Supporting Information for

Asymmetric Response of the Indonesian Throughflow to Co-Occurring El Niño–Southern Oscillation–Indian Ocean Dipole Events

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Introduction

To verify the robustness of the lead-lag correlations between ITF volume transport and the Niño 3.4 and DMI indices, the independent results of each year are shown in Figures S1–S4 during IOD-independent ENSO and ENSO-independent IOD events.
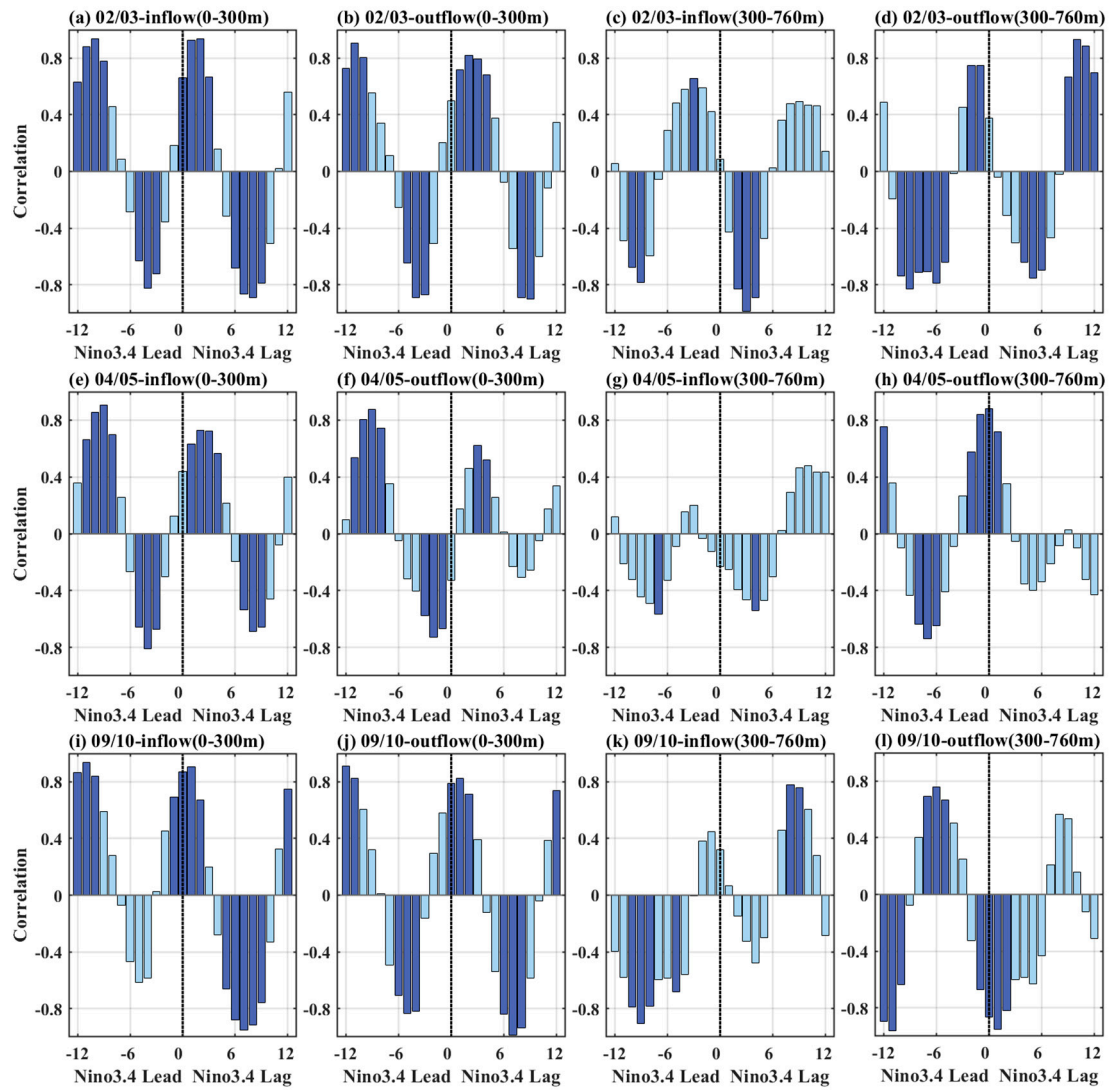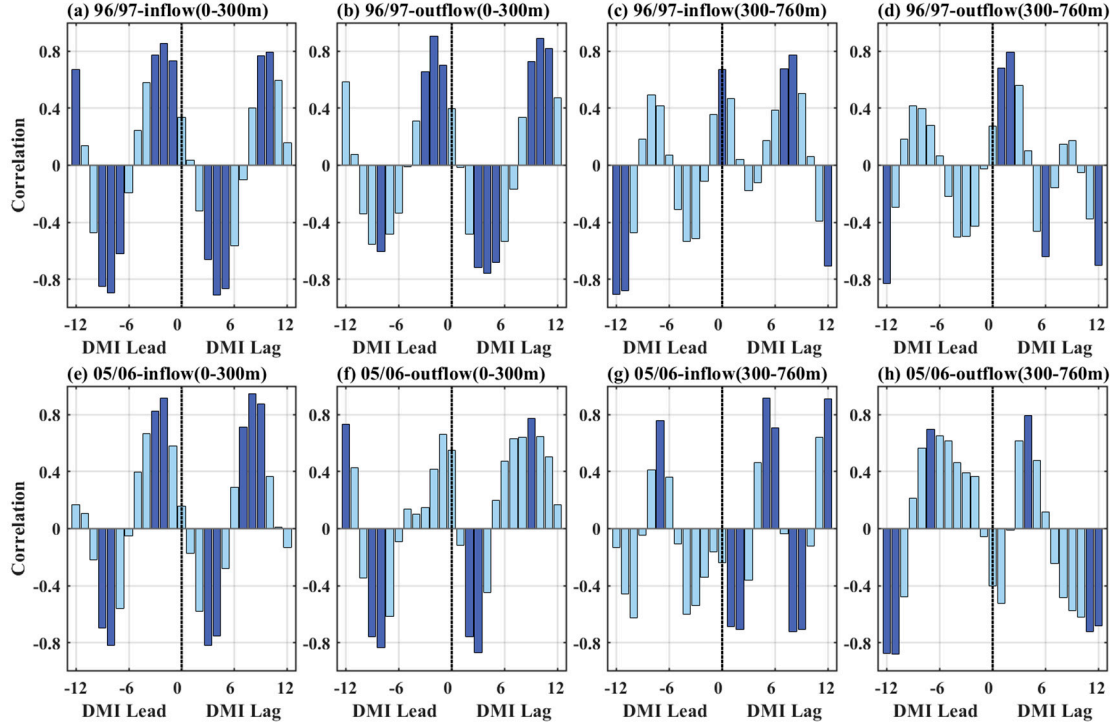
Figure S1. Lead-lag correlations between ITF volume transport and Niño 3.4 index during IOD-independent El Niño events. (**a**) Lead-lag correlations between the ITF inflow upper layer (0–300 m) volume transport and Niño 3.4 index during 2002–2003. The dark blue bars indicate passing the 95% significance test. (**b–d**) Same as (**a**) but for the ITF inflow lower layer (300–760 m), outflow upper layer (0–300 m) and outflow lower layer (300–760 m) volume transport, respectively. (**e–h**) and (**i–l**) Same as (**a–d**) but during 2004–2005 and 2009–2010, respectively.
