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# Possible Factors affecting the Thermal Contrast between Middle-Latitude Asian Continent and Adjacent Ocean

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A middle-latitude Land-Sea thermal contrast Index was used in this study which has close connection to the East Asian summer precipitation. The index has two parts which are land thermal index defined as JJA 500-hPa geopotential height anomalies at a land area (75°-90° E, 40° -55°N ) and ocean thermal index defined as that at an oceanic area (140° -150°E, 35° -42.5°N).
The impact of the surface heat flux and atmospheric diabatic heating over the land and the ocean on the index was studied. The results show that the surface heat flux over Eurasian inner land has little influence to the land thermal index, while the variation of the surface latent heat flux and long-wave radiation over the Pacific adjacent to Japan has highly correlation with the ocean thermal index. The changes with height of the atmospheric diabatic heating rates over the Eurasian inner land and the Pacific adjacent to Japan have different features. The variations of the middle troposphere atmospheric long-wave and short-wave radiation heating have significantly influences on land thermal index, and that of the low troposphere atmospheric long-wave radiation, short-wave radiation and deep convective heating also have impact on the yearly variation of the land thermal index. For the ocean thermal index, the variations of the surface layer atmospheric vertical diffuse heating, large-scale latent heating and long-wave radiation heating are more important, low and middle troposphere atmospheric large-scale latent heating and shallow convective heating also have impact on the yearly variation of the ocean thermal index. And then the ocean thermal index has closely connection with the low troposphere atmospheric temperature, while the land thermal index has closely connection with the middle troposphere atmospheric temperature.
The Effect of the preceding global SST anomalies on the index also was analyzed. The relations of land thermal index and ocean thermal index and the global SST anomalies in the preceding autumn, winter, spring and same summer are observed, the results show that the preceding SST anomalies in North Indian Ocean (50o-130oE[U+FF0C]10oS-20oN) has closely relationship with the land thermal index, and the preceding SST anomalies in Northwest Pacific (140oE-180o,10oN-20oN) are highly positively correlated with ocean thermal index. Utilizing EOF analysis, we have discussed the spatial distribution of SSTA in preceding winter over North Pacific, and it is found that the variation of SSTA in the area located in Northwest Pacific could reflect the variation of SSTA in North Pacific. The spacial distribution of preceding SSTA in the high and low index year confirmed the important effect of these two areas. The relationship of the preceding winter and spring SSTA in the area located in Northwest Pacific and the ocean thermal index, and that of the preceding winter and spring SSTA in the area located in North Indian Ocean and the land thermal index, reveal that the preceding winter and spring SSTA in these two areas could be used as forecasting factors of the index. The effect of the preceding winter SSTA in these two areas on the summer circulation in East Asian was also observed. The results show that, when the preceding winter SSTA in Northwest Pacific is warmer (colder), the anticyclonic (cyclonic) anomalies appears in summer over Japan and adjacent ocean; when the preceding winter SSTA in North Indian Ocean is warmer (colder), the anticyclonic (cyclonic) anomalies appears in summer over Kazakhstan area in Eurasian inner land.