SUPPLEMENT

EXPLAINING EXTREME EVENTS OF 2015 FROM A CLIMATE PERSPECTIVE

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Cover credits:
Front: ©Photo by Joe Raedle/Getty Images—A vehicle drives through flooded streets The flood was caused by a combination of the lunar orbit which caused seasonal high tides and what many believe is the rising sea levels due to climate change. (on September 30, 2015, in Fort Lauderdale, Florida) South Florida is projected to continue to feel the effects of climate change, and many of the cities have begun programs such as installing pumps or building up sea walls to combat the rising oceans.

AMERICAN METEOROLOGICAL SOCIETY

S27. RECORD LOW NORTHERN HEMISPHERE SEA ICE EXTENT IN MARCH 2015

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This document is a supplement to "Record Low Northern Hemisphere Sea Ice Extent in March 2015" by Neven S. Fučkar, François Massonnet, Virginie Guemas, Javier García-Serrano, Omar Bellprat, Francisco J. Doblas-Reyes, and Mario Acosta (*Bull. Amer. Meteor. Soc.*, **97 (12)**, S136–S140) • ©2016 American Meteorological Society • DOI:10.1175/BAMS-D-16-0153.2

Aspects of the NH March 2015 anomalous surface conditions

The positive SAT anomaly, as well as detrended anomaly patterns in the Barents Sea in Fig. S27.1—associated with negative SIC anomalies there in main text Figs. 27.1d, f—are related to regional SLP anomaly patterns and south-westerly anomalous surface wind over the Norwegian Sea. In the Pacific sector we have strong positive SLP anomalies over the western Aleutians that induce southerly anomalous surface winds over the Sea of Okhotsk leading to positive SAT and negative SIC anomalies there. In contrast, over the SIC anomalous region in the Bering Sea (in main text Fig. 27.1) there is an absence of anomalous southerly surface wind in Fig. S27.1, and SAT anomaly pattern closely matches SST anomaly pattern so it appears that these SIC anomalies likely arise from the upper-ocean anomalous properties.

On the need for the trend bias correction

Our OGCM has a weaker Atlantic overturning circulation than estimates from various ocean reanalyses which leads to a weaker Atlantic meridional ocean heat transport (OHT) into the Arctic basin (not shown). A weaker OHT into the Barents and Kara Seas biases regional sea ice cover to have a slower long-term decline. Furthermore, using LIM3 sea ice model with single sea-ice-thickness category makes Arctic sea ice cover more inert to climate change than in observations. A combination of such factors likely contributes to the difference between model and observed long-term trends requiring the use of trend bias correction method to adequately reduce forecast error.

