Contributions of tropical-extratropical oceans to the prediction skill of ENSO after 2000

Liang Shi¹, Ruiqiang Ding², and Yu-heng Tseng³

¹School of Science, Lanzhou University of Technology, Lanzhou, China (shiliang_job@163.com)
²State Key Laboratory of Earth Surface Processes and Resource Ecology, Beijing Normal University, Beijing, China (drq@mail.iap.ac.cn)
³Institute of Oceanography, National Taiwan University, Taipei, Taiwan (tsengyh@ntu.edu.tw)

The skills of most ENSO prediction models have declined significantly since 2000. This decline may be due to a weakening of the correlation between tropical predictors and ENSO. Moreover, the effects of extratropical ocean variability on ENSO have increased during this period. To improve ENSO predictability, we investigate the influence of the tropical-extratropical Atlantic and Pacific sea surface temperature (SST) on ENSO during the periods of pre-2000 and post-2000. We find that the influence of the northern tropical Atlantic (NTA) SST on ENSO has significantly increase since 2000. Meanwhile, there is a much earlier and stronger SST responses between NTA SST and ENSO over the central-eastern Pacific during June-July-August in the post-2000 period compared with the pre-2000 period. Furthermore, the extratropical Pacific SST predictors for ENSO still retain a ~10-month lead time after 2000. We use SST signals in the extratropical Atlantic and Pacific to predict ENSO using a statistical prediction model. These results reveal a significant improvement in ENSO prediction skills. These results indicate that the Atlantic and Pacific SSTAs can make substantial contributions to ENSO prediction, and can be further used to enhance ENSO predictability after 2000.