ANALYSIS OF TEMPERATURES DISTRIBUTION OF FOREST TYPE CLASS USING LANDSAT IMAGERY

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INTRODUCTION

In this study, temperature distribution about each forest type was analyzed using thermal infrared band and digital forest type map. Surface temperature about study site was calculated using satellite imagery, and it was able to extract temperature about each forest types (age class, diameter class, species of trees) effectively using digital forest type map. The results of this study are expected to be utilized basic data about urban planning and creating recreation space inside the forest.

DATA ACQUISITION

Gungui in South Chungcheng Province, Korea overgrown with a forest area was chosen the study area to calculate temperature each species of tree, age and thickness of the forest core using Landsat satellite imagery and was calculated surface temperature using imagery in April 2003, October 2006 and June 2009 and the digital forest cover type map.

DATA PROCESsing

Based on NASA model, the periodic temperature is calculated from equation for surface temperature calculation.

Surface temperature about study site

Mask bands about age class, diameter class, and species of trees were produced by using the digital forest type map of Gungui and three season imageries were masked.

RESULT AND ANALYSIS

Temperature Distribution of Diameter Class

<table>
<thead>
<tr>
<th>Species of Trees</th>
<th>2003/04</th>
<th>2006/10</th>
<th>2009/06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conifer</td>
<td>21.05℃</td>
<td>15.80℃</td>
<td>21.79℃</td>
</tr>
<tr>
<td>Deciduous</td>
<td>20.85℃</td>
<td>14.33℃</td>
<td>21.25℃</td>
</tr>
</tbody>
</table>

Average temperatures

<table>
<thead>
<tr>
<th>Diameter Class</th>
<th>2003/04</th>
<th>2006/10</th>
<th>2009/06</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small (1~10)</td>
<td>10.99℃</td>
<td>20.72℃</td>
<td>21.82℃</td>
</tr>
<tr>
<td>Middle (11~20)</td>
<td>16.60℃</td>
<td>22.65℃</td>
<td>23.80℃</td>
</tr>
<tr>
<td>Large (21~30)</td>
<td>19.60℃</td>
<td>25.15℃</td>
<td>26.20℃</td>
</tr>
</tbody>
</table>

Temperature Distribution of Age Class

<table>
<thead>
<tr>
<th>Age Class</th>
<th>2003/04</th>
<th>2006/10</th>
<th>2009/06</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (11~20)</td>
<td>21.25℃</td>
<td>15.90℃</td>
<td>21.40℃</td>
</tr>
<tr>
<td>2 (21~30)</td>
<td>21.31℃</td>
<td>15.81℃</td>
<td>21.41℃</td>
</tr>
<tr>
<td>3 (31~40)</td>
<td>20.87℃</td>
<td>15.54℃</td>
<td>21.76℃</td>
</tr>
<tr>
<td>4 (41~50)</td>
<td>20.56℃</td>
<td>14.36℃</td>
<td>21.22℃</td>
</tr>
<tr>
<td>5 (51~60)</td>
<td>20.39℃</td>
<td>13.66℃</td>
<td>21.02℃</td>
</tr>
<tr>
<td>6 (61~70)</td>
<td>19.71℃</td>
<td>13.11℃</td>
<td>21.00℃</td>
</tr>
</tbody>
</table>

CONCLUSIONS

In this study, the followings are conclusions by analysis of temperature according to the forest type of the area using multi-temporal satellite images and digital forest type map.

First, forest area has low temperature about 1℃ than the other study areas. Based on this finding, it is concluded that forest area influences temperature decreases.

Second, forest area with large diameter and high age showed lower temperature than any other areas. And deciduous area shows slightly lower temperature than conifer area.

Third, it is expected that information provided by satellite imagery and digital forest type map will be convenient and useful to urban planning and afforestation.
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Gongju in South Chungcheng Province, Korea overgrown with a forest around was chosen the study area to calculate temperature each species of tree, age and thickness of the forest using Landsat satellite imagery and was calculated surface temperature using imagery and the digital forest cover type map.
Based on NASA model, this study calibrates surface temperature from the DN which represents the absolute radiation of land cover.

Satellite image processing program was used to extract the surface temperature and then digital forest type map was used to calculate the surface temperature about the type of each forest type (age class, diameter class, and species of trees).
In this study, masking is carried out about each of the forest type class to figure out temperature distribution of the forest type class, and the temperature is calculated about the results.

When temperature of the study site is compared with the whole city, all of the mean temperature of the study site in 2003, 2006, 2009 are about 1°C lower than the mean temperature of near Gongju.
RESULT AND ANALYSIS

Temperature Distribution of Diameter Class

2003/04

2006/10

2009/06

Temperature Distribution of Diameter Class

2003/04

2006/10

2009/06

Temperature Distribution of Species of Trees

2003/04

2006/10

2009/06
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