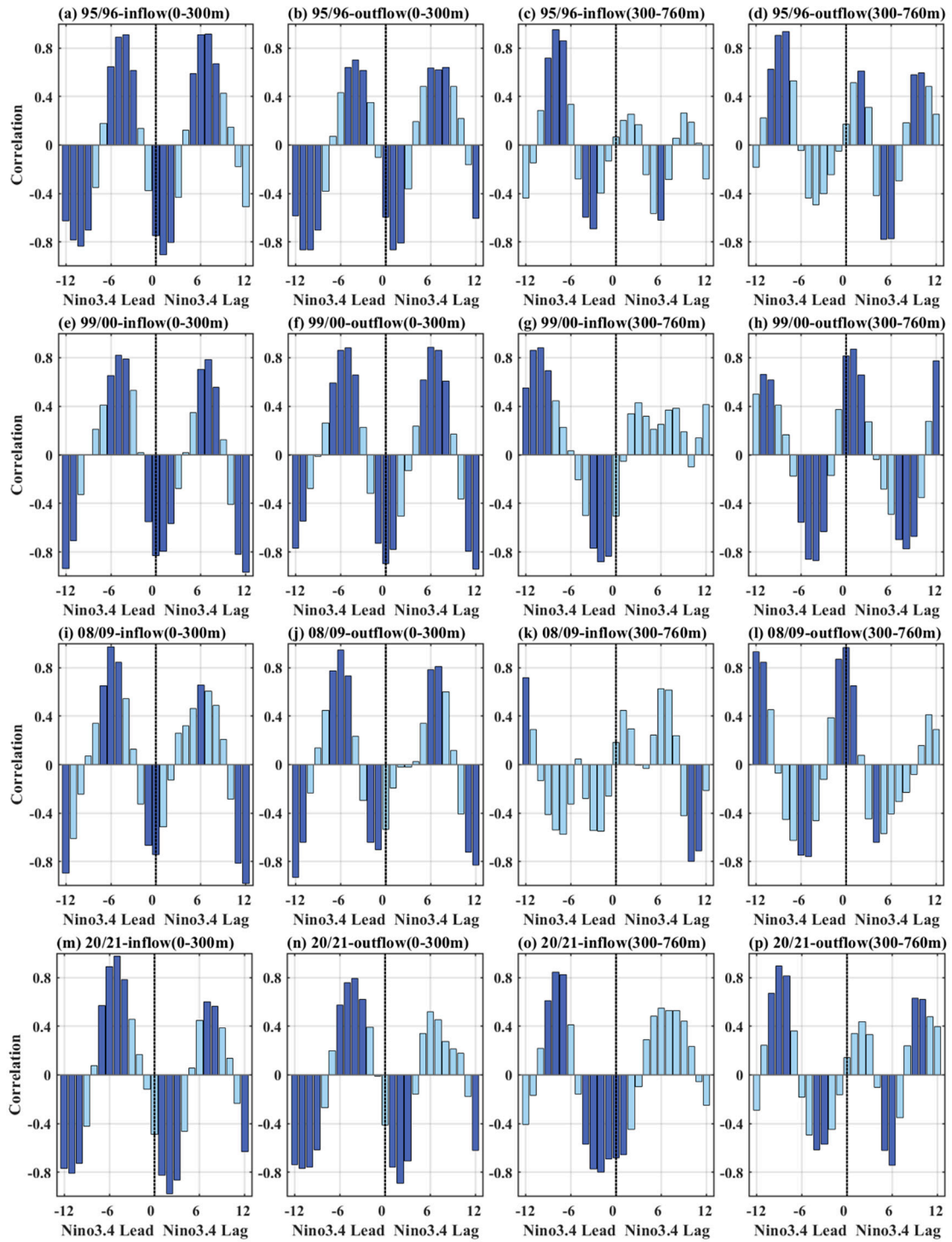
Figure S2. Lead-lag correlations between ITF volume transport and Niño 3.4 index during IOD-independent La Niña events. (**a**) Lead-lag correlations between the ITF inflow upper layer (0–300 m) volume transport and Niño 3.4 index during 1995–1996. The dark blue bars indicate passing the 95% significance test. (**b–d**) Same as (**a**) but for the ITF inflow lower layer (300–760 m), outflow upper layer (0–300 m) and outflow lower layer (300–760 m) volume transport, respectively. (**e–h**), (**i–l**) and (**m–p**) Same as (**a–d**) but during 1999–2000, 2008–2009 and 2020–2021, respectively.
