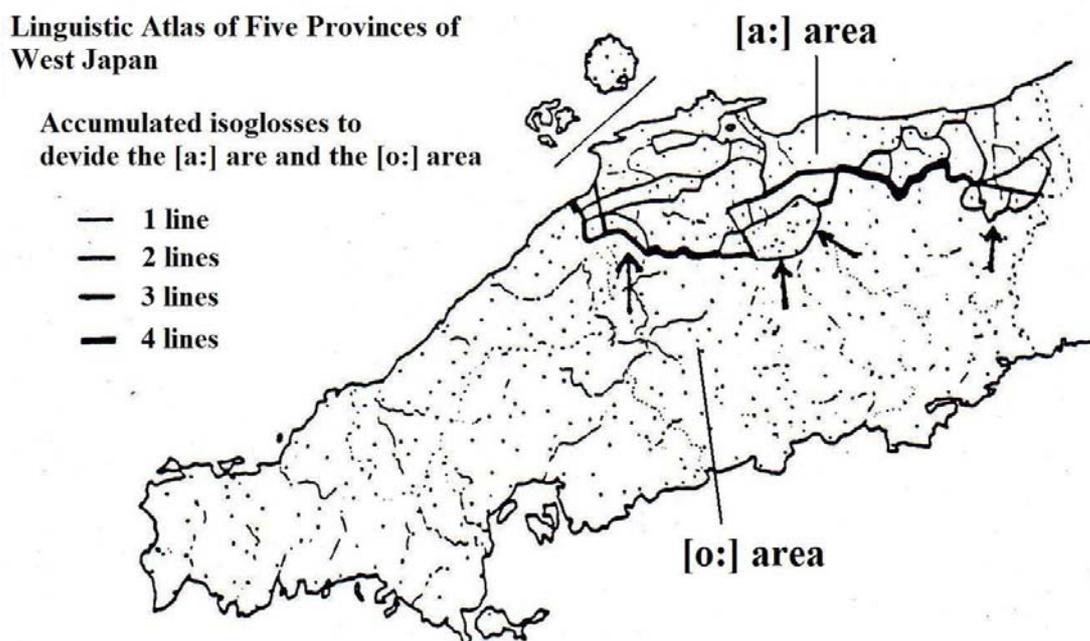


Figure 2. Accumulated isoglosses to divide the [o:] area and the [a:] area

This result prompted the author to do a geolinguistic survey in 1977 and 1978 to make “minute linguistic maps” in one of the key areas. The surveyed area, southwestern Izumo, is located on the dialect border between the San'yo Dialect Area and the San'in Dialect Area and along the main road connecting two cities, Hiroshima in the southern area and Matsue in the northern area (Figure 3). Among the surveyed items, maps were selected and examined with the focus on phonological changes cited above ([au] >[o:] VS [au] >[a:]) (Fukushima 2000b).

The following maps were made using SEAL<sup>1</sup> a software working on a PC. Taking advantage of a computer-assisted approach, what we call “contrast maps” were made to integrate maps by counting the frequency of contrastive word-forms at each locality through linguistic maps and plotting the figures as symbols with different sizes and colors in a linguistic map (Fukushima and Fukushima 2002). Whereas 14 maps of verb and adjective forms have similar geographic distributions (Figure 4), 21 lexical maps have quite different distributions (Figure 5). This was caused by lexical diffusion from south to north, which occurred more powerfully in lexical maps. The paradigm interfered with the evolution in morphological maps. Some informants using both [o:] form and the [a:] form reported that the [o:] forms spreading from the south were new.

The comparison of maps from different surveys supported and confirmed the original interpretation of language changes.

