COMPARISON STUDY OF ROAD ROUGHNESS CONDITIONS BETWENN DIFFERENT TWO CITIES

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1. INTRODUCTION

Pavement roughness is generally defined as an expression of irregularities in the pavement surface that adversely affects the ride quality of a vehicle. The roughness is an important pavement characteristic because it affects not only ride quality but also vehicle operational costs, such as fuel consumption and maintenance costs. The World Bank found road roughness would be a primary factor in the analyses of road profile and trade-offs involving road quality vs. road userôs cost. The roughness is also referred to as ñsmoothnessò although both terms relate to the same pavement qualities. This research aims at monitoring road roughness conditions in local cities in terms of road network level introducing a compact road profiler for the monitoring and evaluation of road surfaces in order to address the demands by the road users, this paper utilizes GIS software to visualize the roughness of network level from the standpoint of land-use characteristic in local city using roughness index (IRI). Finally, the results deeply clarified different two cities road roughness conditions by using statistical analysis.

2. VISUALIZATION RESULTS OF TWO CITIES

Figure 1 and **2** represent results of pavement roughness measurement by using an efficient MPM[1)] (Mobile Profilometer) in March of 2013 in Kitami city and December of 2015 in Obihiro city, showing IRI (International Roughness Index). The IRI data are measured at 100 m intervals over roadway section and plotting on electronic road map together with DRM[2)] data and GIS[3)] software. DRM database includes significant information related to pavement management such as road administrators, lane widths, and locations of road structures. Therefore, it contributes to visualize the surface roughness condition. The ArcGIS is commercially based well-known GIS (Geographical Information System) which is used for compiling geographic data, analyzing mapped information, sharing and discovering geographical information and managing geographic information in a database. According to the **Figure 1** and **2** in city central areas with different colors, the road administrator can investigate pavement situations taking into consideration of land-use plan at a glance.

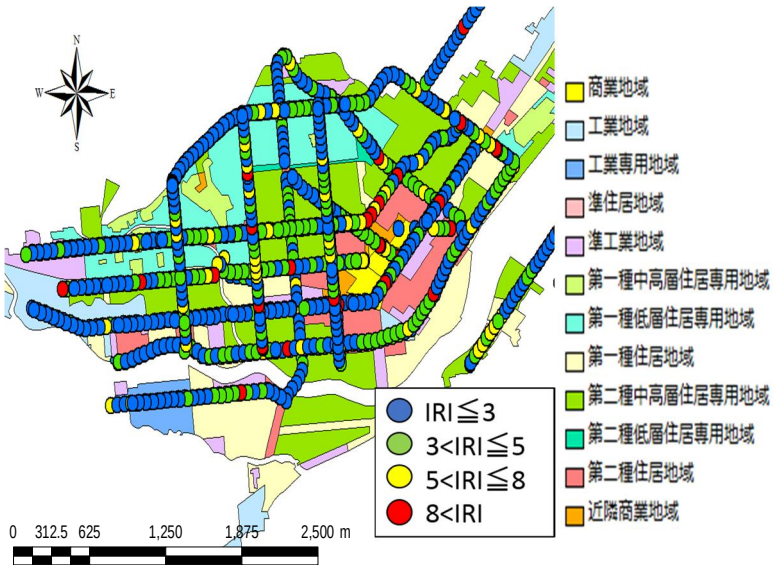

Figure 1: Measurement result of Kitami city in 2013

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3. STATISTICAL ANALYSIS

Figure 3 shows the results of total road network conditions of two cities obtained at municipal roads. Both cities have a population of more than 100 thousands and are core cities in Hokkaido region.

The IRI conditions of both cities are clarified by histogram and cumulative curve as shown in **Figure 4**. In order to calculate histograms and cumulative curves, we used IRI data for each 100-meter section of the road.

From these results as to the situation of different two cities, it is cleared that 52.6% of IRI data for Kitami city and 46.7 for Obihiro city are less than 5 m/km respectively. According to the comparative study of road roughness between different two cities, it has found that the evenness of the Kitami is better than that of Obihiro city in general.

