Spatiotemporal distribution of Constant Square cells not overlapped with Variable Square cells

Norio Takahashi
National Research Institute of Far Seas Fisheries

This short report was prepared for responding to the request made at the OMMP4 meeting to illustrate distribution of Constant Square (CS) cells non-overlapped with Variable Square (VS) cells. This information of the distribution is provided to examine how to deploy research effort of a possible experiment by commercial vessels which would clarify appropriate weighting for CS versus VS indices. Distribution of CS cells not overlapped with VS cells varied spatially and temporally within the same year. Patterns of the CS cell distribution also fluctuated even within the same month among different years. From this inspection, it became evident that 45-50S 120-160E cell and 40-45S 120-160E cell of Area 7 and 40-45S 60-120E cell of Area 8 had tended to be consistently non-overlapped with VS cells and to have higher proportions of index value.

このレポートは、バリアブルスクエア（VS）のセルと重複しないコンスタントスクエア（CS）のセルの分布を示すという OMMP4 会合でのリクエストに応えるために準備された。この情報は、商業漁船による調査努力をどのように展開するかを検討するために提供されている。この調査は CS と VS 指数の適切な重み付けについて明らかにするためのものである。VS セルと重複しない CS セルの分布は 1 年の中でも時空間的に変化していた。CS セルの分布パターンは同じ月でも異なる年では変動していた。この検討から、7 海区の 45-50S 120-160E セルと 40-45S 120-160E セル、8 海区の 40-45S 60-120E セルが一貫して VS セルと重複せず、指数値のより高い割合を占める傾向があることが明らかになった。

Introduction

This short report was prepared for responding to the request made by Dr. John Pope at the CCSBT fourth Operating Model and Management Procedure Technical Meeting (OMMP4) to illustrate spatiotemporal distribution of Constant Square[1] (CS) rectangular cells which were not overlapped with Variable Square (VS) cells (Attachment 5 in CCSBT 2013). This information of the distribution of such CS cells is provided to examine how to deploy research effort of a possible future experiment by commercial vessels which would clarify the appropriate weighting for CS versus VS indices.

Method and Data used

Information of year, month, Area[2] and 5 degree-based latitude for CS rectangular cells not overlapped with VS cells was sorted out for recent five years of from 2008 to 2012 to map distribution of the cells, using the same data set of area index (area weights) which was applied to calculate CS and VS abundance indices (i.e., w0.5 and w0.8) for the 2013 Data Exchange (data files named 'aridx_cs_2013SC.prn' and 'aridx_vs_2013SC.prn').

For each CS cell, the associated abundance index value was calculated by using information of area index and standardized CPUE and the proportion in percentage of the index value to the sum of all index values within the same month was classified by color in distribution maps. The information of standardized CPUE (result from GLM analysis) was also same as that used in the calculation of CS and VS indices for this year's Data Exchange. The statistical model of CPUE standardization was same as that of Nishida and Tsuji (1998), not same as that for core vessels (Itoh et al. 2013).

Results and Discussion

Distribution of CS rectangular cells not overlapped with VS cells varied spatially and temporally within the same year (Fig. 1). Such variation was observed throughout all years examined. Patterns of the CS cell distribution also fluctuated even within the same month among different years, and such fluctuation occurred in all months from April to September.

As long as looking at 5-degree-based rectangular cells, throughout year/month examined, there was no non-overlapped CS cell which was fished only after 2006, the year since when it is considered that Japanese longliners have possibly changed their operation patterns due to introduction of Individual Quota system, reduction in catch allocation and removal of seasonal Area closure (Itoh 2012).

Most of proportions of CS index value associated with the non-overlapped cells were less than 20% across years and months examined (Fig. 1). However, some cells in particular month/year had higher proportions than 50%, and in some other cases, the proportions were over 90%. Examples for these cases are 45-50S 120-160E cell in Area 7/May/2008 and 40-45S 60-120E cell in Area 8/July/2010.

