Impact studies towards the use of SSM/I observations over land in the French global model

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OBJECTIVE
Check the ability of the French global 4D-Var system to assimilate SSM/I observations over land

MEANS
Sensitivity studies and experimental assimilation of SSM/I over land to the best of our knowledge

BASELINE
Dynamic retrieval of land emissivity adapted to SSM/I observations (first developed to assimilate AMSU-A and AMSU-B/MHS surface sensitive channels over land, Karbou et al., 2006)

SENSITIVITY STUDIES to elaborate constructive alternatives

- LAND SURFACE EMISSIVITY ASSIGNMENT
  Dynamically retrieved emissivity from 19 GHz is assigned with an adaptation to channels of same polarization

- BIAS CORRECTION PREDICTOR CHANGE
  \( \text{e}(t_{19}) \) is used instead of \( \text{T}_1 \) as a predictor for bias correcting SSM/I data through VarBC (Auligné et al., 2007)

- QUALITY CONTROL THROUGH RAIN DETECTION
  Rain contaminated SSM/I data are rejected through a regression based on SSM/I data at 37V and 85V (Conner and Petty, 1998)

IMPACT OF ASSIMILATING SSM/I RADIANCES OVER LAND with the synergy of \( \bigcirc \) \( \bigcirc \) \( \bigcirc \) components (15 July – 14 Sep 2006)

- IMPACT ON HYDROLOGICAL CYCLE
  - TCWV (Total Column Water Vapour) analysis difference EXP – CTR
  - TCWV as a function of forecast range
  - LAND: Precipitation rate as a function of forecast range

- FORECAST PERFORMANCE
  - Forecast scores wrt synop data forecast-observation, North Africa (latitude = 5°)

- CASE STUDY 16 August 2006 at 12 UTC
  - Global overreaction of convection over North Africa when SSM/I observations are used over land
  - EXP: Better local convection often happens to be much better represented in EXP (intensity, occurrence)
  - CTR: Obviously misses a large portion of deep convection
  - Cells maintained in EXP throughout the day in good agreement with SEVIRI observations

KEY MESSAGES
- FEASIBILITY
  Extraction of useful information from observations very sensitive to the surface such as SSM/I data

- DIFFICULTY
  Opposed effects once together can lead to some residual biases (combined effects)

- INVESTIGATION
  Some further sensitivity studies on land surface description, rain detection, bias correction

- FUTURE
  Effort ought now to be focused on SSM/I and future microwave sounders