Auxiliary Material Submission for Paper 2010GL044355

"African Easterly Waves in 30-day High-resolution Global Simulations: A Case Study during the 2006 NAMMA Period"

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Introduction: This electronic supplement contains 8 figures. The captions accompanying the figures are listed below.

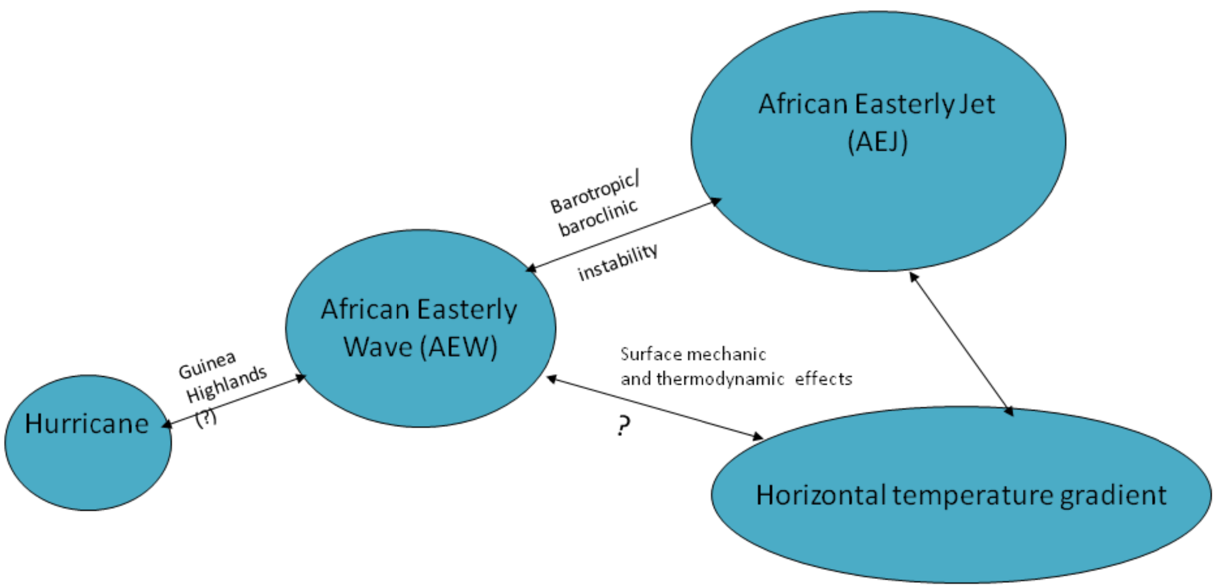

Figure S1: A schematic diagram showing the multiple processes and multi-scale interactions that are involved with the formation of a hurricane associated with an AEW and AEJ. The line with two arrows indicates two-way interaction between the weather systems at different scales. A question mark means that efforts will be paid to examine the impact of two-way interactions between those processes in the future. From a climate simulation perspective, the ultimate goal is to improve the model's ability to simulate the life cycle of weather systems at different scales and their multi-scale interactions and as a result improve our understanding of the impact of climate (and climate change) on hurricane statistics.