Inspecting the spatiotemporal distribution of the non-overlapped CS cells for recent five years, it became evident that 45-50S 120-160E cell of Area 7 had been consistently non-overlapped with VS cells and had tended to have higher proportions of index value (Fig.1). Another cell of Area 7, 40-45S 120-160E rectangle had been also constantly dropped

[1] For explanation of Constant Square and Variable Square CPUE interpretations, see CCSBT (2001)

[2] In this report, "Area" means the CCSBT Statistical Area.

out and had tended to have higher proportions of index value. Not so much as these two cells, 40-45S 60-120E cell of Area 8 had also tended to have relatively higher proportions of index value and had not been overlapped with VS. Some cells, such as 45-50S 60-120E cell of Area 8 and 45-50S 20W-60E cell of Area 9, had also been consistently dropped out from VS cells, although the associated proportions of index value for these cells were very small.

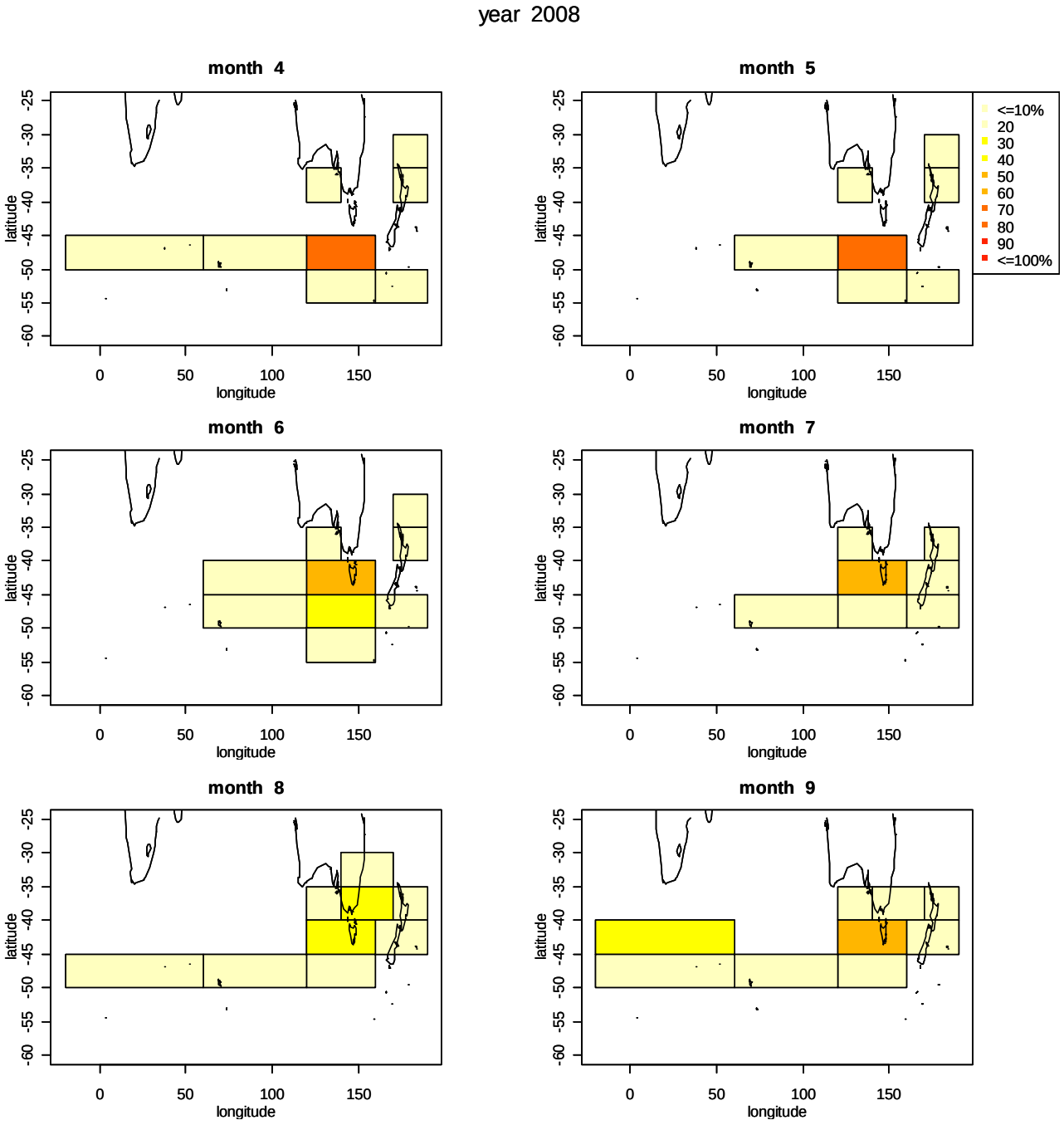


Fig. 1. Spatiotemporal distribution of Constant Square (CS) rectangular cells not overlapped with Variable Square (VS) cells by year and month. Color represents the proportion in percentage of the CS index value for each CS cell to the sum of index values for all non-overlapped CS cells within the same month.