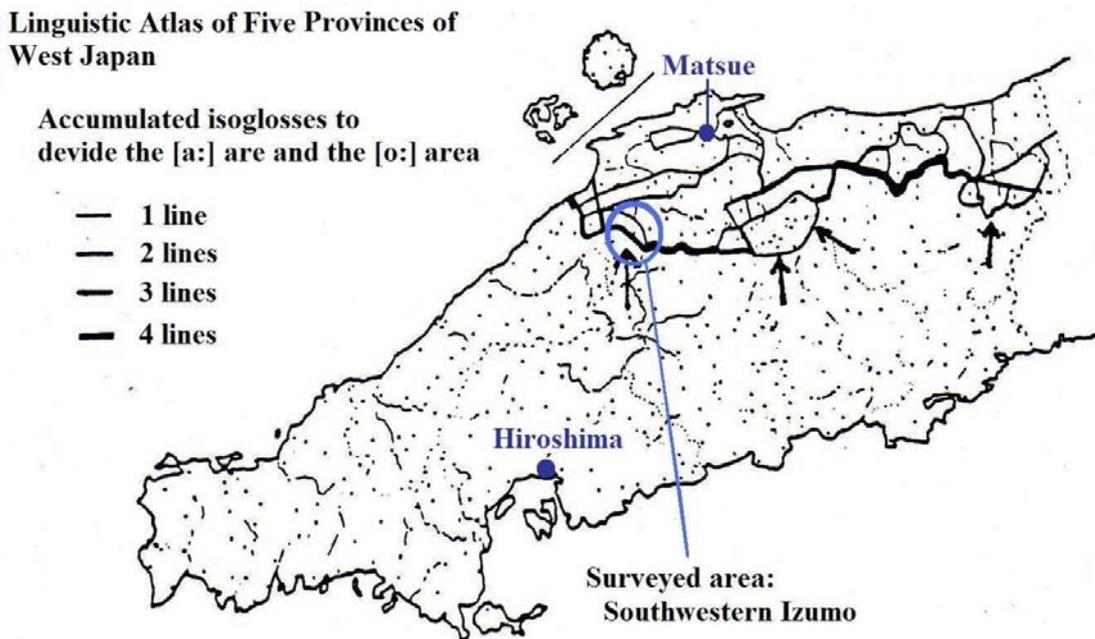


Figure 3. Southwestern Izumo: Surveyed area of minute linguistic maps

<sup>1</sup> The author developed SEAL a software system for personal computers to help make linguistic maps. It has been used for individual map making and also for map integration (Fukushima & Fukushima 2002). The system can be downloaded at the website.

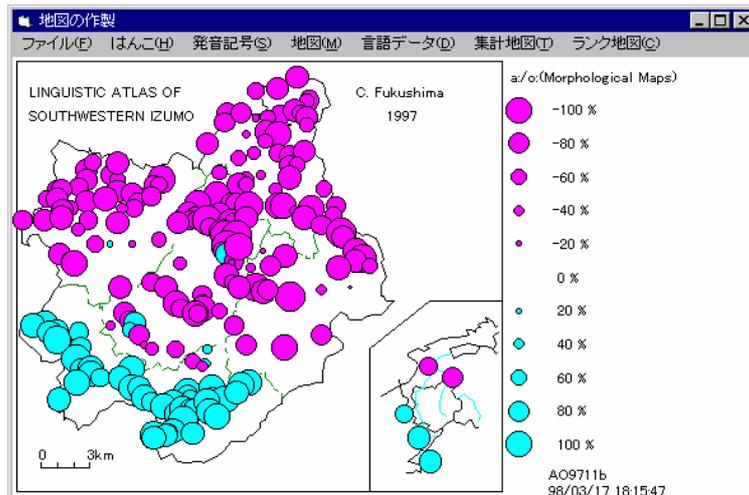


Figure 4. Integrating morphological maps related with the old diphthong [au]

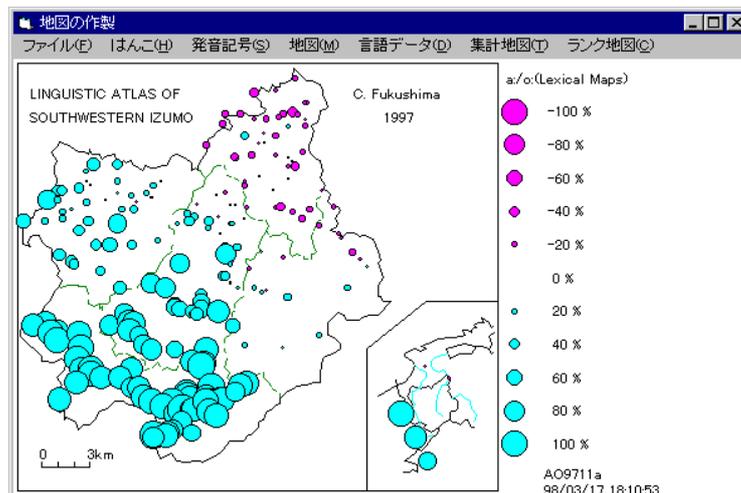


Figure 5. Integrating lexical maps related with the old diphthong [au]

