

Monitoring of CO₂ and CH₄ in Korean Peninsula

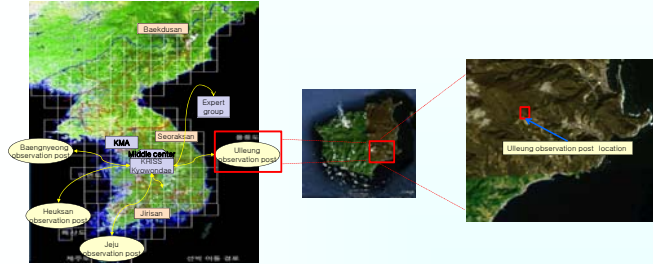
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Introduction

Korea Meteorological Administration (KMA) tries to increase the number of atmosphere watch site in Korean Peninsula in order to monitor the emission of greenhouse gases more efficiently and accurately. It is important to choose the representative network site which can cover most of emissions on the peninsula and to manage observation laboratories more economically.

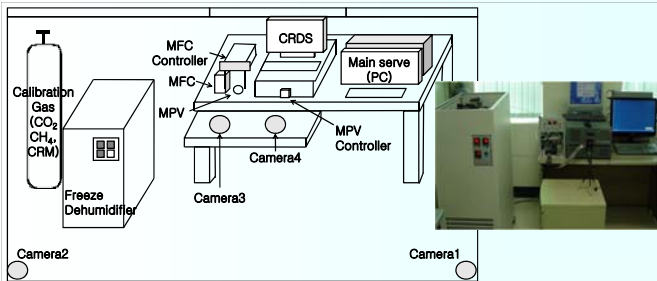
In this study, we developed an automatic remote system to monitor amounts of CO₂ and CH₄ in background air, and established the system in the Ulleung island. The Ulleung island was specially chosen, because it is located in the East Sea whereas other observation sites have been established at Anmyeon and Jeju island by KMA.



Equipments and Tools

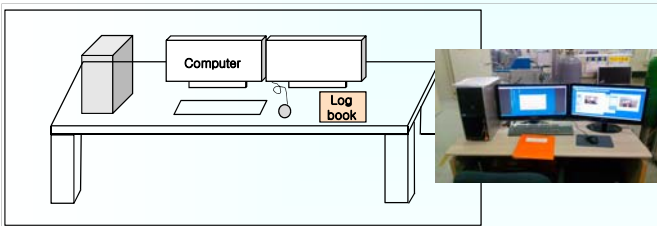
1. Remote control laboratory (Ulleung observation post)

- (1) Real time CO₂ and CH₄ analyzer
 - CRDS : cavity ring-down spectroscopy (Picarro Inc., USA)
 - Data gathering system for the observation data processing
- (2) Calibration system for the analyzer
 - Reference gas for CO₂ and CH₄ (404.41 μmol/mol and 1.926 μmol/mol in air, respectively)
 - Remote control switching system for Sample/Reference
 - Flow control system (mass flow controller)
- (3) Maintenance system for Laboratory
 - Regional server system(PC)
 - Camera: laboratory environment monitoring, analyzer and calibration system display monitoring
- (4) Ambient air collection and pretreatment
 - Sample collection tower and collection line (Inlet Filter, Decarbon tubing)
 - Dehumidifier using refrigerators



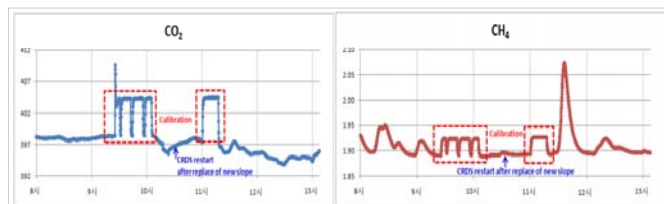
2. Center laboratory (KRISS)

- (1) Central computer : PC and external memory disc for data back-up
- (2) Logbook about the management and calibration

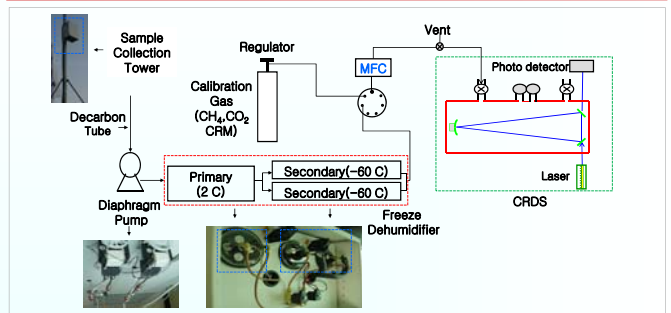


Operation on a Remote monitoring system

We calibrate the CRDS every 2 weeks by one calibration gas mixture, which contains 404.41 μmol/mol CO₂ and 1.926 μmol/mol CH₄ in air. If the difference between measured and calibration values shows larger than 0.1 μmol/mol for CO₂ and 0.002 μmol/mol for CH₄ respectively, we calculate new slope of the calibration curve and replace it in the CRDS.

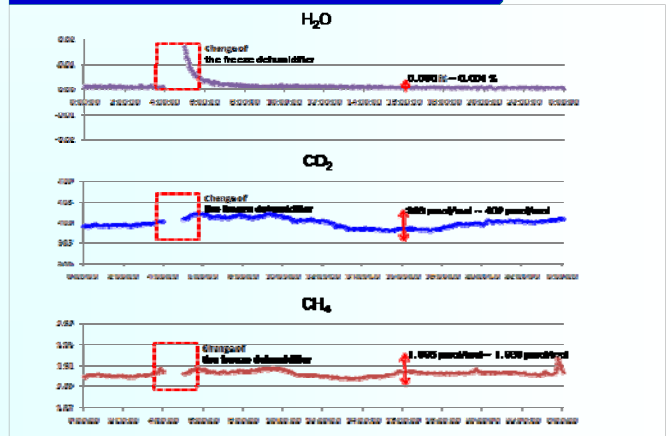


Analytical system

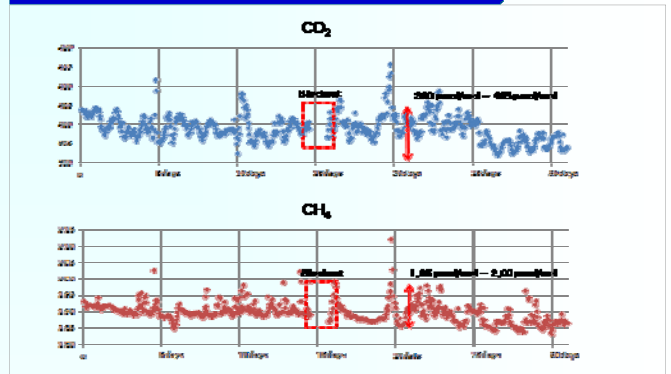


Result

100 sec average data during a day



1 hour average data during 30 days



1 hour average data at Ulleung, Anmyeon and Jeju during 7 days