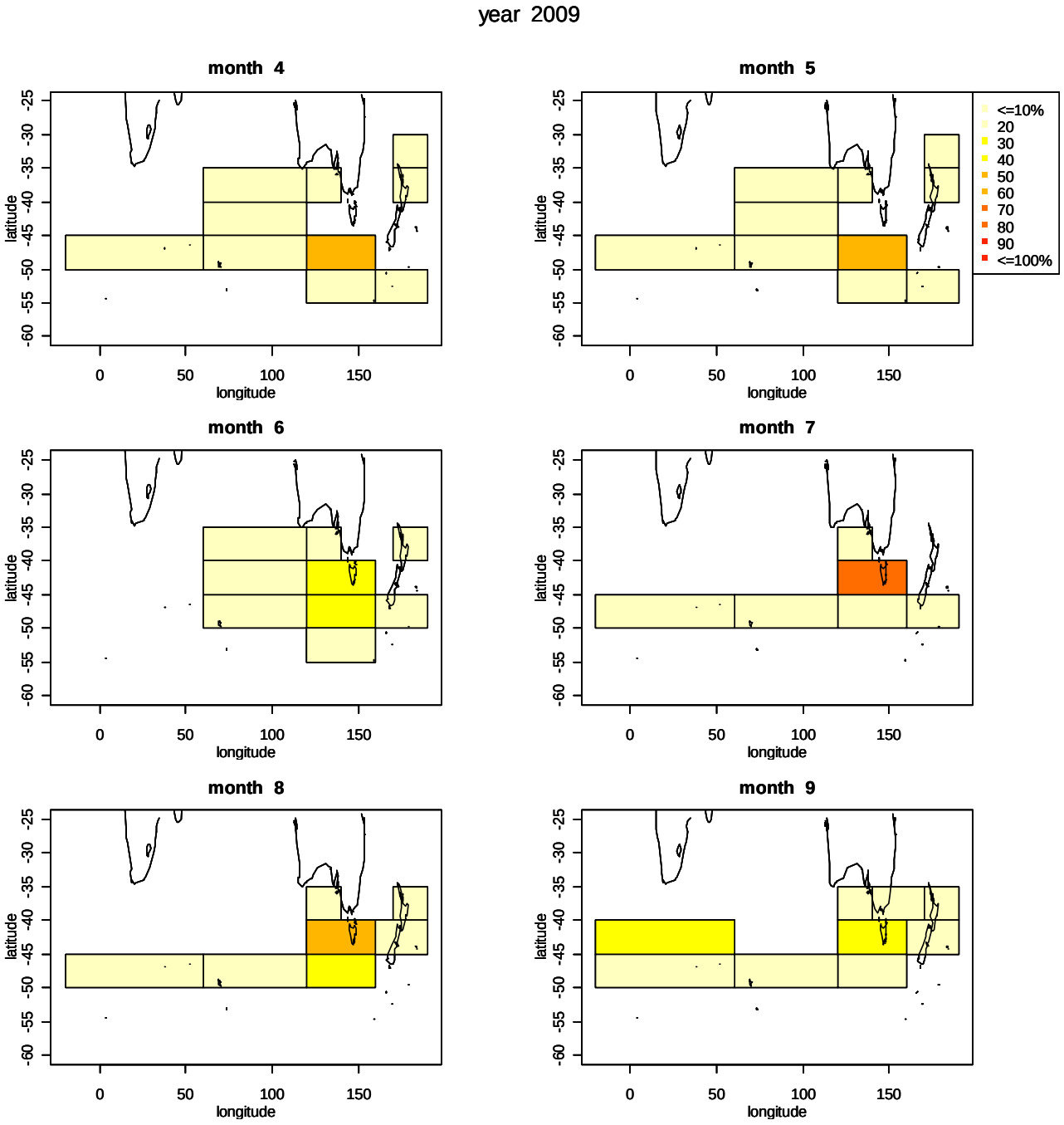