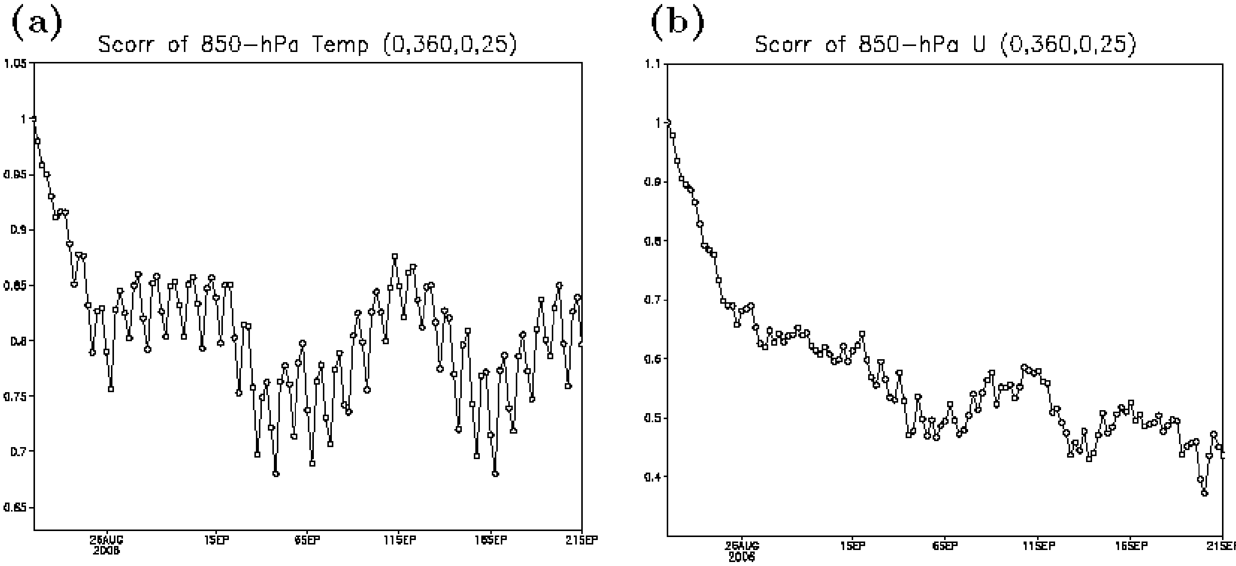

Figure S2: Correlation coefficients between the simulated 850-hPa temperatures (a) and 850-hPa U winds (b) and those from the corresponding NCEP T384 analysis over the domain longitude $0^{o}E$ to $360^{o}E$ and latitude $0^{o}N$ to $25^{o}N$ during the 30-day period. The choice of a 'global' belt domain for verification is due to the zonally-moving weather systems. The correlation coefficients are calculated with the "scorr" function provided by the Grid Analysis and Display System **(**GrADS**).** It should be noted that the correlation coefficients for the 850-hPa temperatures are above 0.7 most of the time, which is better than the correlation coefficients for the 850-hPa U winds.