#### 4. Comparison of linguistic maps targeted for different generations

Both linguistic atlases examined above are based on surveys of informants in the sixties or older. Even though the time difference is appropriately 20 years, clear linguistic changes are not found. However, linguistic maps targeted for different generation in the same area can be compared to illustrate chronological changes shown as geographical distributions.

Here compared are *Grammatical Atlas of Japan* (GAJ) and *Dialects of College Students in Niigata* (DCSN). The nationwide survey for GAJ was made from 1979 to

1982 and the informants were in the sixties or seventies at that time. The survey for DCSN was made from 1994 to 2002 and the informants were 18-20 years old. Thus there is approximately 60-70 year difference concerning the informants' birth year.

Only the data of informants in Niigata Prefecture was used for comparison. See Figure 6 for the location of Niigata Prefecture. The linguistic maps of the same linguistic item “because” were drawn and superimposed using SEAL. Figure 7 showing the dialects of the elderly is based on the GAJ data published on the web. There are *sake* and its related forms, all of which were descendants of *sakai* “because” used in the Kansai area, center of west Japan. Figure 8 showing the dialects of young students is based on the data collected by the author. The new word *kke*, derived from *sake*, is distributed in the broader area, driving *sake* into isolated localities. Figure 7 and Figure 8 are superimposed to make Figure 9, which shows two maps in different colors (Fukushima 2007).

