During the aircraft-based 2008 Andøya field campaign of IPY-THORPEX two major polar low developments took place over the Norwegian Sea. In the former case (3-4 March) three flight missions were successfully carried out, thereby obtaining a unique insight into the full life cycle of the polar low. In the latter case (16-17 March), two flights were conducted, one focusing on the pre-conditioning phase, the other on the mature phase of the polar low. Together, these data provide an unprecedented testbed for NWP models and their ability to simulate polar lows. We have investigated the influence of model resolution on the UK Met Office Unified Model’s ability to simulate the two polar low developments. For the first case, decreasing the horizontal grid spacing from 12 to 4 km significantly improved the simulation of the developing polar low, and a further decrease to 1 km gave further improvement. Indications were found for the improved model performance at higher resolution to be connected to the model’s handling of convection. When simulating the other polar low case the model failed to produce the polar low, independent of the resolution. Results from ongoing investigations aimed at understanding the large difference in predictability of the two cases will be shown. An important factor seems to be a stronger low-level baroclinic signature in the former case, with the polar low forming at the intersection of two convergence zones.