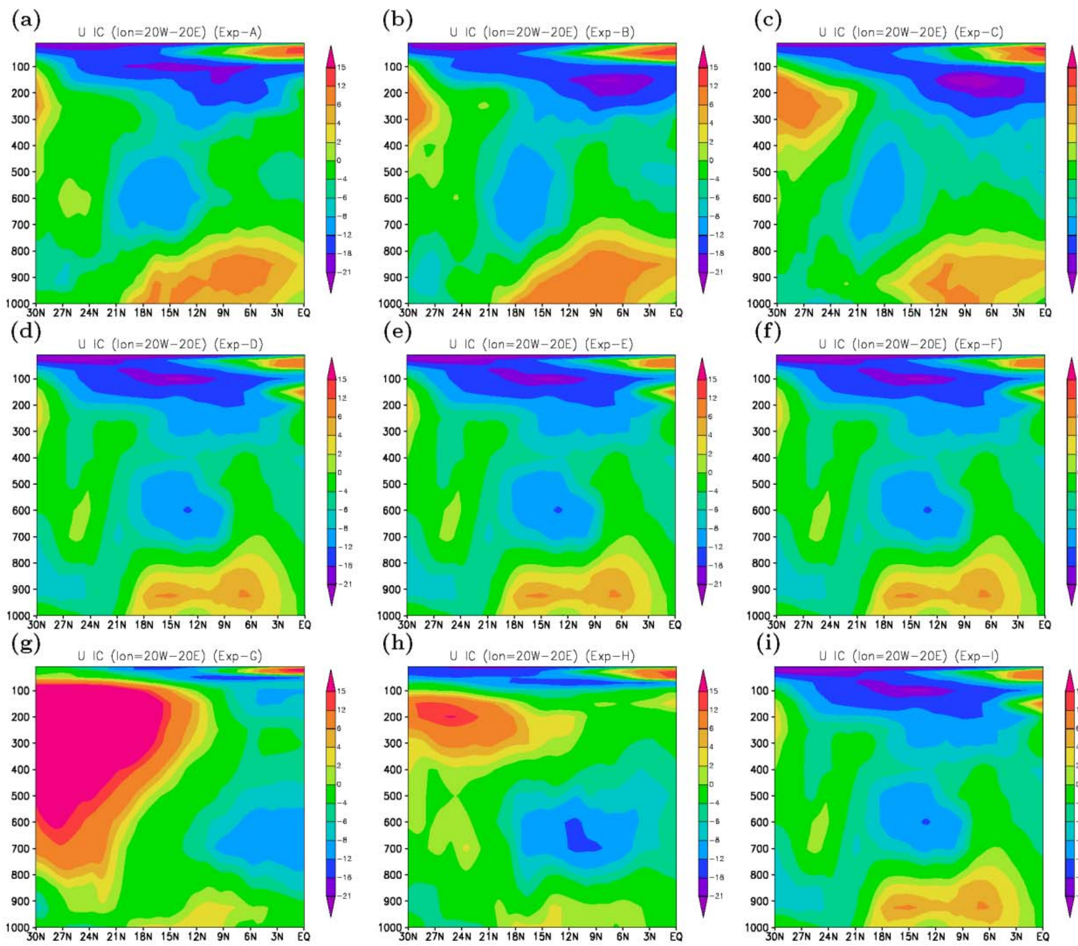

Figure S3: Altitude-latitude cross sessions of the initial zonal winds (including the AEJ) averaged over longitude 20^{o}W to 20^{o}E in the 9 experiments listed in Table 1. It should be noted that the dynamic ICs (and the initial AEJ as well) in Exps. D, E, F and H are the same as those in the control run. Panel g (h) shows no (a less) realistic AEJ with dynamic ICs on February 22 (June 22).

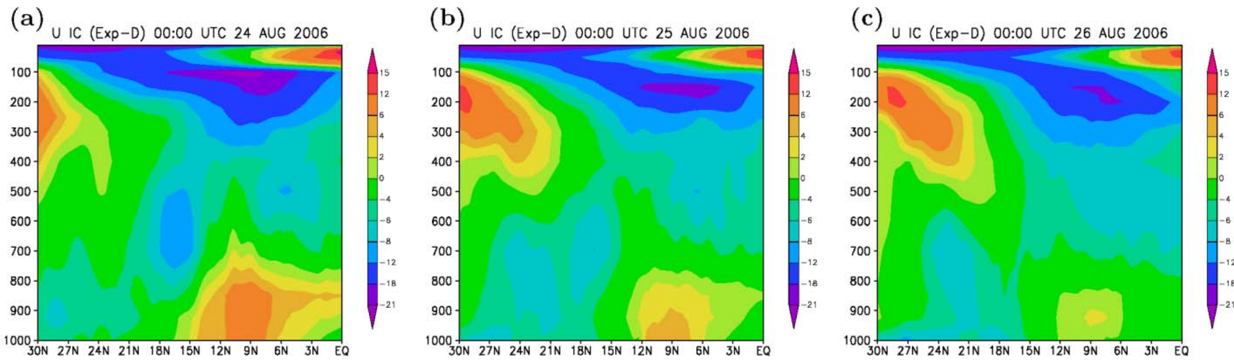

Figure S4: The dissipation of an (initial) AEJ in Exp D with the land surface conditions from a cold- start run. Panels (a-c) show altitude-latitude cross sessions of zonal winds averaged over longitude 20^{o}W to 20^{o}E on August 24, 25, and 26, 2006, respectively.

