ON THE ENTROPY FLOW PROPERTIES OF A SEVERE STROM

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I. INTRODUCTION

More attention has been paid to thermodynamics and statistical physics in which the atmosphere, as a many-body system, is treated as a heat engine to a great extent, and entropy is regarded as a measure of degree of disorder for a thermodynamic system. The relationship of entropy flow with the evolution of a severe tropical storm is investigated in this paper, based on observational analyses covering its life-cycle, to see whether low entropy will correspond to order and negative entropy flow plays an important role in the storm growth

II. PRESENTATION OF RESEARCH

The formula for calculating entropy flow is derived starting with the Gibbs relation, in terms of constant pressure coordinates (De Groot and Maxur, 1962). The evolution of the tropical storm Bilis (2006) is divided into three major stages: development, maturity and decay. The computations of entropy flow are made on the every stage, and the results are compared with each other from point of view of the theory of atmospheric dissipative structures (Prigogine, 1955; Liu and Liu, 1994).

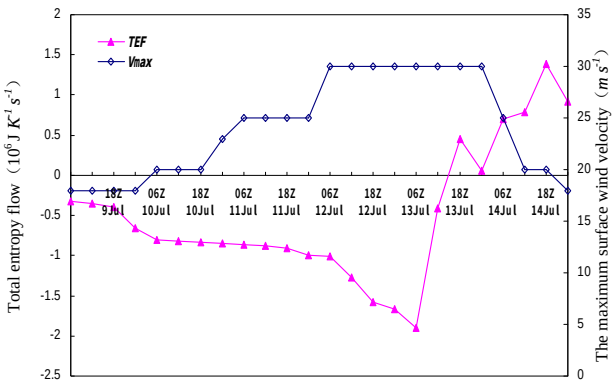

FIG. 1: The evolution of total entropy flow (TEF) for TS Bilis in 6 h timesteps, with changes in the maximum surface wind velocity (V_{max}) as a reference.

III. RESULTS AND CONCLUSIONS

In this work it is shown that the negative entropy flow dominates the storm center and its neighbourhood during the stage of development and, on the contrary at the decay. Figure 1 shows the evolution of the total entropy flows (TEFs) for the three-dimentional storm in the interval of 6 hours, suggesting that the TEFs are negative and intensify monotonically during development correspondingly to the wind intensification. As a result, entropy flow analysis is a powerful tool in understanding the mechanism responsible for the evolution of an atmospheric system..

IV. ACKNOWLEDGMENTS

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V. REFERENCES

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