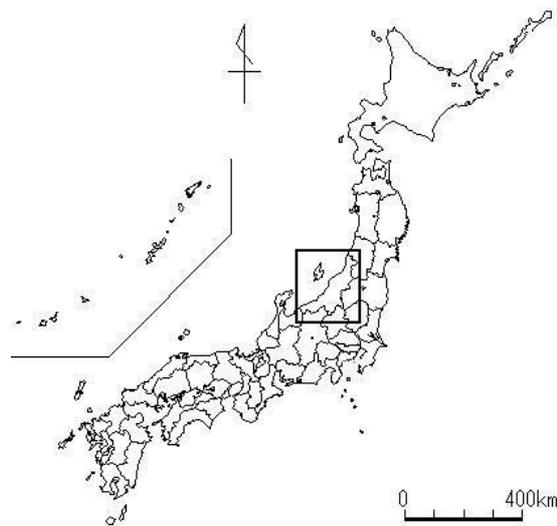


Figure 6. Niigata Prefecture: Surveyed Area

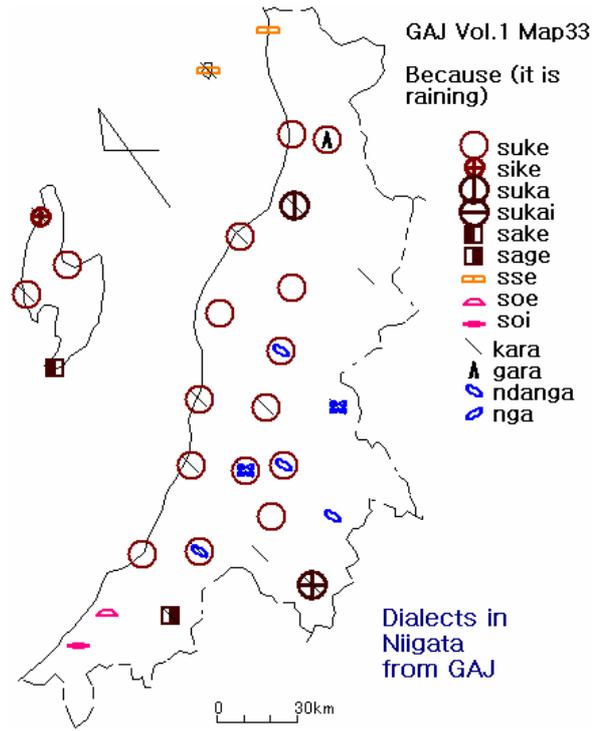


Figure 7. "Because": Grammatical Atlas of Japan

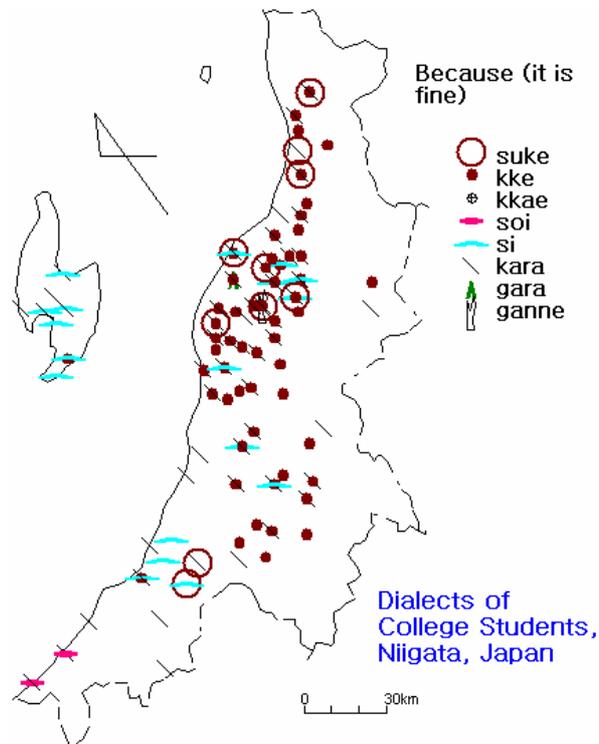


Figure 8. "Because": Dialects of College Students in Niigata

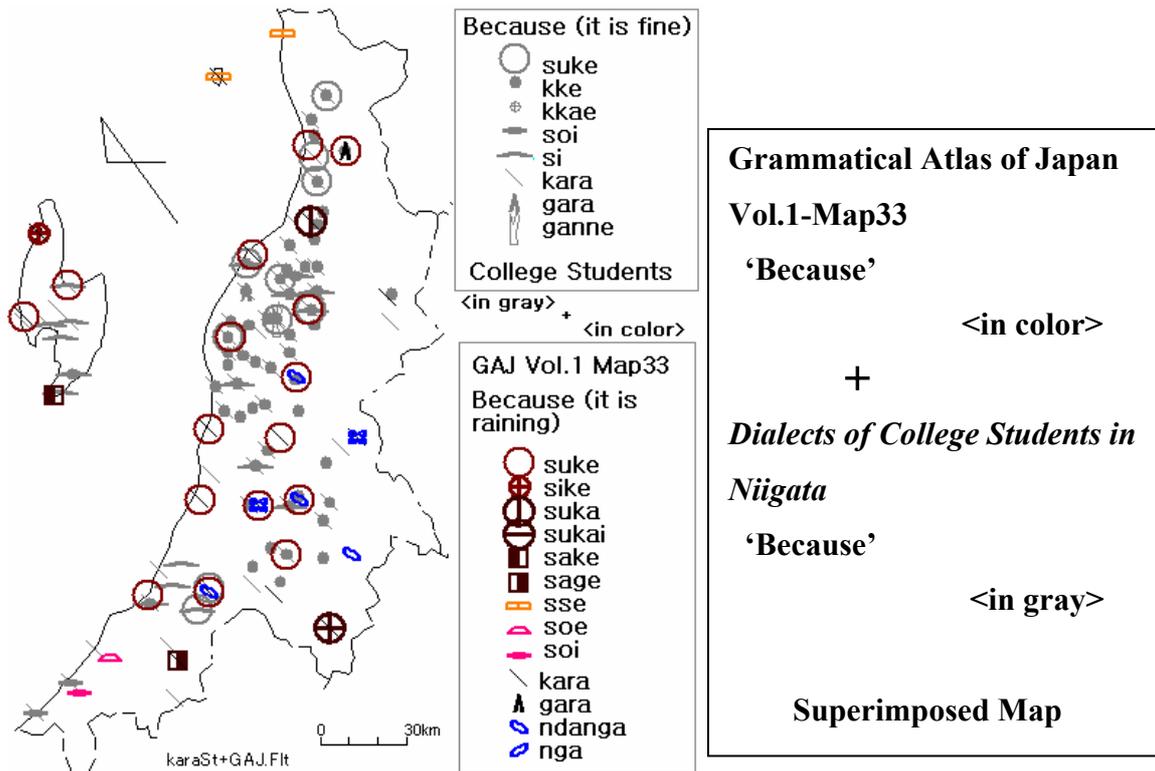


Figure 9. “Because”: Superimposed map of GAJ and DCSN

The maps from these different surveys are useful to trace linguistic changes in real time.

## 5. Conclusion

In geolinguistics, linguistic maps from different surveys can be compared for various reasons. One reason is to confirm interpretations from different perspectives. The wide area linguistic maps and minute linguistic maps have complementary scopes of interpretations about linguistic history in the surveyed area. Another reason is to trace linguistic changes in real time by comparing linguistic maps targeted for different generation. The computer-assisted approach has promoted this method and its further development is expected by making use of GIS.

## References

- FUKUSHIMA, Chitsuko (2000a) “Calculating and Mapping Regional Speech Variation in Tokunoshima”, *The Bulletin of Niigata Women’s College*, 37, 79-87.
- FUKUSHIMA, Chitsuko (2000b) “Using a Personal Computer to Grasp Dialectal Variation”, *Dialectologia et Geolinguistica*, 8, 37-52.
- FUKUSHIMA, Chitsuko (2007) “Superimposing Linguistic Maps to Trace Linguistic Changes”, *Linguistic Atlantica*, 27-28, 2006-2007, 40-45.
- FUKUSHIMA, Chitsuko (forthcoming) “Integrating Linguistic Maps to Show Scholastic Interpretation”, *Dialectologia*, special issue.  
