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Analysis of the Phytoncide Emission Trend in Saneum Recreation Forest

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◈ Abstract

Exposed to extreme stress, more and more people turn their eyes on forest therapy. Phytoncide which is the key to forest healing also draws attention, but the lack of related research data leads to difficulty in utilizing them to create recreational forests and programs. Reasons why it is difficult to conduct studies on phytoncide emission are that there are many variations including weather conditions, forest conditions, and land status, and in many cases constant tendency cannot be found. Short-term or temporary studies have been conducted so far. As a result, it is not easy to read the emission trend of phytoncide depending on changes in four seasons.

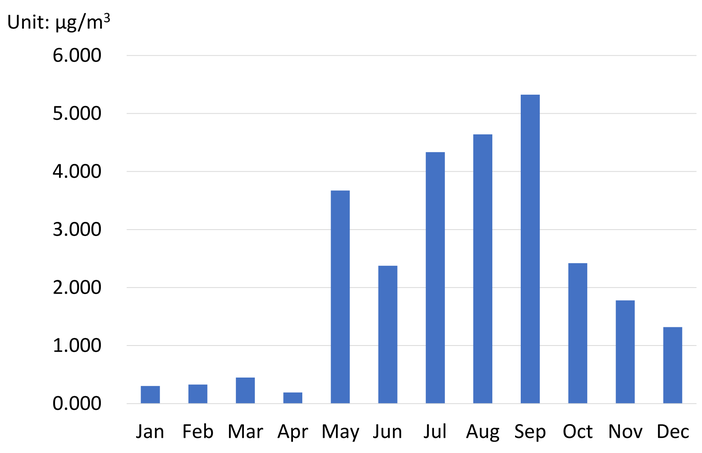
This study analyzed the change in phytoncide concentration by sampling forest air by type of forests, month, and hour for one year in Saneum Recreation Forest. Moreover, the correlation with phytoncide concentration was analyzed, facilitating climate factors at the time of measurement such as temperature, humidity and wind speed. It is expected that this study which examined the phytoncide emission trend will provide information of forest therapy and help to develop forest healing programs.

◈ Methods

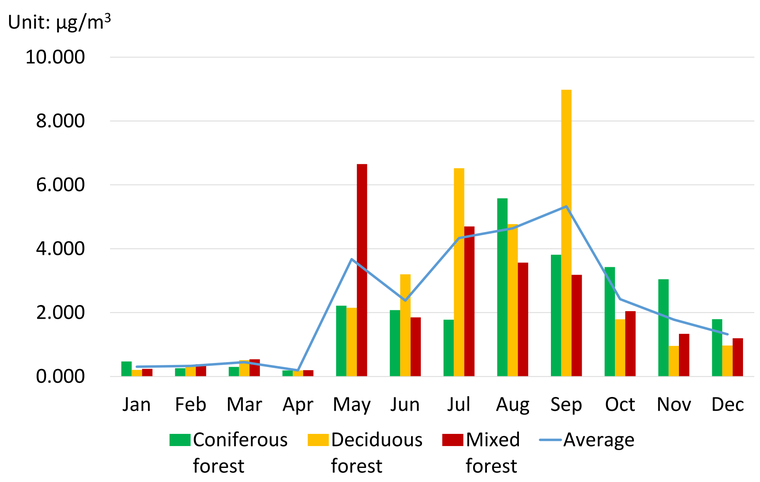
- Phytoncide emissions were measured for one year from the end of May 2016 to the middle of May 2017, twice a month at sunrise, culmination and Sunset each day.
- NVOCs samples were collected at coniferous forest, deciduous forest and mixed forest.
- Climate factors such as temperature, humidity and wind speed were obtained from the Korea Meteorological Administration.

