SCOOPS

SCREENING + SCORES + OOPS

Florian Suzat 2023/03/13

Navigate over this presentation with arrows; left and right to navigate on chapters, up and down inside a chapter

Powered by Revealjs

- foreword
- SCOOPS C++
- SCOOPS WEB
- Model scores
- Conclusion

FOREWORD

Part 1 : foreword

MAIN IDEAS OF SCOOPS

- calculate observation scores using as reference, the observations available in data assimilation
- use a efficient, robust and modular software framework
- extend the tools developped in this main purpose to other scores (ensembles, analysis scores,...)

Part 1 : foreword

GOALS OF THIS PRESENTATION

- NOT present how does SCOOPS works (impossible in 15m)
- But present an overview of SCOOPS and some results
- arouse ideas/questions/reflexions among colleagues

Part 1 : foreword

REMARKS

- for the moment SCOOPS is only a prototype and not a finalized software
- the process is a step by step round trip

SCOOPS C++

Part 2 : scoops C++

A SCREENING WITH OOPS

```
std::shared_ptr pp(
 new Observer_(obspace(), hop(), obias(), tstep));
oops::PostProcessor post;
post.enrollProcessor(pp);

post.initialize(modelstate, end(), tstep);
post.finalize(modelstate);

std::shared_ptr yequ(pp->release());
Departures_ ydep(yobs() - (*yequ));
ydep.save(eckit::LocalConfiguration(getConfig(), "fg_depar"));
```

Quite simple! (the complexity is hidden backward)

Part 2 : scoops C++

OVERVIEW OF SCOOPS C++ MECANICS

When H(x) is done: fg_depar populated in odb

SCOOPS doScores (not detailled): use datas in odb to produce statistics in lon/lat/varno/obstype/term/lvl «boxes» (for radiances lvl is chan)

all the information stored in ODB can be used to customise «boxes»

Part 2 : scoops C++

OUTPUT

```
#n=obs number
#b=bias (guess - obs)
#e=root mean square
#sensor 15 chan 5
s_15_c_3:{'n': '1018', 'b': '0.914', 'e': '3.079'}
#varno 3 obstype 2 level 3
v_3_o_2_l_3:{'n': '86', 'b': '0.953', 'e': '3.218'}
#varno 119 geoBox E2
v_119_g_E12:{'n':2024', 'b': '18.325', 'e': '26.193'}
#varno 29 obstype 13 lvl 3 geoBox F8
v_29_o_13_p_3_g_F8:{'n': '5292', 'b': '-0.0142', 'e': '0.0145'}
```

Very generic formulation: infinite filtering

SCOOPS WEB

http://intra.cnrm.meteo.fr/gws/scoops/

Part 3 : scoops Web

SOME FEATURES

- Creation of «experiments». Example
- Launch jobs
- View results. Example
- Compare "instants". Example
- Launch aggregations
- View aggregated datas geo lvl cards

SCOOPS MODEL

Scores versus analysis 

Part 4 : scoops model

MECANICS

The strength of OOPS is (amont other things) to do effectively products of this type

$$(Y^{\top})CX$$

With huge matrixes... (even if in practice they do not exist in a single node... but it is exactly as it was)

Part 4 : scoops model

MECANICS

$X = ICMSHTEST - ICMSHREF$ -> increment in the OOPS world (colum matrix)

$Bias_i = \frac{(1^T)C_iX}{N_i}$ -> mean of field in the box

$Eqm_i = \frac{(X^T)C_iX}{N_i}$ -> root mean square of field in the box

C_i is a localisation matrix in a «box» (same geoDiscretisation mecanism as for observations: either **latLonRegular**, or **Polygon** + vertical discretisation on pressure levels, and **field id**. In pratice C_i zeros X outside «box» and is identity in the «box».

N_i represents the number of grid points in the «box».

1 a column matrix composed of ones.

ICMSHXXXX is model file

please spend few time meditating on this formulas....

Part 4 : scoops model

BENEFITS

- Analysis scores calculated in the same job than observation scores.
- Full customisation of «boxes» and vertical levels
- Possibility to compare with other grid (ECMWF for example), if a fullpos is done before
- Reuse toolbox for ensemblists scores (not yet on this presentation)

CONCLUSION

Part 5 : conclusion

- many choices are for the moment «hard coded», some on the complexity was not shown in this presentation
- new aggregations? new views?
- improve portability?
- unit test?
- validation agains other system?
- beautify codes...
- on the flight score calculations...
- wants more informations? ask me !

Thanks you for your attention

More...

SCORE GEOLVL AGGREGATION: EXAMPLE OF EQM

- build serie of EQM(test)-EQM(ref)/EQM(ref) in lon/lat/varno/obstype/term/lvl «boxes» (for radiances lvl is chan)
- We focus on this serie Mean
- for significativity, lets calculate with coef=2.576 and coef=1.96

$$signif(coef) = Mean - sign(Mean) * (coef * Stdev/sqrt(N))$$

- if sign(Mean)=sign(signif(2.576)) -> very significative, else if sign(Mean)=sign(signif(1.96)) -> almost significative else not significative