提 1015-009(5)

大気 CO_2 カラム計の無償共同利用プログラムのお知らせ

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科学技術振興機構研究成果展開事業（先端計測分析技術・機器開発プログラム）課題名「ＣＯ$_2$大気カラム濃度自動計測装置の活用・普及促進」により、明星電気株式会社が開発した太陽直達光分光式大気 CO_2 カラム計を無償で共同利用する事が可能になりましたのでお知らせします. http://www.jst.go.jp/sentan/saitaku/H26c.html

本課題による共同利用の詳細につきましては，上記の明星電気（株）または協力大学の担当者のいずれかにご連絡ください．皆様の共同利用へのご応募をお待ちしております.

記

A　ＣＯ$_2$大気カラム濃度自動計測装置の特徴

１）小型・小電力
２）太陽直達光スペクトルをファイバーエタロンで分光する
３）分光部は小型恒温箱内に格納され，特別な設置環境は不要
４）太陽直達光が雲により間歇的に遮蔽されても動作は安定
５）設置にかかる日数は１日

B　ＣＯ$_2$大気カラム濃度自動計測装置の利用例

1)　雲の多い熱帯地域
2)　森林・泥炭火災の発生量
3)　メンテナンスが不便な遠隔地
4)　二酸化炭素帯水層貯留地での洩量
5)　大規模人為発生源における発生量の直接計測
6)　その他の利用

観測装置につきましては，次ページ英文案内をご覧ください.

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Call for collaboration program of remote sensing of CO_2 column density with use of a Fiber Etalon Sun-photometer

A collaboration program supported by Japan Science and Technology Agency, JST

Meteorological & Air Traffic Control Systems Div. , Meisei Electric Co.,Ltd
Solar-Terrestrial Environment Lab. , Nagoya Univ..
Tonokura lab., Dep. Of Environment systems, Univ. of Tokyo

Meisei Electric Co.,Ltd has developed a fully-automated and handy solar spectrometer to evaluate the CO_2 column density using optical fiber technology, **FES-C** (**F**iber **E**talon **S**un-photometer for **C**O_2)

Meisei Electric Co.,Ltd seeks collaboration programs that measure atmospheric CO_2 column densities. Science and engineering teams are welcome to apply this collaboration program.

This program is financially supported by the Japan Science and Technology Agency, Ministry of Education, Science, Culture and Sports of Japan. http://www.jst.go.jp/sentan/en/index.html

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Meisei Electric Co.,Ltd of the IHI group manufactures sensing and communication instruments for environmental measurement system, meteorology, hydrology and geophysics research.
http://www.meisei.co.jp/english/

(a) Sun-tracker attached with a solar telescope

(b) Fiber optics spectrometer in a temperature controlled box

(c) Controller

(d) FES-C carrier

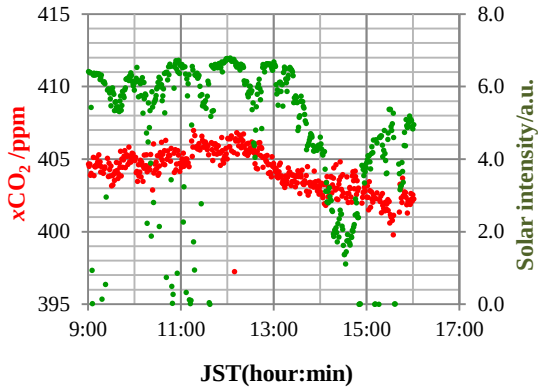
Components of FES-C

Reference: M. Kawasaki, M. Ohashi, G. Inoue, *SPIE Newsroom*, 10.1117/2.1201301.004659
This paper reports performance of a prototype FES-C model under wild fire occasions in the Kalimantan Province, Indonesia. Note that the present Meisei model provides much stable data.

Detailed Information about FES-C instrument

Greenhouse gases in the atmosphere absorb the near-infrared solar radiation and the spectral absorbance has information on their concentrations. The FES-C spectrometer consists of an optical fiber-based spectrum analyzer with a resolution enough to resolve the CO_2 rotation lines. Direct sunlight is collected by a fiber collimator installed on a sun tracker and transmitted through a single-mode optical fiber into the spectrum analyzer to obtain optical density data caused by atmospheric CO_2. The data are converted to the CO_2 column densities by means of spectral simulation analysis.

Figure shows a diurnal change of xCO_2 under partially cloudy conditions, which was measured in collaboration with the National Institute for Environmental Studies (NIES) in Tsukuba-City, Japan.



Diurnal change of xCO_2 under partially cloudy condition
(**Red dot**): xCO_2 in ppm calibrated to the Tsukuba TCCON data
(**Green dot**): solar intensity at near-infrared region

Date/place: May 24th, 2014/ NIES, Tsukuba, JAPAN

FES-C instrument and requirements to a monitoring site

1. FES-C is composed of three parts, (a) a sun tracker with a fiber collimator, (b) a temperature controlled box that contains fiber etalon optics and electronics, (c) a controller/data logger. Total weight of 30 kg. FES-C can be packed in two carry cases.
2. The sun tracker should be installed on a place where the sun is visible from 9 am to 3 pm LT. The cables for electric/signal lines and an optical fiber connect the outdoor parts with the indoor parts through a hole of 50 mm diameter. Installation can be completed in a day.
3. Total electric power requirement is 200 W in operation and 300 W at starting. The temperature control box is better to place in an air-conditioned room below 34°C.
4. FES-C is suitable for use in field measurements, especially under a remote area, because of easy handling and maintenance, and low running cost.

References

1. E.L. Wilson *et al*., *Meas. Sci. Technol.*, **18,** 1495 (2007)

2. N. Kobayashi *et al*., *Atmos. Meas. Tech.*, **3**, 1 (2010)