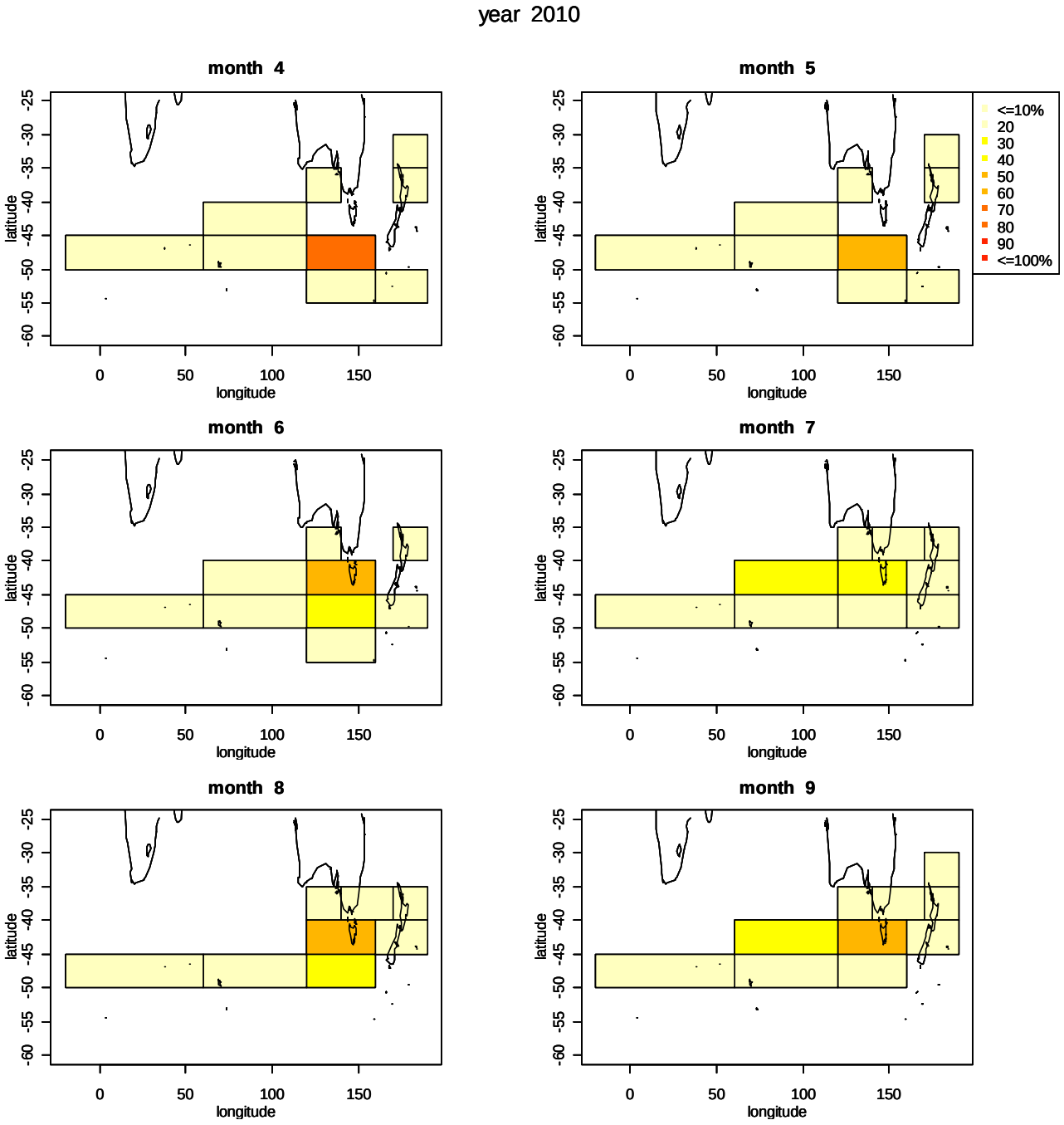


