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Influence of Northeast Monsoon cold surges on air quality in Southeast Asia

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1 **Influence of Northeast Monsoon Cold Surges on Air Quality in Southeast Asia**

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15 **Abstract**

16 Ozone (O₃) is an important ground-level pollutant. O₃ levels and emissions of O₃ precursors have
17 increased significantly over recent decades in East Asia and export of this O₃ eastward across the
18 Pacific Ocean is well documented. Here we show that East Asian O₃ is also transported southward to
19 tropical Southeast (SE) Asia during the Northeast Monsoon (NEM) season (defined as November to
20 February), and that this transport pathway is especially strong during ‘cold surges’. Our analysis
21 employs reanalysis data and measurements from surface sites in Peninsular Malaysia, both covering
22 2003-2012, along with trajectory calculations. Using a cold surge index (northerly winds at 925 hPa
23 averaged over 105-110°E, 5°N) to define sub-seasonal strengthening of the NEM winds, we find the
24 largest changes in a region covering much of the Indochinese Peninsular and surrounding seas. Here,
25 the levels of O₃ and another key pollutant, carbon monoxide, calculated by the Monitoring

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