The impact of dropsonde and extra radiosonde observations during the field campaigns NAWDEX and SHOUT in autumn 2016

Matthias Schindler1, 2, Martin Weissmann1, 2, Andreas Schäfler3, Gabor Radnót4, Jim Doyle5, Rolf Langland5, Ron McTaggart-Cowan6

1) Hans-Ertel-Centre for Weather Research (HEiZ), Data Assimilation Branch, LMU Munich, Germany
2) Deutsches Zentrum für Luft- und Raumfahrt (DLR), Oberpfaffenhofen, Germany
3) Deutsches Zentrum für Luft- und Raumfahrt (DLR), Oberpfaffenhofen, Germany
4) European Centre for Medium-Range Weather Forecasts (ECMWF), Reading, United Kingdom
5) Naval Research Laboratory (NRL), Monterey, United States
6) Environment Canada, Dorval, Canada

**MOTIVATION**

- Over 600 dropsondes deployed from four research aircrafts over the North and West Atlantic for the NAWDEX and SHOUT campaign
- Several hundred additionally launched radiosondes over Canada and Europe

**GOALS**

- Evaluation of observation impact on downstream weather evolution
- Assessment of model errors and their potential sources as related to specific weather features

**APPROACH**

- Data denial experiments with ECMWF global model (including EDA, current version)
- Forecast Sensitivity to Observation Impact (FSOI)

**FORECAST ERROR**

- Small improvement up to 96 hrs (denial region)
- Consistent for different levels and parameters
- Neutral for Northern Hemisphere

**FSOI FOR DIFFERENT EXPERIMENTS**

- Beneficial impact of dropsonde and extra radiosonde observations in denial region
- Small impact from European extra radiosondes
- Largest impact per observation by NAWDEX dropsondes, followed by SHOUT dropsondes and Canadian radiosondes

**EX TROPICAL CYCLONE KARL**

- Slightly lower mean error of control
- Large differences for Karl, NA development
- Beneficial impact of dropsondes/ radiosondes
- Small impact of European extra radiosondes
- Large impact by NAWDEX/SHOUT dropsondes and Canadian radiosondes

**SUMMARY & OUTLOOK**

- Reduced analysis spread for control experiment
- Reduction presumably related to SHOUT dropsondes
- Smaller forecast error over widespread NA area

**RESULTS:**

- Case studies (e.g. Karl, Matthew...)
- Compare FSOI to FG and EPS-spread
- FSOI from NRL
- Single cycle experiments