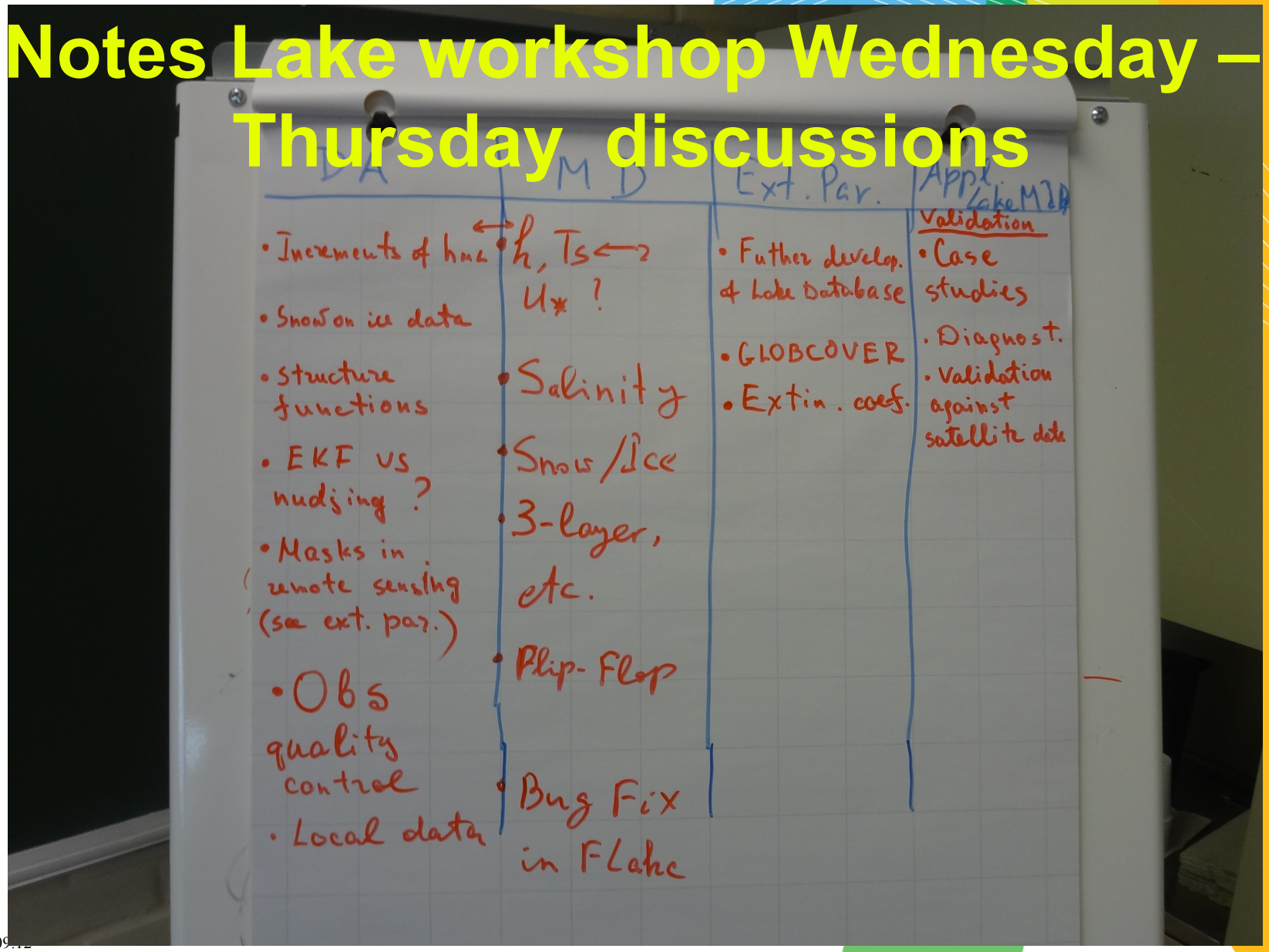
ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

Workshop Lake12

Notes on discussions

LR 27.9.2011

Notes Lake workshop Wednesday – Thursday discussions



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FLake bug fixes

- **Security change for exponential function with small values**
- **Inverse stratification due to initial grib inaccuracy**

Dmitri to write one-page document at FLake site to suggest how to reprogram those in FLake and when feeding it with initial values

Salinity

- Patrick's experiences and suggestions from the salty lagoon
- Handling of salinity in sea ice models – HIGHTSI experience
- Freezing temperature as function of salinity, prognostic salinity or prescribed
- No big effect in NWP, would be big job to take into account in FLake – a lot of reprogramming.

Advice for reprogramming available from Dmitri if someone would like to try

Snow on ice - model and analysis

- Homa's examples of satellite ice/snow on ice observations: SAR, MODIS, AATSR snow/ice on-off. SAR classification to ice classes needs additional info from MODIS, from models etc – complicated, low priority
- Ice and snow together when melting. Snow insulation. Model errors seen when too large snow layer on thin ice
- Brute force: remove/add ice to FLake according to satellite observation. Might be not really possible in operational NWP analysis. Methods to interpolate and assimilate ice cover (on/off) together with LWST needed

Snow on ice - model and analysis

- To take into account in FLake: improve snow density, albedo, heat conductivity parametrisations. Independent update sets by TIdo and Dmitri
- Conversion of snow to ice: different processes in freezing (early winter) and melting (late winter) phases. Suggestions by Bin applied in HIGHTSI
- Application of an external snow scheme on lakes – coupling with Flake?