Fig. 1. (cont'd) Spatiotemporal distribution of Constant Square (CS) rectangular cells not overlapped with Variable Square (VS) cells by year and month. Color represents the proportion in percentage of the CS index value for each CS cell to the sum of index values for all non-overlapped CS cells within the same month.



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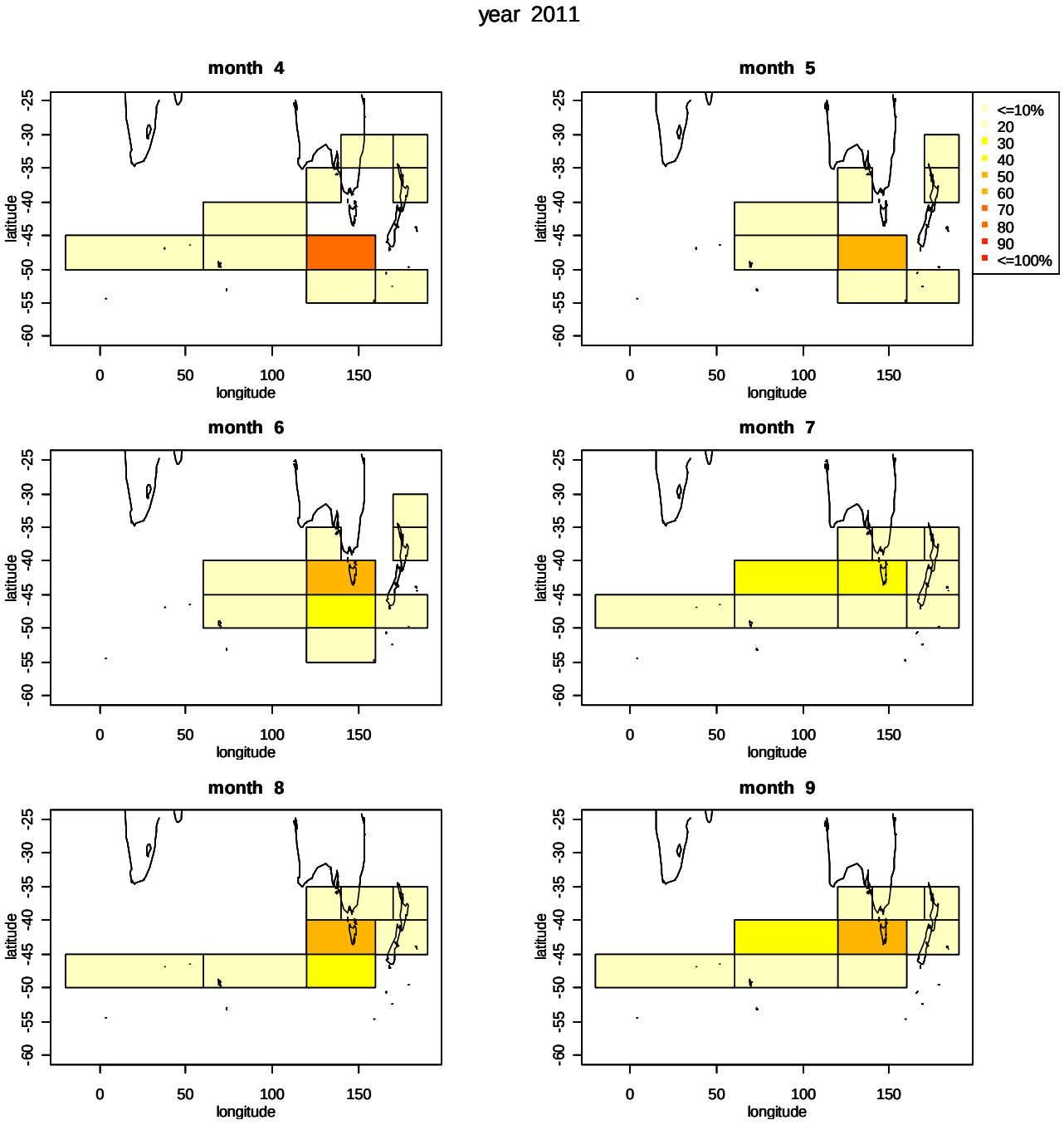

