ANALYZING FOREST CHARACTERISTIC OF THE PARASITIC VOLCANO(ORM) USING MULTI-TEMPORAL HIGH RESOLUTION SATELLITE IMAGES AND SML(SPATIAL MODELING LANGUAGE)

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ABSTRACT Recently the development of GIS and spatial information technology is used to construct very detail forest information. In addition, in order to classify forest characteristic, the geographical characteristic information of forest could be very useful for the forest classification,

In this study sampling points were arranged to clarify the difference between the orm area and the land forest area. Also, forest feature pattern could be discriminated by using satellite images and SML. This study result should be constructed to efficiency forest management in especially forest area in Jeju Island

KEY WORDS: Parasitic volcano, Orm, SML(Spatial Modeling Language), Sample place

1. INTRODUCTION

Korea forest terrain is composed of granite, sandy of granite gneiss. Otherwise forest terrain in Jeju Island is distributed that especially 368 parasitic volcano, which is consist of basalt in low viscosity and high water permeability.

In this study, forest characters of the east area of Seogwipo city where parasitic volcano was analysed by using SML based on high-resolution satellite images. And we performed the correlation analysis with spatial information of forest and its verification by using spatial information of forest extracted through on-site forest survey and SML.

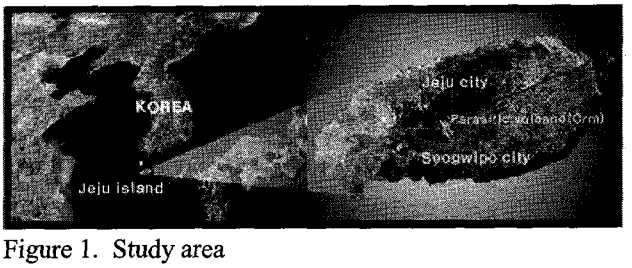


Figure 1. Study area

The IKONOS images for this study are in 2004,2002 and 2000 and RPC for Ortho rectification was performed.

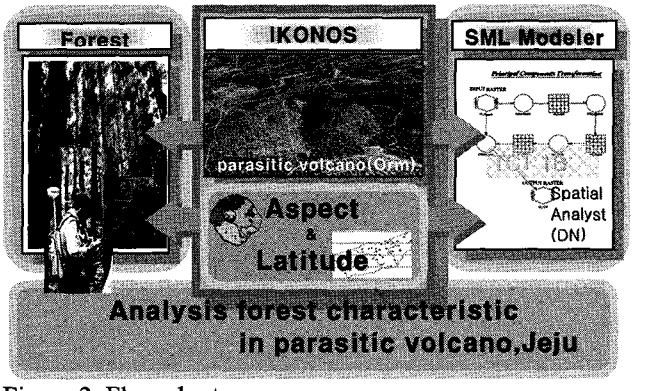


Figure 2. Flow chart

2. SURVEY ABOUT SAMPLE PLACE

In order to obtain the spatial information of forest, we performed on ?site forest survey by arrangement of sample places arranged sample places of total 300, pure of tree of 272. <refer to to figure 3>

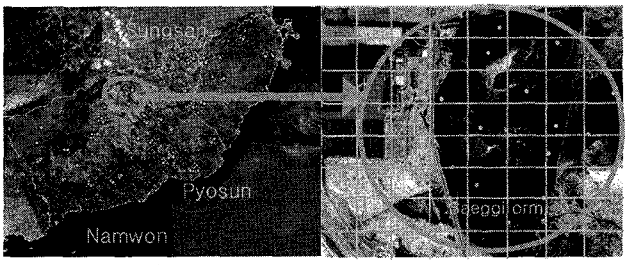


Figure 3. Sample place information

Treated SML model application by pixel value of float type, and classified forest information of forest area

through sample place examined by on-site forest survey and correlation analysis.

