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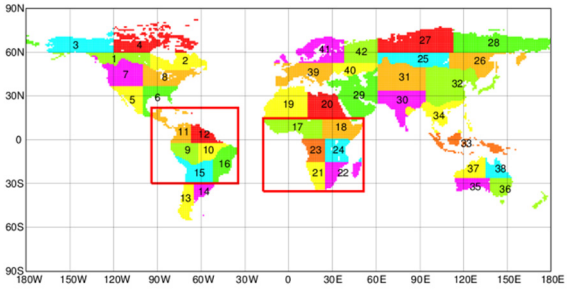

Fig. 1. The analyzed regions are Regions 9, 10, 11, 12, 15, and 16 in South America, and Regions 17, 18, 21, 22, 23, and 24 in Africa.

Table 1. Correlation coefficients between the monthly differences in the carbon dioxide (CO_2) flux and in the land surface elements (PREC: precipitation, NDVI: Normalized Difference Vegetation Index, SWR: short-wave radiation, and Tsfc: surface temperature) in South America and Africa. The correlations for the differences between 2009 and 2010 (2010 – 2009) (from June to December) and those for the differences between 2010 and 2011 (2011 – 2010) (from January to October) are examined separately. G+G indicates coefficient values for the difference in the CO_2 flux by inverse analysis using both ground-based CO_2 concentration data and the Greenhouse gases Observing SATellite (GOSAT) data. G means those using only ground-based CO_2 concentration data. Correlation coefficient values in bold indicate values that exceed the 90% significance level.

		G+G		G	
		2010-2009 (Jun-Dec)	2011-2010 (Jan-Oct)	2010-2009 (Jun-Dec)	2011-2010 (Jan-Oct)
S. America	PREC	**-0.26**	0.19	0.08	**0.30**
	NDVI	**-0.46**	**-0.24**	-0.20	**-0.23**
	SWR	**0.36**	0.00	-0.01	-0.06
	Tsfc	0.17	-0.08	0.21	-0.19
Africa	PREC	0.04	**-0.23**	0.05	-0.18
	NDVI	0.03	0.15	-0.04	0.12
	SWR	-0.00	-0.19	-0.09	-0.16
	Tsfc	0.11	0.04	0.18	0.12

- In this study, the features and validity of changes in the carbon dioxide (CO_2) flux estimated by inverse analysis were verified by interrelation analysis with changes in precipitation, short-wave radiation, surface temperature, and Normalized Difference Vegetation Index (NDVI) in regions of South America and Africa where CO_2 flux observation data are limited.

- Sufficient accuracy of the land surface elements is required for the analysis results to confirm the CO_2 flux estimated by inverse analysis. An examination of the correlation of anomalies showed consistent relationships among the precipitation, short-wave radiation, surface temperature, and NDVI data used in this study, which were created independently.

- The relationships between change in the estimated CO_2 flux and characteristic changes of the land surface elements in South America and Africa were consistent in each region. This study confirmed the physical and biological validity of the changes in the CO_2 flux estimated by inverse analysis.

- During the period of this study, the NDVI anomaly was influential in South America, and the precipitation (soil wetness) anomaly was an essential factor in Africa for the CO_2 flux anomaly. The short-wave radiation anomaly was also influential at the inverse analysis region scale in both South America and Africa. The distinctive relationships are detected more clearly in the results of inverse analysis using both ground-based CO_2 concentration data and the Greenhouse gases Observing SATellite (GOSAT) data than in the results using only ground-based CO_2 concentration data. This demonstrates the usefulness of GOSAT data in regions with limited atmospheric CO_2 concentration data.