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Plain Language Summary: La Niña (LN) events generally persist longer than El Niño (EN) events. This study revealed that the anomalous Australian winter monsoon (AWM) maintains LN events long through strengthening the convective activity in and around the Indonesian maritime continent (IMC) from March to August (Figure 1). First, LN forces the surface temperature in the northern Australian continent (NAC) low by modifying surface soil moisture and downward shortwave radiation flux there. Formed large surface temperature difference between the IMC and the NAC drives the stronger-than-usual AWM, which maintains LN events long. LN seems to have a self-sustained mechanism with a positive feedback with the AWM, which may be called the LN-AWM feedback. EN does not have such a feedback mechanism so that EN events end in the period of March–August.

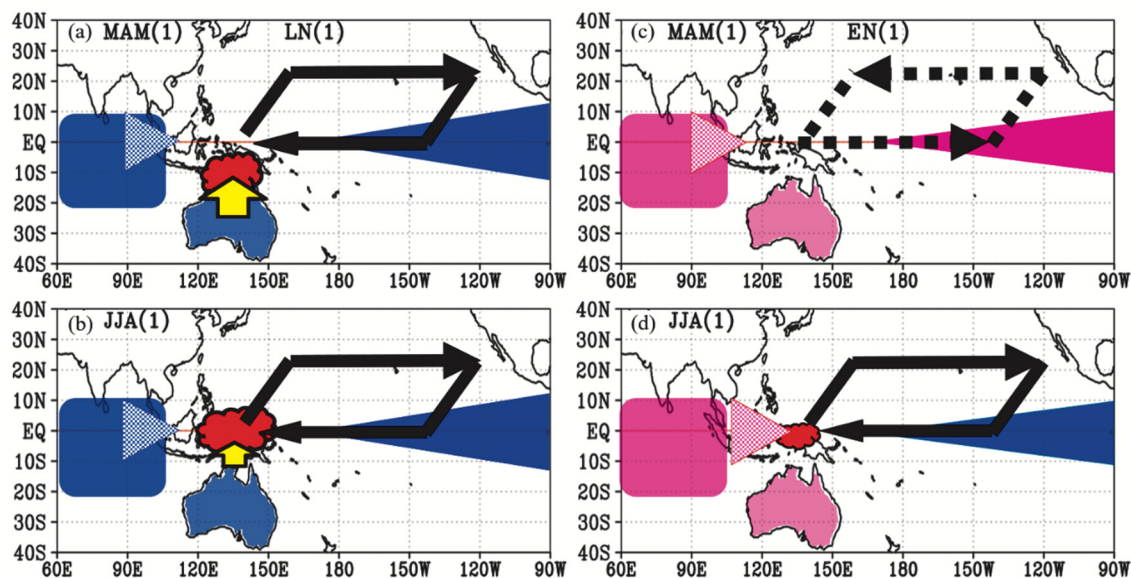


Figure 1. Schematic diagrams illustrating the processes in La Niña (left) and in El Niño (right). (a) and (c) are for MAM(1), whereas (b) and (d) are for JJA(1). Magenta (blue) indicates the positive (negative) anomalies in surface temperature. Red clouds correspond to the positive rainfall anomalies representing stronger-than-usual convective activity. Yellow arrows denote the stronger-than-usual AWM. Black solid and dotted arrows indicate the rotation of anomalous Walker circulation. Blue (red) triangles represent the eastward movement of anomalous descent (ascent) disturbances occurring with the eastward shift of anomalous Walker circulation.

- A physical mechanism maintaining La Niña events long is proposed; that is the anomalous Australian winter monsoon.
- La Niña modifies the Australian winter monsoon to be stronger-than-usual.
- La Niña has a self-sustained mechanism with a positive feedback with the Australian winter monsoon.