

# 全球的な CO<sub>2</sub> 季節交換量の増大が北極圏の CO<sub>2</sub> 濃度に及ぼす影響について

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## **Influence of global enhancement of seasonal exchange of CO<sub>2</sub> on the concentrations in the Arctic**

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A numerical simulation was conducted to reproduce an observed enhancement of seasonal amplitudes of CO<sub>2</sub> concentrations in the Arctic. Global enhancement of seasonal exchange of CO<sub>2</sub> was evaluated using a global atmospheric transport model, STAG. The model was driven by reanalysis of the European Centre for Medium Range Weather Forecasts, 1979 to 2013. The model was integrated from global homogeneous concentrations of 320ppm at 1950 using meteorology of 2010-2013 before 1978. Emissions from fossil fuels combustion estimated by Carbon Dioxide Information and Analysis Center (CDIAC, mean increase rate of 108GgC/yr), and monthly sources and sinks from ocean estimated by Takahashi that was prepared for TransCom experiments were used without change. Monthly sources and sinks estimated using CASA biospheric model that is also prepared for TransCom were first adjusted to match with observed seasonal amplitude in 1971 at point barrow (BRW, GSNF=13.4PgC/yr). Sources and sinks were further modified under the constraint that growth rate of annual mean concentrations agrees with the observations. Seven cases for enhancement of sources and sinks, such that the enhancement of source equals 0% to 60% of enhancement of sinks were tested in the model. Simulated seasonal amplitudes were best compared to the observations in the case of 50% which corresponds the 0.31%/yr increase of the source, and 0.56%/yr increase of the sink. Results at other sites are under investigation.

北極域で検出された二酸化炭素濃度の季節変動振幅の増加を再現することを試みた。陸上生態系の活発化による交換量の増大を全球同率と仮定して大気輸送モデル(STAG)により評価した。輸送モデルは1979-2013年のヨーロッパ中期予報センターの再解析値で走らせた。1950年に全球一様320ppmと仮定し、1978年以前は2010-2013年の気象場を用いて積分した。二酸化炭素解析情報センターの報告した化石燃料起源の月別排出強度分布と国際輸送モデル相互比較実験(TransCom)に高橋から提供された海洋起源の月別放出吸収値をそのまま用いた。陸上植生の月別放出吸収はTransComに提供されたCASAの推定値をバロウ岬の1971年の振幅に調節した値を基準として変更した。放出と吸収は年平均濃度の増加率が観測と合う事を拘束条件として調節した。強くなった吸収の何割が放出されるかをゼロから六割まで指定した実験を行ったところ5割と指定した場合が最も観測に近かったが、この場合放出は年0.31%で増大し吸収は0.56%で増大する。他の地点に関しては現在解析中。

### **References**

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