(<http://www.publicacions.ub.es/revistes/dialectologia1/>)
- FUKUSHIMA, Chitsuko & Yusuke FUKUSHIMA (2002) *SEAL Users' Manual, 6th Edition (English Version) SEAL 6.0E for Windows 98/Me/2000, Report for Grant-in-Aid For Scientific Research*, Niigata: Niigata Women’s College.
- FUKUSHIMA, Chitsuko & David HEAP (2008) “A Report on the International Conference: Geolinguistics around the World”, *Dialectologia*, 1, 135-156.  
(<http://www.publicacions.ub.es/revistes/dialectologia1/>)
- GROOTAERS, W.A. (1976) *Nihon no hogen-chirigaku no tame ni [For Dialect Geography in Japan]*, Tokyo: Heibonsha.
- HIROTO, Atsushi (1965) *Chugoku-chiho goken gengo-chizu [Linguistic Atlas of the Five Provinces of West Japan: LAFP]*, Tokyo: Kazama Shobo.
- NATIONAL INSTITUTE FOR JAPANESE LANGUAGE (1965-1974) *Nihon gengo chizu [Language Atlas of Japan: LAJ], Vols. 1-6*, Tokyo: Printing Bureau, Ministry of Finance.
- NATIONAL INSTITUTE FOR JAPANESE LANGUAGE (1989-2002) *Hogen bunpo zenkoku chizu [Grammatical Atlas of Japan: GAJ], Vols. 1-5*, Tokyo: Printing Bureau, Ministry of Finance.
- ONISHI, Takuichiro (2007) “Application of GIS Technology to Studies in Japanese Dialectology”, *Linguistic Atlantica*, 27-28, 2006-2007, 76-80.

## URLs

*A Room for Linguistic Geography: A site for announcements and downloading the SEAL System.*

<http://www.nicol.ac.jp/~fukushima/english/>

*Hogen-kenkyu no heya [The Room for the Dialectological Study] for downloading GAJ data*

<http://www2.kokken.go.jp/henka1/>