3. FOREST TYPE DISTRIBUTION ANALYSIS ACCORDING TO THE AZIMUTH

The forest distribution analysis has performed by the azimuth, which uses the sample place. A parasitism volcano has the cone, oval, horse's hoof, compositeness. Various azimuths could be appeared in one parasitic volcano.<refer to to figure 4>

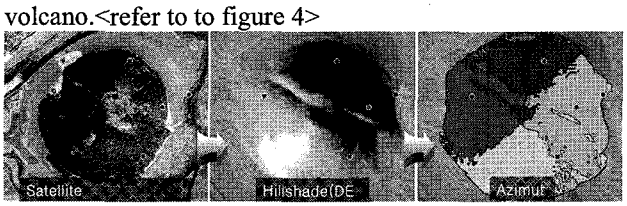


Figure 4. Azimuth calculated used DEM

Through above methods, we performed on-site forest survey for sample places of examination only to north forest of Pine(37.7%), east forest of Cedar(39.2%), south forest of Cedar(50.7%), west forest of Cedar and Pine(32.8%) for total sample places. <refer to table 1>

Table 1. Forest survey for sample place(Azimuth)

North (315°-45°)		East (45°-135°)		South (135°-225°)		West (225°-315°)	
TYPE	100%	TYPE	100%	TYPE	100%	TYPE	100%
Pine	37.7	Cedar	39.2	Cedar	50.7	Cedar	32.8
Cedar	30.2	Pine	36.3	Pine	37.3	Pine	32.8
Cypress	7.5	Cypress	7.3	Cypress	2.7	Cypress	15.5
Snowbell	7.5	Quercus acutissima	5.8	Snowbell	2.7	Mallotus japonicus	5.2
Hornbeam	5.7	Hornbeam	4.4	Quercus acutissima	2.7	Snowbell	5.2
Quercus acutissima	1.9	Snowbell	2.9	Castanopsis cuspidata	2.7	Hornbeam	3.4
Maple	1.9	Camellia	1.5	Cherry	1.3	Castanea crenata	1.7
Castanopsis cuspidata	1.9	Pinus	1.5			Quercus dentata	1.7
Quercus dentata	1.9	Mallotus japonicus	1.5			Cinnamomum japonicum	1.7
Lindera erythrocarpa	1.9						
Ligustrum obtusifolium	1.9						

4. FOREST TYPE DISTRIBUTION ANALYSIS ACCORDING TO THE LATITUDE

The forest distribution analysis has performed by the latitude, which uses the sample place. <refer to to figure 5>

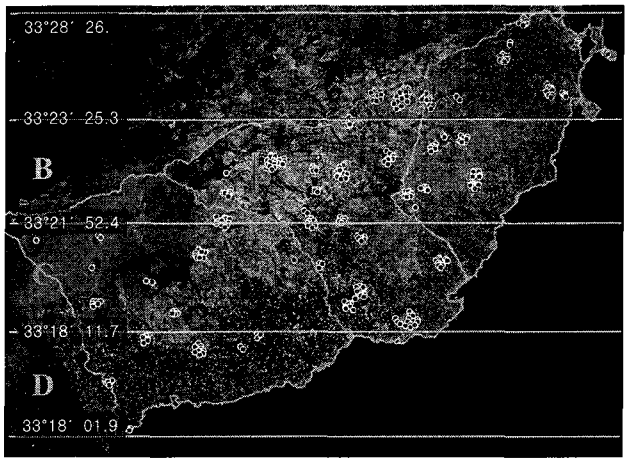


Figure 5. Latitude break

Through above methods, we performed on-site forest survey for sample places of examination only to A forest of Pine(47.0%), B forest of Cedar(40.6%), C forest of Cedar(41.5%), D forest of Pine(44.0%) for total sample places.<refer to table 2>

Table 2. Forest survey for sample place(Latitude)

33°28' 26.6" ~33°25' 18.1"	100%	B 33°23' 25.30" ~33°22' 03.80"	100%	C 33°21' 52.40" ~33°18' 29.70"	100%	D 33°18' 11.70" ~33°18' 01.90"	100%
Pine	47.0	Cedar	40.6	Cedar	41.5	Pine	44.0
Cedar	38.2	Pine	25.7	Pine	33.7	Cedar	24.0
Cypress	7.4	Cypress	9.9	Cypress	6.5	Cypress	12.0
Snowbell	2.9	Snowbell	7.9	Snowbell	3.9	Castanopsis cuspidata	8.0
Pinus	1.5	Hornbeam	5.9	Hornbeam	3.9	Celtis sinensis	4.0
Mallotus japonicus	1.5	Quercus acutissima	5.0	Quercus acutissima	2.6	Quercus acutissima	4.0
Quercus dentata	1.5	Castanea crenata	1.0	Mallotus japonicus	2.6	Mallotus japonicus	4.0
		Maple	1.0	Castanopsis cuspidata	1.3		
		Quercus dentata	1.0	Camellia	1.3		
		Lindera erythrocarpa	1.0	Cherry	1.3		
		Ligustrum obtusifolium	1.0	Cinnamomum japonicum	1.3		