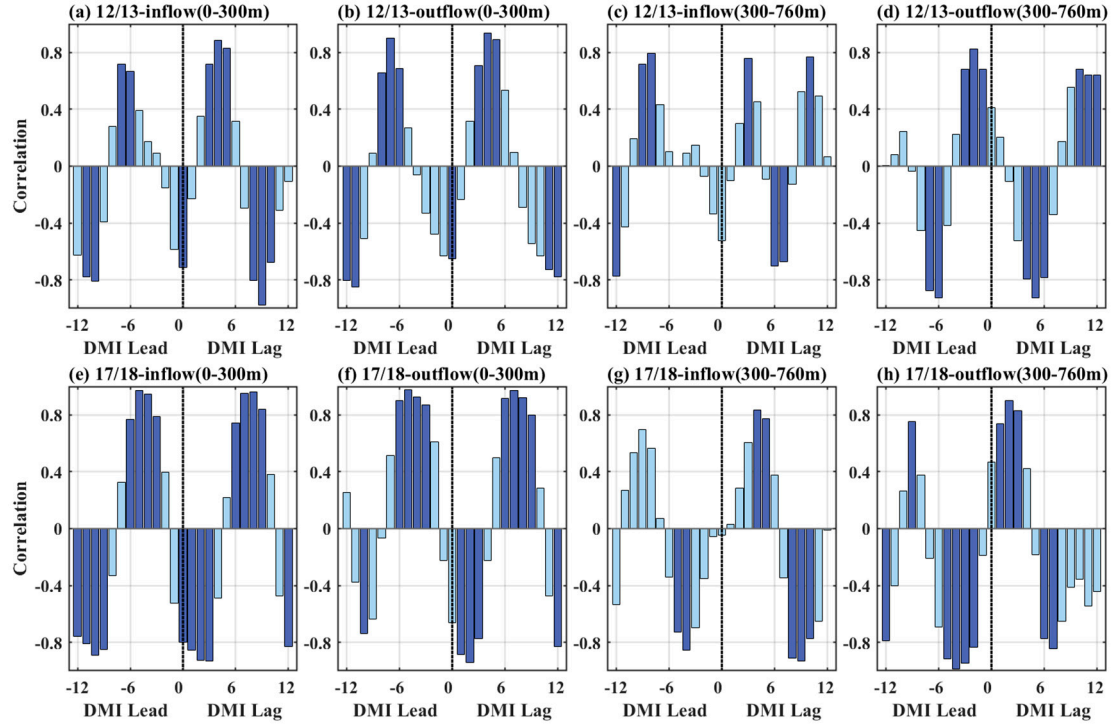
Figure S3. Lead-lag correlations between ITF volume transport and DMI index during ENSO-independent Positive IOD events. (**a**) Lead-lag correlations between the ITF inflow upper layer (0–300 m) volume transport and DMI index during 2002–2003. The dark blue bars indicate passing the 95% significance test. (**b–d**) Same as (**a**) but for the ITF inflow lower layer (300–760 m), outflow upper layer (0–300 m) and outflow lower layer (300–760 m) volume transport, respectively. (**e–h**) Same as (**a–d**) but during 2017–2018.

Figure S4. Lead-lag correlations between ITF volume transport and DMI index during ENSO-independent Negative IOD events. (**a**) Lead-lag correlations between the ITF inflow upper layer (0–300 m) volume transport and DMI index during 1996–1997. The dark blue bars indicate passing the 95% significance test. (**b–d**) Same as (**a**) but for the ITF inflow lower layer (300–760 m), outflow upper layer (0–300 m) and outflow lower layer (300–760 m) volume transport, respectively. (**e–h**) Same as (**a–d**) but during 2005–2006.