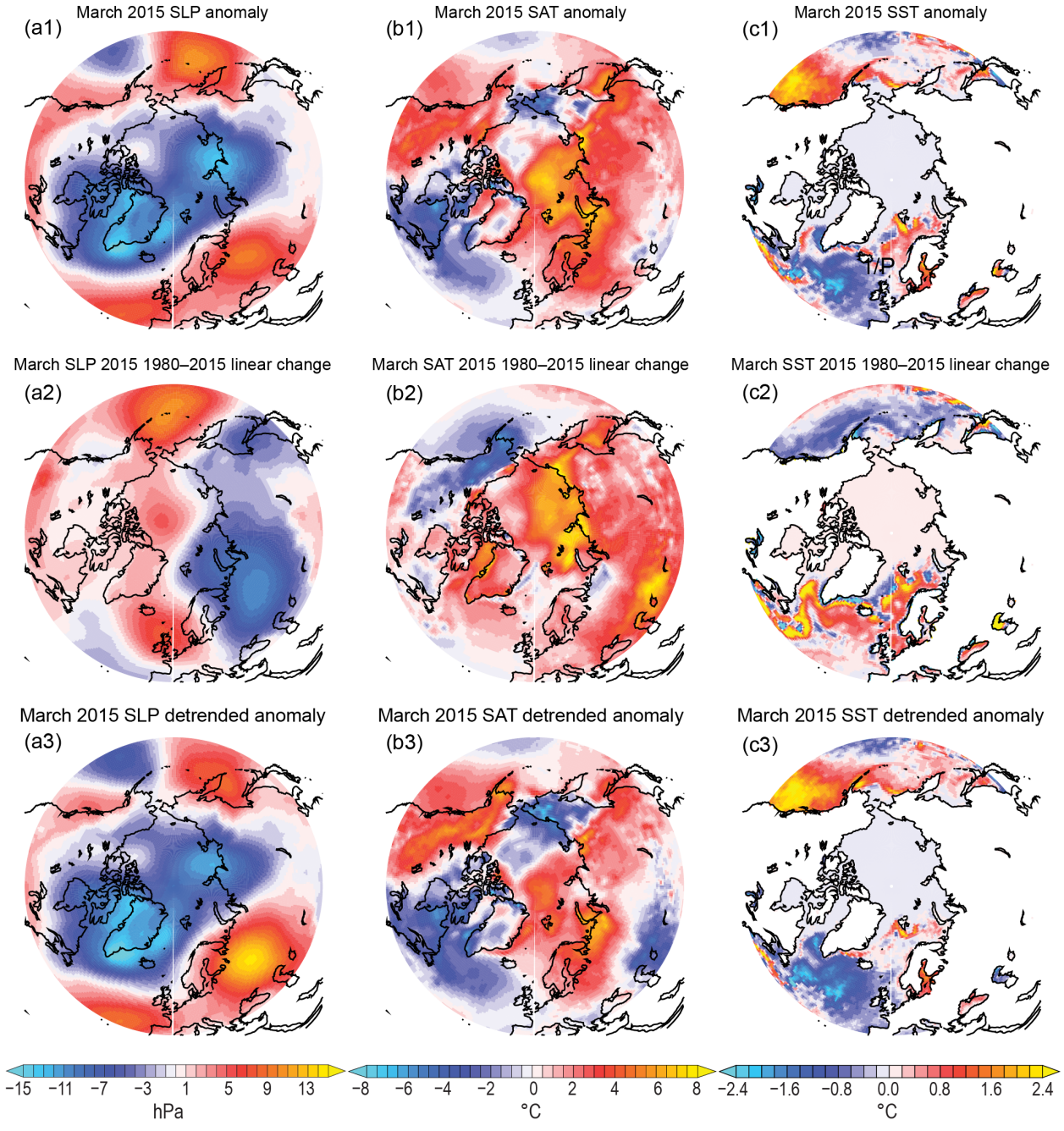

Fig. S27.1. Left, center, and right columns show mean sea level pressure (SLP; hPa); 2-m surface air temperature (SAT; °C); and sea surface temperature (SST; °C) from the ECMWF's ERA-Interim reanalysis, respectively. Top, middle, and bottom rows show the anomaly in March 2015 with respect to the 1980–2015 average; linear change (linear trend times 36 years); and March 2015 anomaly with respect to the linear fit over this period, respectively. The most of shown SLP values are between −15 hPa and 15 hPa, while most SAT values are between −8°C and 8°C, and most SST values are between −2.4°C and 2.4°C.

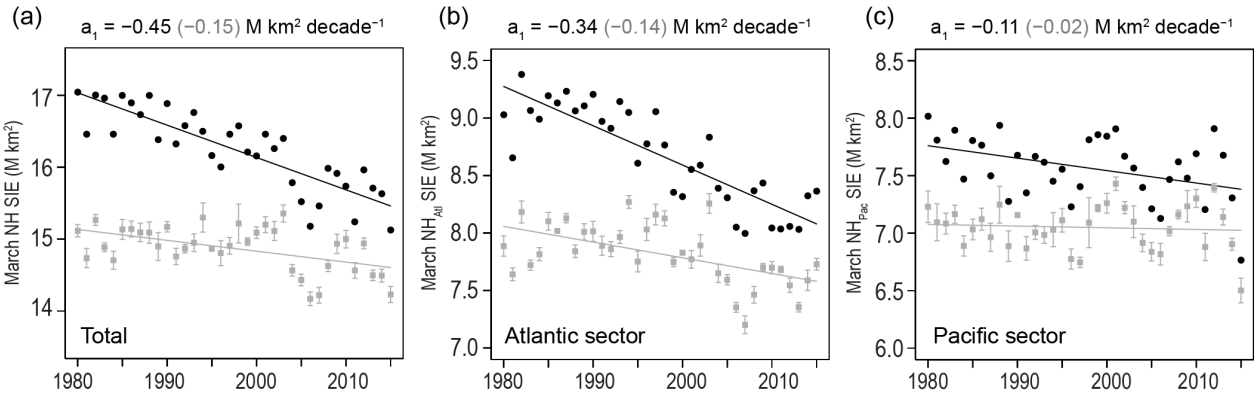

FIG. S27.2. (a),(b), and (c) show the March NH, NH_{Atl} and NH_{Pac} SIE values ($\times 10^6$ km^2) from OSI-SAF (black points) and raw ensemble-mean CTL outputs (gray squares with the 95% confidence interval bars). Black and gray lines show the associated linear fits over the 1980–2015 period of interest. Their linear trends are shown on the top of the panels in the associated colors.