

Was there a basis for anticipating the 2010 Russian heat wave?

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The 2010 summer heat wave in western Russia was extraordinary, with the region experiencing the warmest July since at least 1880 and numerous locations setting all-time maximum temperature records. This study explores whether early warning could have been provided through knowledge of natural and human-caused climate forcings. Model simulations and observational data are used to determine the impact of observed sea surface temperatures (SSTs), sea ice conditions and greenhouse gas concentrations. Analysis of forced model simulations indicates that neither human influences nor other slowly evolving ocean boundary conditions contributed substantially to the magnitude of this heat wave. They also provide evidence that such an intense event could be produced through natural variability alone. Analysis of observations indicate that this heat wave was mainly due to internal atmospheric dynamical processes that produced and maintained a strong and long-lived blocking event, and that similar atmospheric patterns have occurred with prior heat waves in this region. We conclude that the intense 2010 Russian heat wave was mainly due to natural internal atmospheric variability. Slowly varying boundary conditions that could have provided predictability and the potential for early warning did not appear to play an appreciable role in this event.