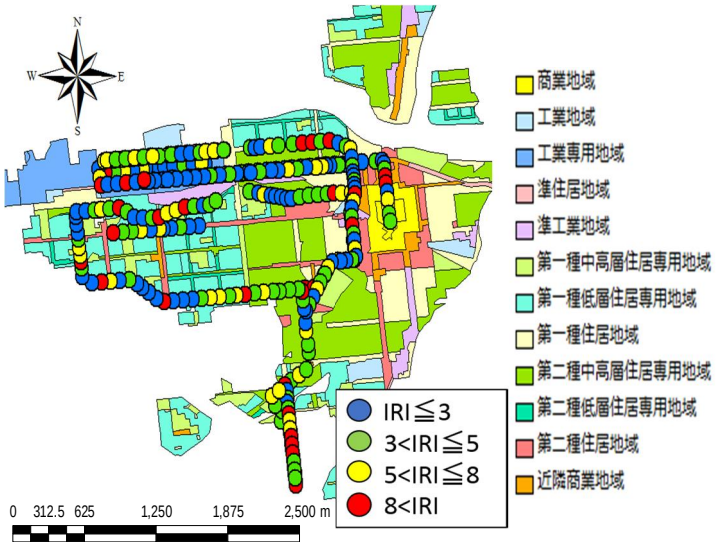

Figure 2: Measurement result of Obihiro city in 2015

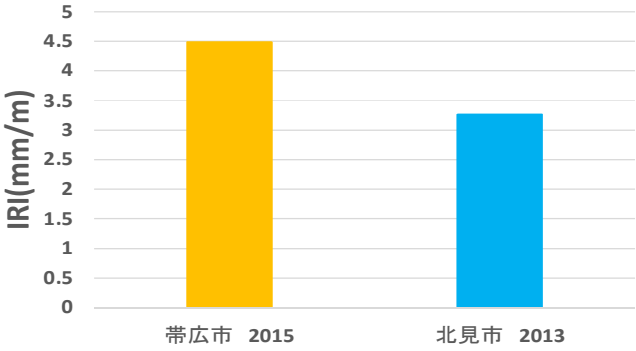

Figure 3: Total road network IRI

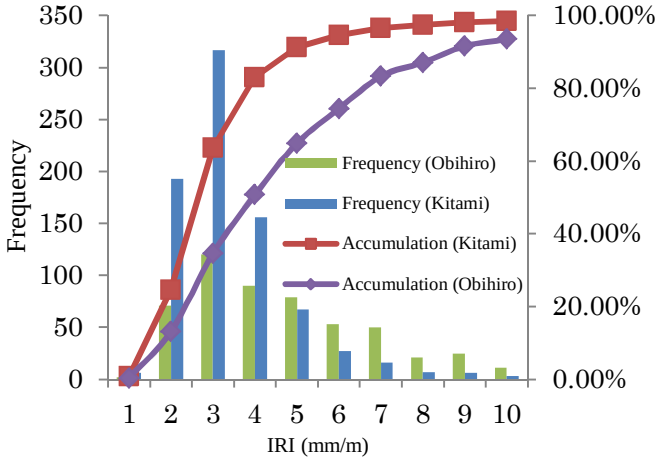

Figure 4: Statistical results of two cities IRI

4. CONCLUSIONS

Principal results of this study are summarized as follows:

(1) According to the frequent measurement of road surface by using the MRM which makes it possible to acquire IRI of road network in local city at one time, and in real time.

(2) As described above, the roughness for each city easily and visually clarified by the implementation of the DRM data with GIS. It is strongly expected that application of the results in this study contribute to monitoring the road roughness and identification of the road distress conditions for establishment of efficient PMS (Pavement Management System). Moreover, survey results of the road surface conditions of each city found that the evenness of the Kitami city is better than that of Obihiro city since we have surveyed relatively rough road sections in Obihiro city.

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