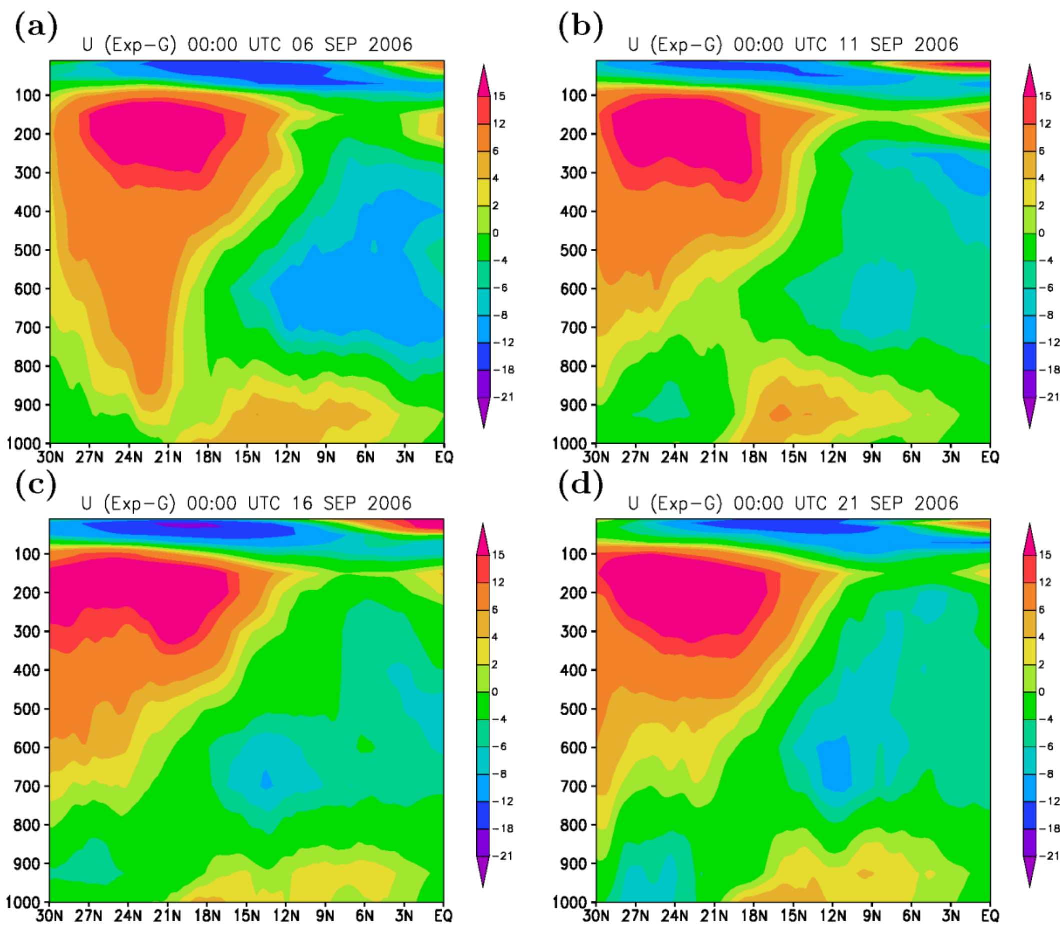

Figure S5: The development of an AEJ in Exp G which includes realistic land surface conditions but no realistic AEJ in the dynamic ICs. Panels (a-d) show altitude-latitude cross sessions of zonal winds averaged over longitude 20^{o}W to 20^{o}E on September 6, 11, 16, and 21, 2006, respectively A realistic AEJ seems to appear after 25 days of integration (panels c-d).

