Development of methods for estimating carbon dioxide emissions from vehicles utilizing vehicle travel data

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1. Introduction

The 21st annual Conference of Parties to the United Nations Framework Convention on Climate Change was held in Paris from November 30th to December 13th in 2015, and a legal framework for measures to combat global warming was adopted and will go into effect after 2020.

In the "Intended Nationally Determined Contributions" submitted by Japan for COP 21, the reduction target for greenhouse gases in FY2030 is cut to 26.0% compared to the emissions in 2013, and the target for the transportation sector is to reduce 62 million tons carbon dioxide by improving fuel efficiency, popularizing next-generation vehicles, and implementing other measures of the transportation sector (promoting measures to improve traffic flow, promoting the use of public transportation, and so on). Because improving the speed of vehicles by easing traffic congestion will lead to the reduction of fuel consumption, road improvements and appropriate route selections will contribute to the reduction of carbon dioxide emissions. However, a study on how to quantitatively grasp their effects is still under way.

We are attempting to develop methods for estimating carbon dioxide emissions from vehicles utilizing vehicle travel data.

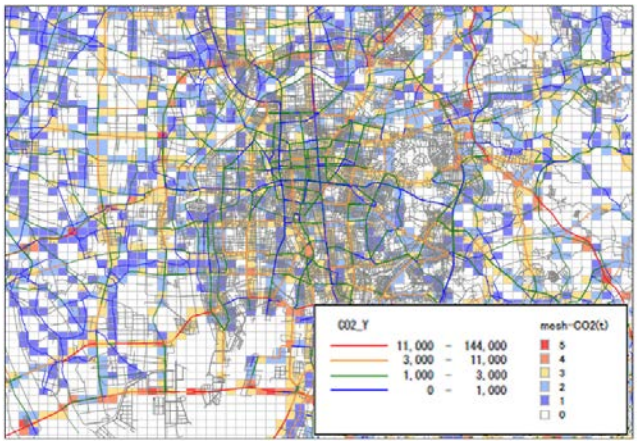

Figure 1 Areal distribution of carbon dioxide emissions based on probe data and road traffic data (500-m mesh)

2. Grasping carbon dioxide emissions by utilizing vehicle travel data

Figure 1 shows an aerial distribution of carbon dioxide emissions based on probe data and road traffic data. It makes it easier to grasp areas where a large amount of carbon dioxide is discharged, along with the variation in emissions before and after implementing traffic control measures, and we expect that this can be used to evaluate the effects of measures.

Figure 2 shows the relationship between the average travel speed and instantaneous fuel consumption classified by the travel conditions, which was produced using the on-board diagnostics (OBD) of vehicles. Considering the fact that it is necessary to press the accelerator when traveling uphill, and a large amount of fuel is consumed as a result of traffic congestion because of the increase in the number of acceleration/deceleration and idling periods, it is supposed that carbon dioxide emissions will increase as a result.

3. Future development

In the future, we plan to examine a method to assess the carbon dioxide generation suppression effects of traffic control measures utilizing ETC 2.0 probe data, and will examine concrete utilization plans by road administrators for methods to estimate the carbon dioxide emissions from vehicles.

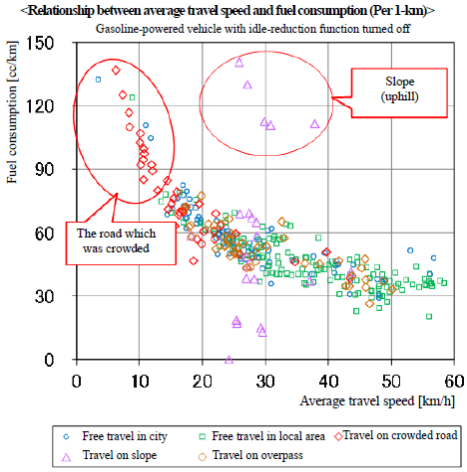

Figure 2 Relationship between average travel speed and instantaneous fuel consumption, classified by travel conditions, based on OBD data.