General comments:

The authors present a new framework for the evaluation of IMEX methods for atmospheric applications where a linearized nonhydrostatic system of normal modes is used. Several IMEX methods are tested with the new framework. Tests with the new framework are compared to tests with the acoustic system. All presented IMEX methods are investigated with regard to stability. M2 methods which are a special type of IMEX methods are described. They are also investigated with regard to dispersion and dissipation properties. The authors present an intersting work on the suitability of IMEX methods for atmospheric applications which can contribute to the understanding of the numerical methods. I have the feeling that the sections where the new framework is described could contain more details. A few suggestions can be found in the section "Specific comments".

Specific comments:

1. section 2.1: It might help the readers if the linearized system without substituting the single mode solution was written down.
2. the same section system (6)-(7): It might contribute to a better understanding if you explained how the system (6)-(7) can be obtained from the linearized system. For better clarity, you might want to write down the whole system.
3. section 2.1 equation (8): Would you give some additional details to explain where equation (8) comes from?
4. the same section lines 91-96: Equation (9) describes a boundary condition. Could you discuss how this boundary conditions is related to c_1, c_2 (line 93 and 94) and equation (10)?
5. the same section line 96-98: In line 96 the wavenumbers m are defined by equation (10), where A, B and D are constant, right? Then you write " Wavenumbers are found numerically in Matlab by solving Eq. (10) for $m_i \in \{1, \dots n_{\text{lev}}\}, n_{\text{lev}} = 20$." Why do you need the m_i?
6. section 2.3 line 124: The eigenvalues of M are not exactly the same as the $i\omega$ in system (1)-(5).
7. section 2.3 line 132: Would you explain what category 2b is?
8. section 4.2.1 line 230-131: Can you give details about the differences between the normal mode system and the acoustic system that explain the unstable behaviour in Figure 2(c)?
9. section 4.3 line 241-242: Is there a motivation that explains why the authors use the scheme from Kinnmark, I. and Gray, W. (1984a)? Does this scheme have any specific properties?

10. section 4.3.3 line 288-289: „Its stability region in Figure 5(a) coincides with stability region of its explicit table“. Would you explain which scheme is described by the explicit table? Why is the stability region of that method so large?
11. section 4.3.3 Figure 4 and Figure 5: How would you compare the methods from Figure 4 to the methods from Figure 5? Is there a difference that explains why they show up in different tables?
12. section 4.3.4 line 310: Would you explain the function $s(z)$? What does this function tell us?
13. the same section line 313-314: „we speculate that stability of any M2 method is directly related to amount of dissipation provided by the last stage coefficients d.“ Would you explain this sentence? Did you have Figure 5(a) in mind? In Figure 5(a) the stability region is large, but the dissipation rates for the acoustic waves are big. Would you say that dissipation is unaffected by the other stages?
14. section 5 Conclusion: You presented several IMEX methods. When you consider your findings, can you evaluate the different methods with respect to the applicability for atmospheric applications? How would you evaluate the M2 methods?

Technical corrections:

1. Figures 2-6: Please check the labelling of the color bars.
2. section 3.3 line 187: Is $\tilde{\omega}_j$ real or complex? Would you shift the tilde.