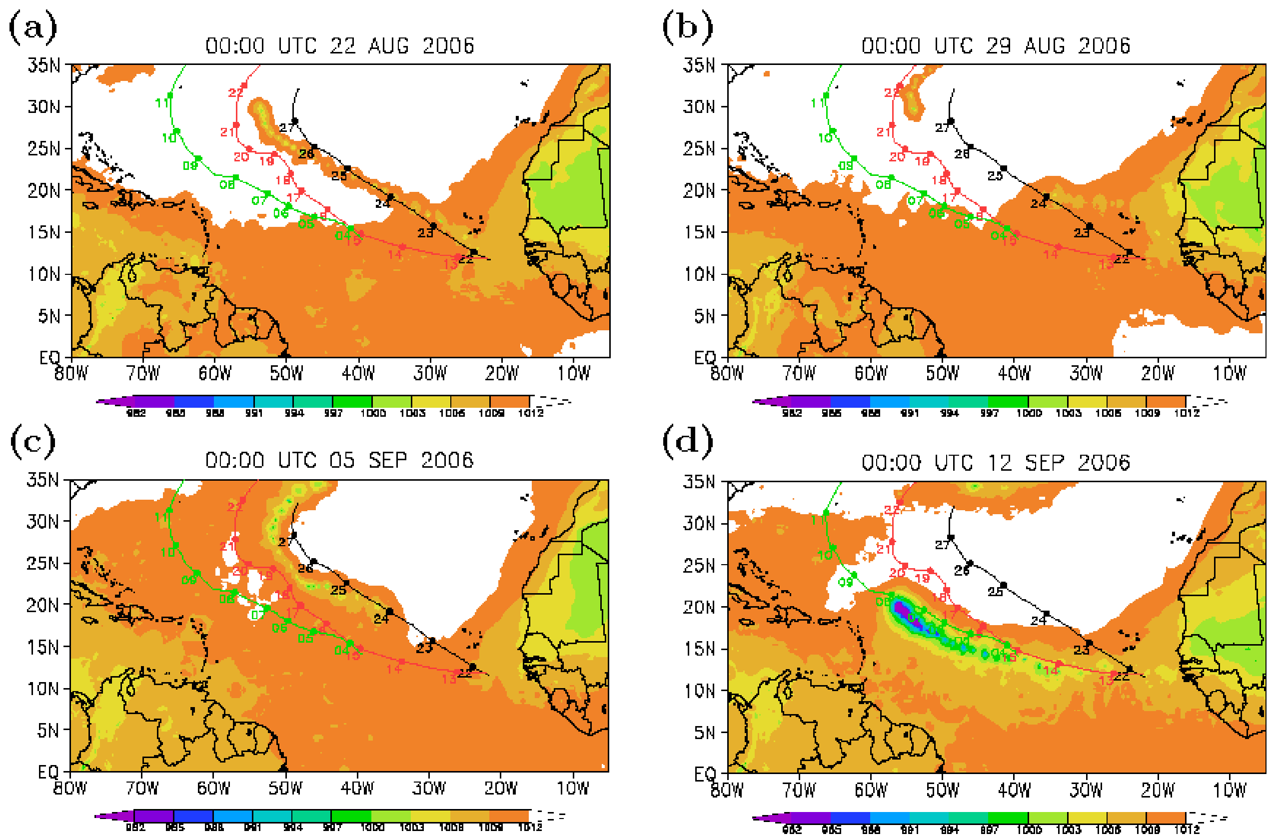

Figure S6: Spatial distribution of minimum sea level pressure (SLP) over a 7-day period (shaded), qualitatively showing the location and subsequent movement of simulated hurricanes. Panels (a)-(d) have a starting date of August 22, August 29, September 5 and September 12, respectively, and an ending date of August 29, September 5, September 12, and September 19, respectively. The black, red, and green lines represent the best tracks for Hurricanes Debby (21-27 August), Florence (03-12 September) and Helene (12-24 September), respectively, with a cut off at latitude 35°N or higher. Panel (a) shows the movement of simulated Hurricane Debby, which is quite close to the best track in black. Panel (c) shows the movement of simulated Hurricane Florence, which has much larger errors in location and timing as compared to the best track in green. Panel (b) shows the late stage of Hurricane Debby and the early stage of Hurricane Florence. Panel (d) shows the movement of simulated Hurricane Helene, as compared to the best track in red, which is discussed in the main text. The best tracks are obtained from http://www.nhc.noaa.com. Spatial distribution of minimum sea level pressure (SLP) over a 7 days period is calculated with the function of GrADS as follows: min(slp, starting date, ending date) for the entire domain.

