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Letter

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Advancing decadal-scale climate prediction in the North Atlantic sector

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The climate of the North Atlantic region exhibits fluctuations on decadal timescales that have large societal consequences. Prominent examples include hurricane activity in the Atlantic¹ (#B1), and surface-temperature and rainfall variations over North America² (#B2), Europe³ (#B3) and northern Africa⁴ (#B4). Although these multidecadal variations are potentially predictable if the current state of the ocean is known⁵, (#B5) ⁶, (#B6) ⁷ (#B7), the lack of subsurface ocean observations⁸ (#B8) that constrain this state has been a limiting factor for realizing the full skill potential of such predictions⁹ (#B9). Here we apply a simple approach—that uses only sea surface temperature (SST) observations—to partly overcome this difficulty and perform retrospective decadal predictions with a climate model. Skill is improved significantly relative to predictions made with incomplete knowledge of the ocean state¹⁰ (#B10), particularly in the North Atlantic and tropical Pacific oceans. Thus these results point towards the possibility of routine decadal climate predictions. Using this method, and by considering both internal natural

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climate variations and projected future anthropogenic forcing, we make the following forecast: over the next decade, the current Atlantic meridional overturning circulation will weaken to its long-term mean; moreover, North Atlantic SST and European and North American surface temperatures will cool slightly, whereas tropical Pacific SST will remain almost unchanged. Our results suggest that global surface temperature may not increase over the next decade, as natural climate variations in the North Atlantic and tropical Pacific temporarily offset the projected anthropogenic warming.

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