◈ Results

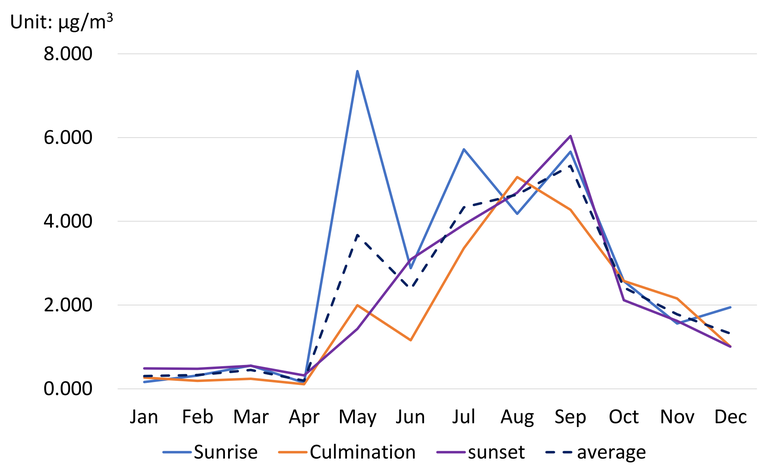
1. Monthly change of NVOCs concentration in one year



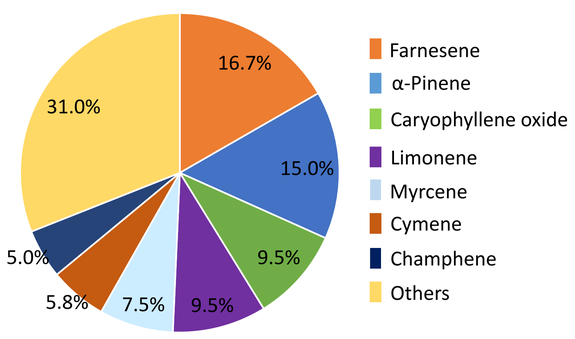
2. NVOCs concentration by forest type



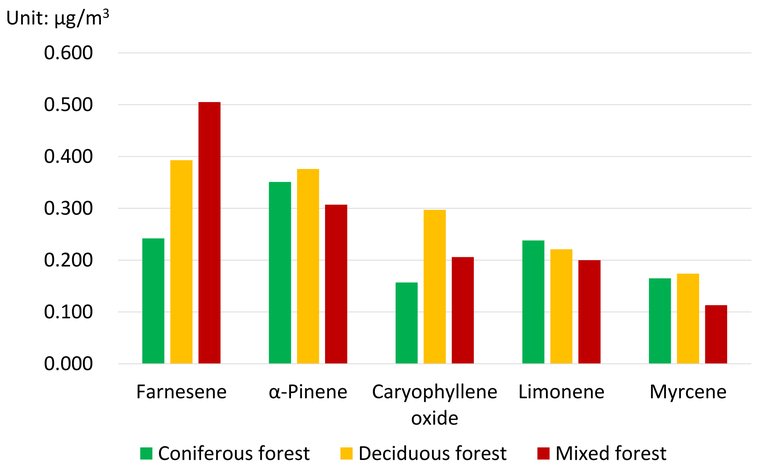
3. NVOCs concentration by forest type



4. Ratio of NVOCs compositions



5. Major compositions of NVOCs by forest type



6. Correlation analysis of NVOCs and Surrounding environment factors

NVOCs	Temperature	Humidity	Wind speed
Coniferous forest sunrise	.551**	-.165	.092
Coniferous forest culmination	.266	.301	-.197
Coniferous forest sunset	.483*	.239	-.191
Deciduous forest sunrise	.603*	.351	-.010
Deciduous forest culmination	.522**	.464*	-.342
Deciduous forest sunset	.585**	.290	-.082
Mixed forest sunrise	.415*	-.210	.000
Mixed forest culmination	.431*	.495*	-.371
Mixed foerst sunset	.619**	.499*	-.142

◈ Conclusion & Suggestion

- First, NVOCs was increased from April and after that slightly decreased but increased again in June, as moving toward September. After reaching peak in September, NVOCs emission was gradually decreased during winter time.
- Second, the average annual concentration of NVOCs in deciduous forest was 2.548μg/m^3, followed by mixed forest for 2.517μg/m^3 and coniferous forest for 2.078μg/m^3.
- Third, major components of NVOCs such as Farnesene, α-Pinene, Caryophyllene oxide, Limonene, Myrcene, Cymene, Camphene showed higher values in the order listed from the highest to the lowest.
- Fourth, NVOCs concentration was higher at sunrise, second highest at culmination and the lowest at sunset. This study found a significant correlation between NVOCs and climate factors such as temperature and humidity, while no correlation was found between NVOCs and wind speed.
- Finally, it is expected that this study will help provide visitors with essential information such as the time of visit, and the ideal hours of a day for walking and forest healing programs based on the trend of NVOCs emission.