

A study on geographical changes in main roads and coastlines in the 200 years in Japan

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This study analyzed the changes in the spatial distribution of main roads and coastlines and its determining factors between 1818 and 2018. These changes are important social and natural foundations for the Japanese national land formation, and the knowledge of the spatial changes is useful for promoting the sustainable society. Previous studies have focused on the regional transformation using aerial photographs, drilling surveys, and some old paper maps. They used the geographical data after modernization and targeted the specific region. In our study, an attempt is made to compare the long term of 200 years on the national scale by using INŌ's digital map.

Digital data of main roads and coastlines on the INŌ's map are included in the "Digital INŌ's Map, Professional Edition". This is digitized by using the INŌ's large paper map which is the largest scale in the INŌ's map. In the analysis of the changes in main roads, we used the attribute information of Digital INŌ's Map. The changes in coastlines were derived by overlay analysis with coastlines of Digital INŌ's Map and the present national land. In the overlay analysis, each section of coastlines which did not overlap with the present national land was defined as the section changed by the backward movement of the coastline. On the other hand, each section of coastlines which overlapped with the present national land contained both the section changed by the reclamation and the section almost unchanged. In analyzing the determining factors, land use data (100m gridded area) and coastal ocean data (1km gridded area) were mainly used.

As a result, it was found that the route changes in main roads were 18.3% of the total (Fig.1), and the changes in coastlines were 28.9% of the whole length. In the changed coastlines, the changed section by the backward movement was 66.3% (Fig.2A), and the changed section due to the reclamation was 33.7% (Fig.2B). Main roads drawn on the INŌ's large map had different density depending on the region, because only main roads surveyed by INŌ's team were drawn on the INŌ's large map. Therefore, the distance of the changed section was summarized at the regional level. The rate of the change was the largest in Kyushu region (27.8%), and the smallest in Shikoku region (2.8%). On the other hand, coastlines drawn on the INŌ's large map distribute uniformly at the national scale. The rate of the change was the largest in the eastern Japan (Fig.2A) and the industrial areas (Fig.2B). Details on determining factors of changes will be discussed on the day of the presentation.

Keywords: Changes in Roads, Changes in Coastlines, INŌ's Map, GIS, Japan

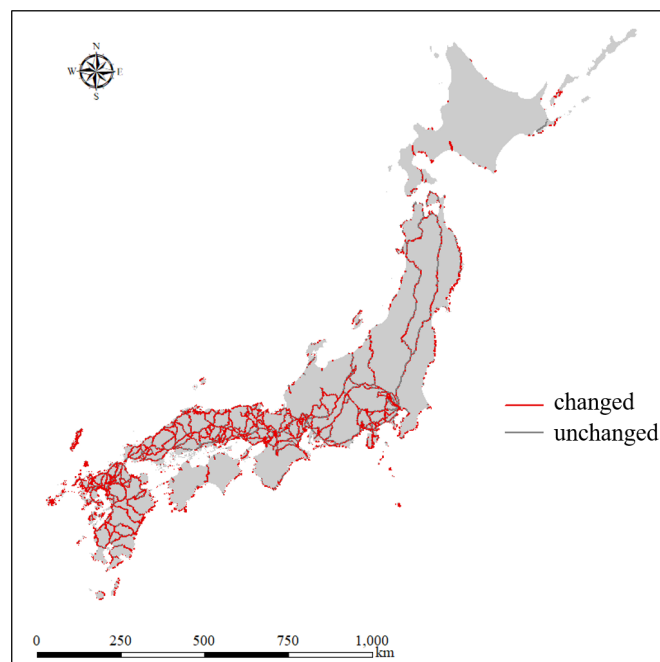


Figure 1 The main roads drawn in the INŌ's large map

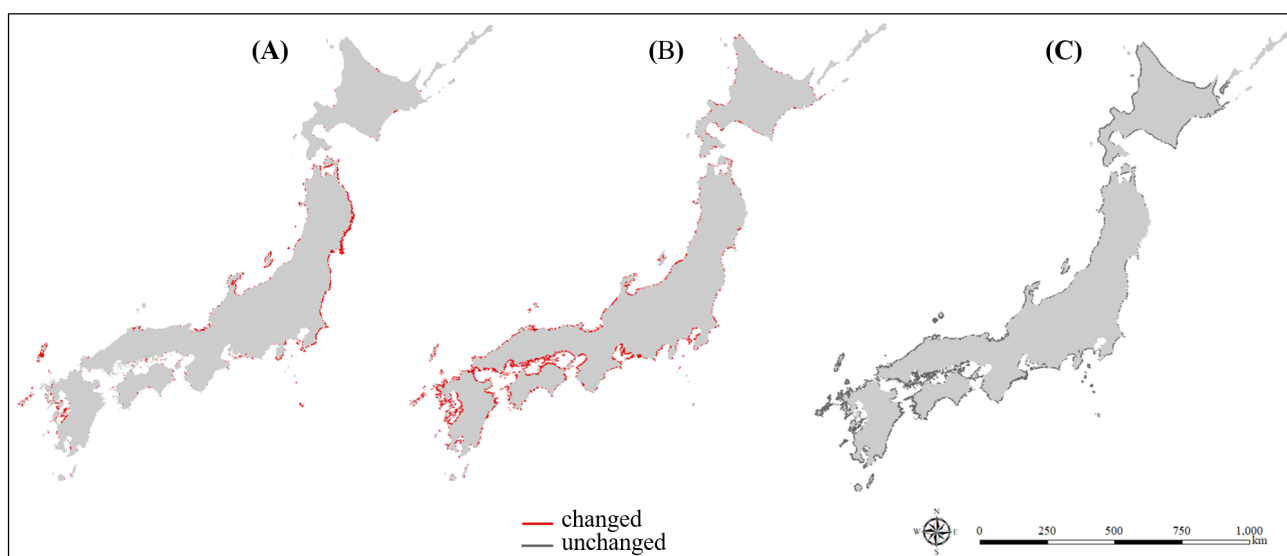


Figure 2 The coastlines drawn in the INŌ's large map; (A) coastlines occurred by backward movement, (B) coastlines occurred by reclamation, (C) coastlines unchanged