地球温暖化がシベリア冬道路に及ぼす影響

河本　憲[1]・奥村　誠[2]
（東北大学 [1,2]大学院工学研究科土木工学専攻 [2]東北アジア研究センター地域計画科学研究分野）
[1]kawamoto@cneas.tohoku.ac.jp (内 7567)　奥村　誠

The effects of global warming to the winter road in Siberia

Ken KAWAMOTO[1], Makoto OKUMURA[2]
(Tohoku University; [1,2]Graduate School of Engineering, Department of Civil and Environment Engineering, [2]Center for Northeast Asian Studies, Division of Science and Technology for Regional Planning)　(Poster)

Key words: global warming, winter road, river ice, heat balance, Siberia

東シベリアのロシア連邦サハ共和国では，冬期になるとレナ川などの大河川が凍結し，その上を「冬道路」として利用している．この自然環境を活用した冬道路はエネルギー消費や環境負荷が少ないため今後の活用が望まれるが，季節変動への対応，将来の地球温暖化の影響の把握が必要である．本研究では，地球温暖化が冬道路の利用可能期間に及ぼす影響を分析した．まず凍結河川の氷厚変化をモデル化し，次に仮想的な気象条件に対する氷厚と積載可能重量の計算を行い，温暖化による気温変化が利用可能期間に与える影響を求めた．これにより，重量の重い車両ほど温暖化の影響を受けやすく，温暖化に対し使用可能期間は非線形に減少することが分かった．

Many people pass on road on frozen river, named as “winter road”, in Sakha republic in east Siberia. The winter road is environment friendly system taking opportunity of the cold weather in winter and requiring less energy.　It is said that the average temperature of that region will increase in the future, however, how long people can pass on the winter road is important issue in the near future.

This study analyzes the effects of global warming to the available period of the winter road. First, we model the relationship between air temperature and thickness of ice. Second, we calculate the relationships between the thickness of ice and the maximum weight, which means how much the winter road can withstand the force of load (Fig.1). Then, we found that the heavier vehicles are more strongly influenced by global warming, and the available period of the winter road nonlinearly decreases with increases of air temperature (Fig.2).

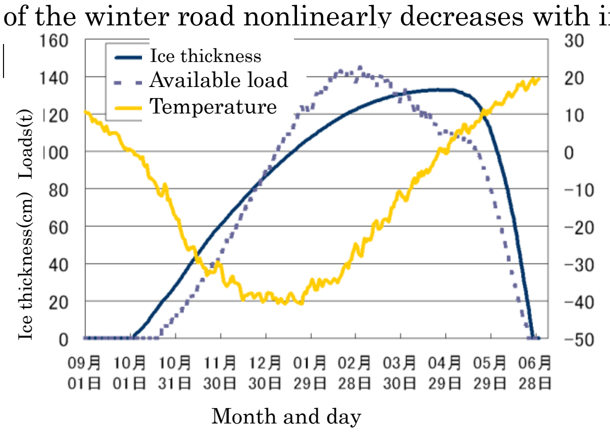

Figure 1. relationship between ice thickness, weight and temperature

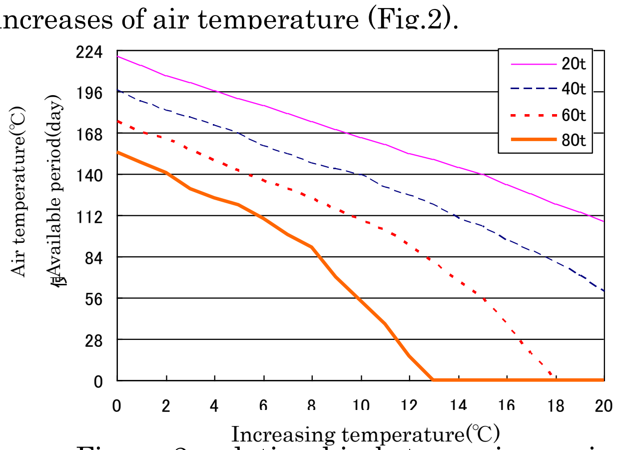

Figure 2. relationship between increasing temperature and period which can be used