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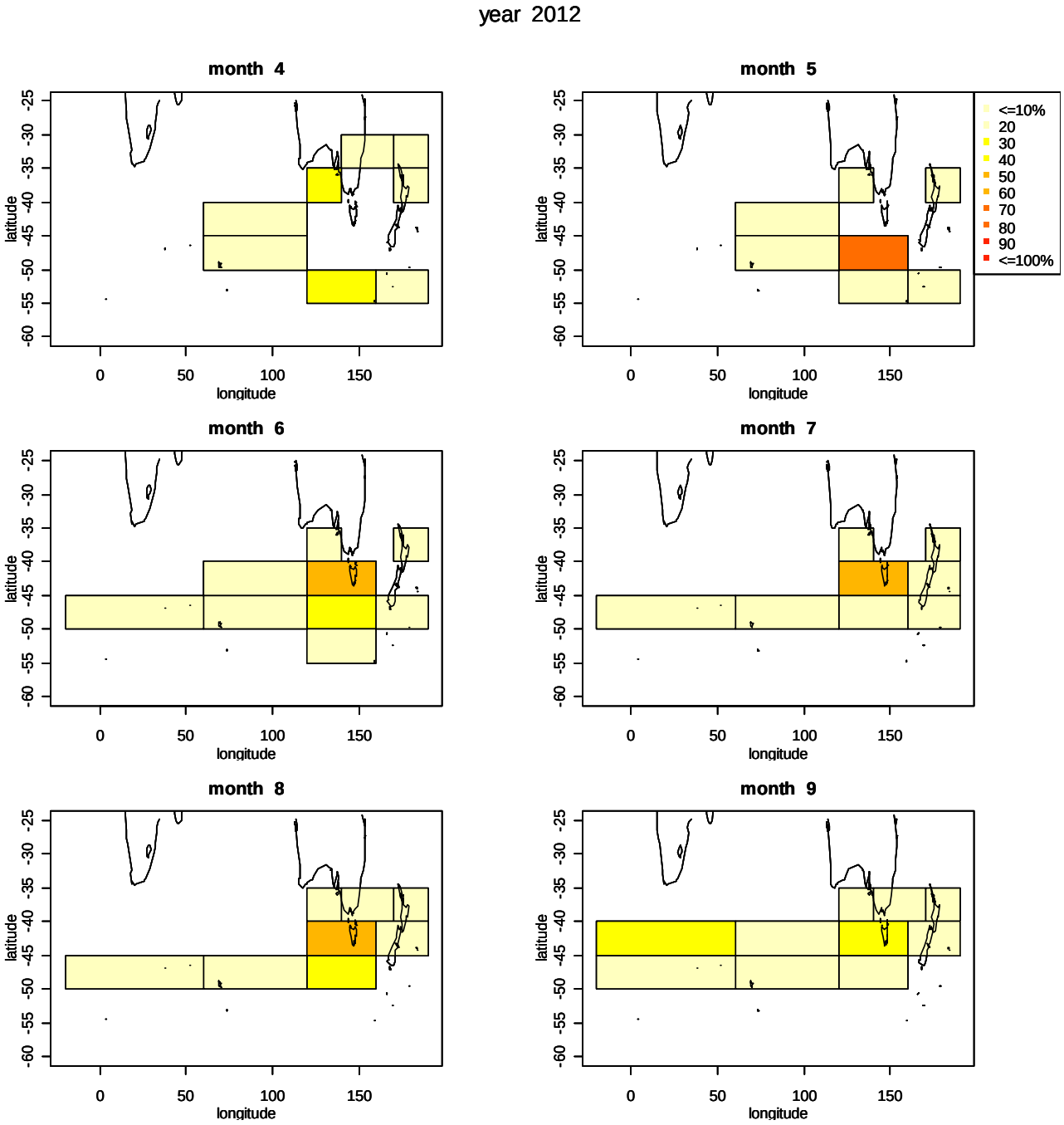

Fig. 1. (cont'd) Spatiotemporal distribution of Constant Square (CS) rectangular cells not overlapped with Variable Square (VS) cells by year and month. Color represents the proportion in percentage of the CS index value for each CS cell to the sum of index values for all non-overlapped CS cells within the same month.

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