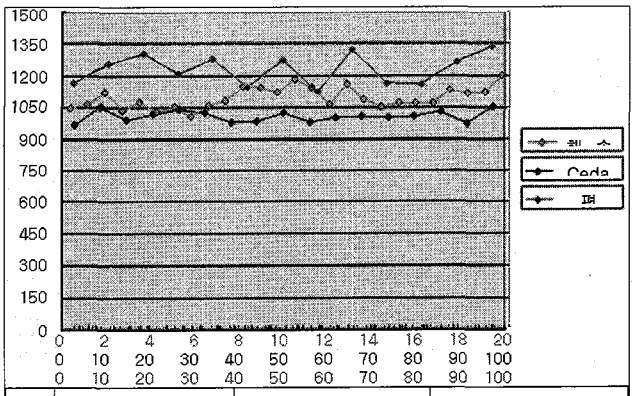
5. FOREST TYPE CHRACTORISTIC ANALYSIS USING SML

On the basis of high resolution IKONOS, by using SML,

Cedar, Pine, Cypress was extracted very often and its samples palaces were detected 92, 100, 20, respectively.

TCT to be able to get needed data by amplifying optical information that movie of satellite has to abstract

reflection character of vegetation. In TCT, we used GVI having deep vegetation and correlation.<refer to figure 6>

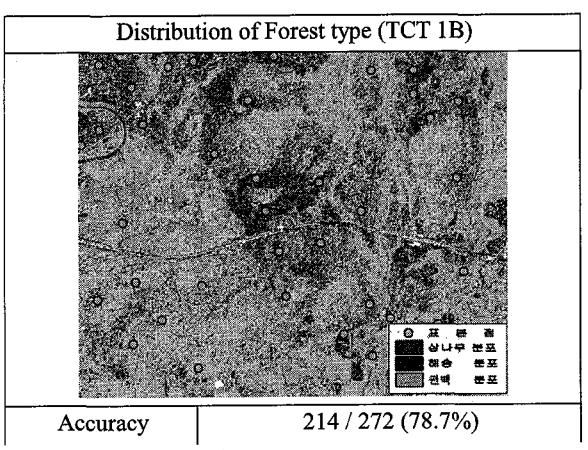


Model	Pine			Cedar			Cypress		
	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
TCT 1B	996	1186	1082	955	1040	996	1120	1340	1230

Figure 6. DN value classified by species of trees

6. REITERATED AND COMPARE

On the basis of distribution chart made by using TCT 1B, we reiterated information on forest type and species of trees examined at sample place, and verified classification accuracy.<refer to figure 7>.



Accuracy	214 / 272 (78.7%)

Figure 7. Classification accuracy

Through forest type and distribution chart of tree, we reiterated and compared it with sample place, and forest type distribution showed classification accuracy of 78.7%

7. RESULT

By using data of on-site forest survey area and Azimuth , Latitude, SML of high resolution of IKONOS-2 satellite, we analysis for forest type characteristic.
The summary of this study is like below
1. The main forest type of Orm is Pine, Cedar, Cypress.
2. According to azimuth by forest type distribution, Pine and Cedar are appeared between 135°-225° in south while Cypress is appeared between 225°-315° in west.
3. According to altitude by forest type distribution, Pine and Cedar are appeared between 33°28′ 26.6″ ~ 33°25′ 18.1″ in north while Cypress is appeared between 33°18′ 11.70″ ~ 33°18′ 01.90″ in west.

For the future, the altitude of forest type can be analyzed. Also, through analysis of subdivided DN value by using image of satellite of multi spectrum, research on classification of more species of trees should be performed.

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