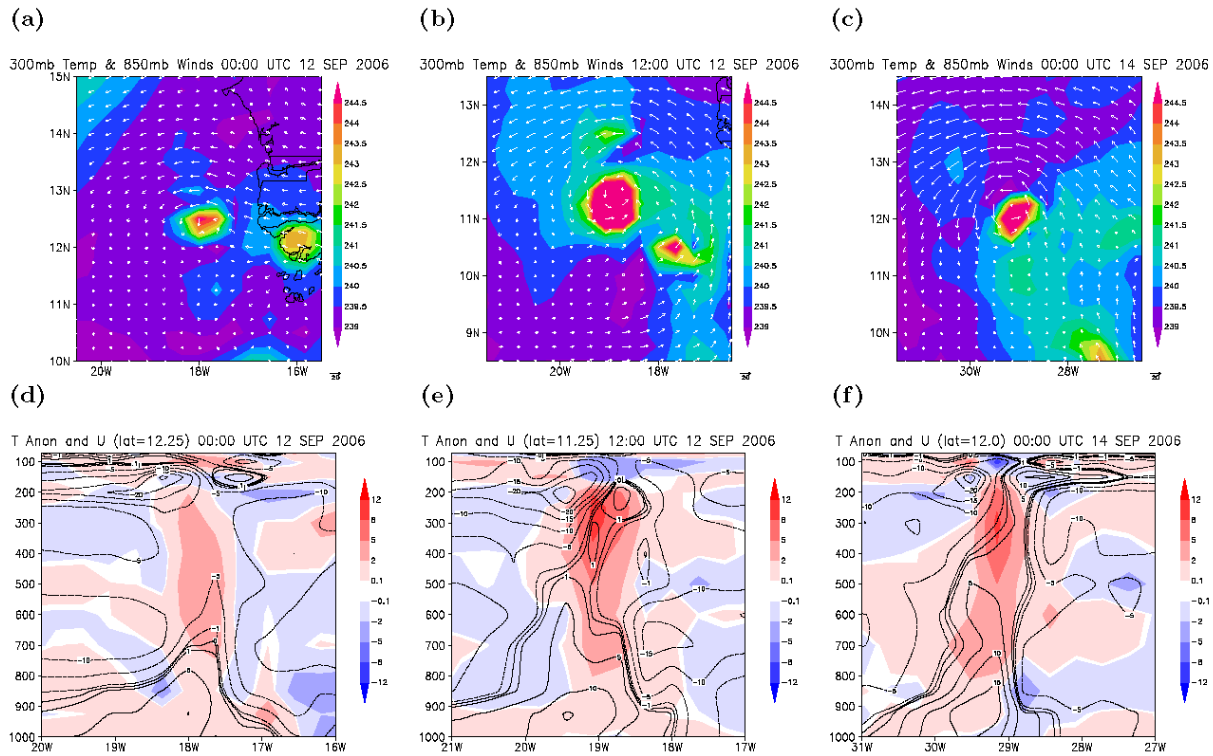

Figure S7: Simulations of the initial formation for Hurricane Helene (2006) at 0000 UTC 12 September (a,d), 1200 UTC 12 September (b, e), and 0000 UTC 14 September (c,f). Top panels show 850-hPa wind vectors and 300-hPa temperatures (^{o}K, shaded). Bottom panels show altitude-longitude cross sessions of zonal winds (m/s, contours) and temperature anomalies (^{o}C, shaded). These panels show the development of a low-level closed-form circulation and an elevated warm core and realistic upper-level outflow as well.

