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Hurricane Initialization and Satellite Data Assimilation

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In this study we evaluate the current operational model strategies on hurricane initialization. Based on the advantage and disadvantage of the current schemes, a new method is proposed in which we derive 3D hurricane wind structure with the use of the latest satellite products. We further address to what extent does hurricane circulation adjust to satellite retrieved temperature and moisture fields using 4DVAR data assimilation technique. Our conclusions are as follows.

- Only assimilating T & q in a 30-min time window slightly improves the TC surface pressure, but the TC wind is underestimated. A longer assimilation window (180 min) leads to improved SLP and wind fields, but is still not satisfactory.
- Only assimilating SLP can reproduce true surface pressure, but after time integration the SLP starts to rise. In this scenario, TC wind is underestimated. Only assimilating SLP may produce an unrealistic high temperature core at the end of assimilation window.
- Assimilating combined SLP, T & q may produce reasonable SLP and wind fields. This implies that a bogus generated SLP field plus satellite retrieved T & q may reproduce a reasonably well initial TC condition.
- Assimilating one-point SLP and T & q is another good choice.