EKF v.s. nudging in data assimilation

To compare in offline Flake: Katya, Dmitri to suggest a plan - input observations and atmospheric forcing, locations and times, diagnosis of results

Quality control of lake observations

Evaluation of MODIS LWST observations by comparison with SYKE observations in Finland, Canadian lake observations by Homa. No evaluation of remote-sensing ice/snow observations over lakes is known to exist

OI quality control in NWP – information about std error of in-situ LWST, remote-sensing LWST and ice observations needed. Possibility of quality control also in the EKF phase.

Local data for comparison and validation

- LakeMIP people to provide links to data used over Valkea-Kotinen, Kuivajärvi, Kossenblatter lake and others
- Permission issue: not all open data
- Ice mass balance buoys – Lake Orajärvi in Sodankylä in internet: martech.sams.ac.uk/fmi : temperature profile in snow, ice, water during the winter
- SRNWP surface expert group linking to FLake, LakeMIP web sites?
- Design of the new comparison experiments

FLake developments

Towards 3-layer structure of Flake

Ideas shown in Georgi's presentation. Open postdoc position in Berlin to continue model development

Solving the problem of flip-flop

Problem detected in the stand-alone data-assimilation experiments by Katya, in operational HIRLAM with ice (possibly these are different problems)

Numerical issues related to definition of the exchange coefficient based on too fast variables? Technical problems with lake snow?

External data sets

Global lake depth data base

Second version ready based on work by Margarita (see her presentation) with ECMWF funding (gratefully acknowledged), to be released with documentation for users to download

Further improvements and continuation of funding are needed. Relation to the data about lake cover (fraction).

Question of Globcover, ECOCLIMAP, glcc2. Comparison with local data to reveal missing lakes or errors in lake size. Is there bias in the averaged fields in NWP/Climate model grids?

External data sets

FLake global climatology

Corrected version of the climatology of 12 prognostic variables available for Flake cold start and presented in Katya's talk, to be released with documentation for users to download

Lake climatology derived for ECMWF model available, see Patricia's talk

External data sets

Extinction coefficient

Measurements data available from Portugal, Canada, Russia, Germany...

Collection of data base to be coordinated by Rui – please send to rsal at uevora.pt

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Notes Lake workshop final discussion

11.09.12

Lake MIP tasks

Suggestions by Victor

Concentrate on flux comparisons between observations and models

Eddy covariance observations for validation over additional lakes, e.g. Lake Kuivajärvi (University of Helsinki, see Ivan's presentation)

Add FLake to the models compared

Comparison's over Lake Kivu – see Wim's presentation and summary of LakeMIP discussion meeting (next two slides)

LakeMIP Kivu

- Unified protocol:
  - Two main simulations:
  - Freshwater 60m
  - Saline simulation 240m including CO2 and CH4
  - 240: Salinity, CO2 and CH4 as forcing data
  - 240: uniform equation of state (Schmidt et al., 2012)
  - 240: geothermal heat flux = 0.3 W m-2 (Schmidt, 2010)
  - K-eps : Using real molecular diffusivity
  - Forcing data: hybrid data from two stations
  - 1 year spin up
  - mean lake's k (= 0.27 m-1)
  - Sensitivity experiments for k, geothermal heat flux, surface flux schemes and wind velocity
  - ...

LakeMIP Kivu

- 5 models confirmed:
  - LAKE
  - LAKEoneD
  - FLake
  - Hostetler
  - DYRESM

  ➔ other models still welcome!

- Roadmap:
  - 7/10/2012 : forcing fields
  - **14/12/2012 : model results**
  - 30/01/2013 : EGU abstract
  - 28/02/2013 : manuscript first draft
  - 27/04/2013 : LakeMIP meeting at EGU

Recommendations on Lake Viktoria WMO initiative

WMO initiative presented in Jeanette's talk

Lake MIP single column experiments in several points?

3D lake models done already and more needed?

Lake climatology runs with bathymetry and varying forcing done by Katya et al. when preparing FLake climatology

Climate model results of coarse resolution with Flake included exist in Canada by Andrey et al

Problem of the lack of continuous observation data

Exchange of information: send to jeanette.onvlee at knmi.nl > WMO

Special issue to publish this workshop results

Ask Tellus again

JAMES (ask Z. Subin)?

Geoscientific Model Development (http://www.geoscientific-model-development.net)?

Hydrology and earth system sciences?

Organisation committee to find out a suitable journal

Next workshop - Lake14

To be arranged in 2014

In Portugal: Evora – Rui to inquire the possibilities

or

In Germany: Berlin – Georgi & Dmitri to find out