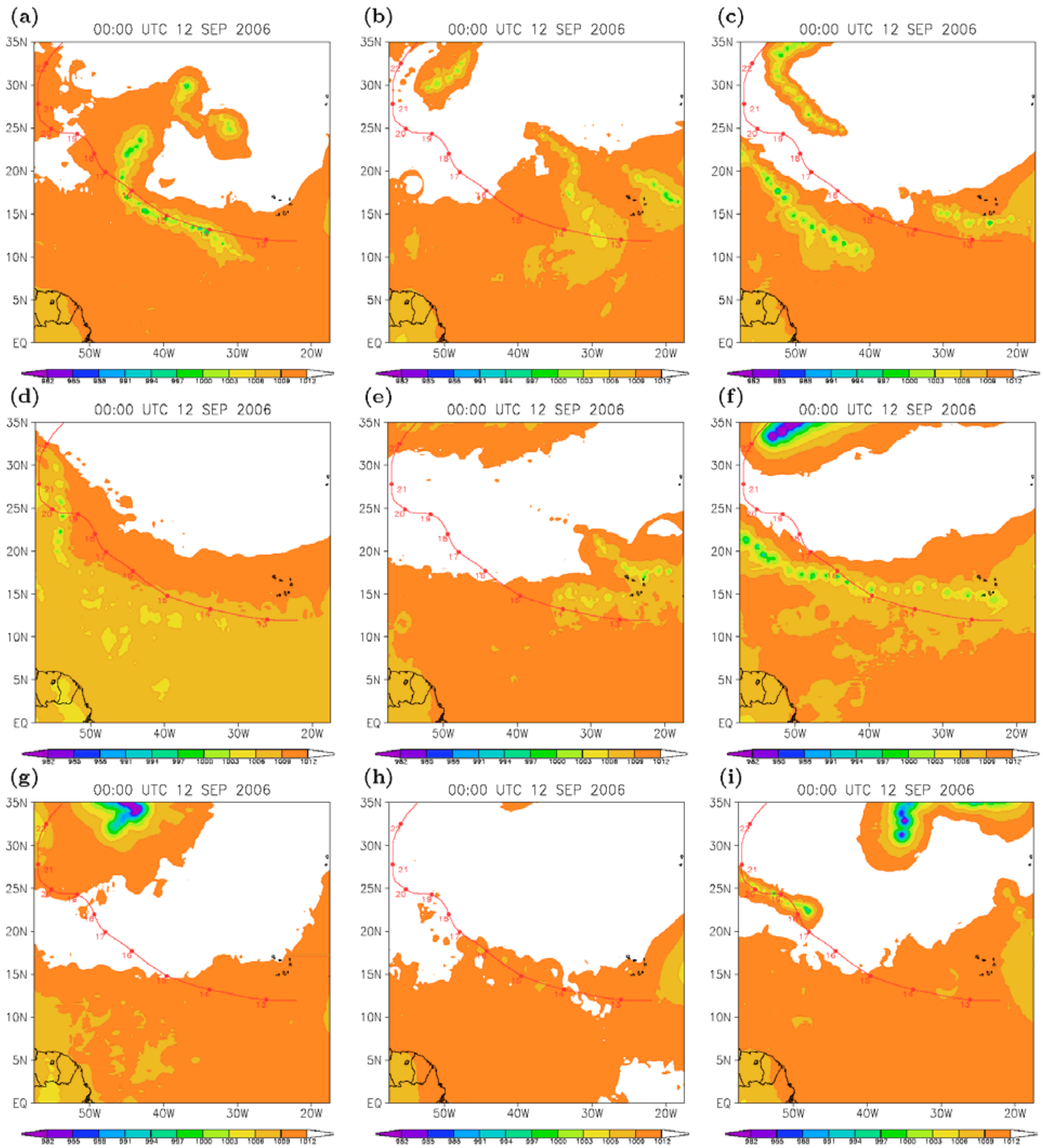

Figure S8: Spatial distribution of minimum SLP over a 7-day period, with a starting date of Sep. 12 and an ending date of Sep. 19. Panels (a-i) show the results for Exps (A-I), respectively. The red line represents the best track for Hurricanes Helene. These show that accurate hurricane simulation depends on accurate dynamic ICs, land surface ICs, realistic SSTs and regional terrain.