Accounting for Particular Balance Properties Over Precipitation Areas within Variational Data Assimilation Systems

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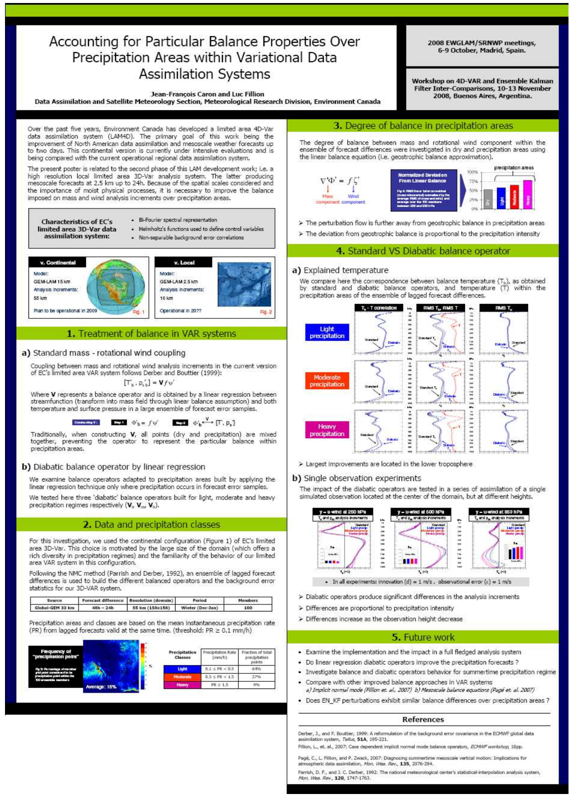

- Over the past five years, Environment Canada has developed a **limited area variational data assimilation system** (3D and 4D)

- Two ongoing R&D project are using this new system to improve short range forecasts:
    1. North America (15 km)
    2. Targeted areas over Canada (2.5 km)

- Improve the balance imposed on mass and wind analysis increments over precipitation areas

In this poster we paid attention to mass – rotational wind balance

- Do this balance differs between dry and precipitation areas ?

  Balance characteristics were investigated in a large ensemble of forecast error sample (lagged forecast differences: NMC method to estimate background error statistics)

- Current balance operator:

  In our system, coupling is currently done by an operator obtained through a linear regression between streamfunction and mass (T and p_s) in the forecast error samples

  All points (dry and precipitation) are mixed together, preventing the operator to represent the particular balance within precipitation areas.

- **Tested approach: Use only precipitation points to build a 'diabatic' balance operator by linear regression**

  1. Do the diabatic operator reproduced better the forecast error temperature than the standard operator in precipitation areas ?

  2. Impact of this new operator is tested in a series of single observation experiments