

# **HARMONIE-Climate**

Patrick Samuelsson, SMHI

---

On the initiative of HIRLAM-B Management Group (MG) SMHI was asked to host a discussion Workshop focusing on climate applications with HARMONIE. The Workshop took place at SMHI, Norrköping, March 2-3 2015. See <https://hirlam.org/trac/wiki/HarmonieClimate/HCLIMmeetingMarch2015>

Purpose of Workshop was to present status of climate applications at NWP HARMONIE/HIRLAM/ALADIN institutes in Europe and see if we can benefit from each other in such applications. Main focus on HARMONIE.

## Institutes presenting status and plans:

SMHI

KNMI

Metno

AEMET

DMI

FMI

Tartu University

RMI

**In total 25 participants**

## Also participating:

Met. Hungary, Meteo France, Met. Slovenia

## **Can we join around a common development version of HCLIM?**

Yes partly, some groups show interest in joining current SMHI HCLIM development version. But staying more close to NWP is focus for some. The technical development of HARMONIE for climate simulations is common! SMHI will make our HCLIM branch available for every one interested soon! (runs at ECMWF)

## **Can we join around common physics?**

No hardly, groups have different focus with their climate applications. E.g. hindcast case studies, multi-year future scenario simulations, high-resolution 1-2 km, more classical RCM scales 5-30 km, different processes ... Thus, different versions of AROME, ALARO and SURFEX are needed to fulfill all needs. Concern was brought up that some groups leave their CORDEX-style RCMs behind and need some replacement (ARPEGE and IFS physics options in HARMONIE!?)

## **How can HARMONIE NWP and climate benefit from each other?**

Increased number of users means that more people invest development time on both system and processes. It is proposed that we should validate/develop/tune a new cycle of HARMONIE in climate mode before NWP/data assimilation applications follow. Climate ahead of NWP w.r.t. cycles. We should go for e.g. cy42 in next HCLIM (SURFEXv8).

## **More user friendly HARMONIE, especially for climate!?**

Current HARMONIE system is experienced as very complex by some users with background in RCM modelling. The complexity requires system know-how in the corridor (can't be used outside NWP centers) and it slows down development speed. Voices were raised that a more simple version of HARMONIE should be developed. Compare Open-IFS.

## **HARMONIE-Climate, a new role in HIRLAM management group!?**

Strong support at the Workshop that a climate applications of HARMONIE should become an official responsibility of HIRLAM-C. I.e. a HARMONIE-climate role in the HIRLAM management group. Or as special project...

Please let your national HAC and council representatives know if you support this idea!

## **HARMONIE-Climate training!?**

A HIRLAM training for HARMONIE Climate use is considered for autumn 2015. Are you interested in this? Please let Ulf Andrae know!

## **Can we join around validation tools or validation criteria!?**

For validation of climate simulations we need to complement existing NWP validation tools. Such exists so no problem but we will probably not join around this among groups. However, we may define common criteria for what aspects should be fulfilled.

**In the climate community it is essential to freely be able to distribute results to any user over any domain. Will that be possible with HARMONIE (ALARO/AROME)?**

## **How do we communicate HCLIM experience/results/plans among groups?**

A session at yearly ALADIN/HIRLAM Joint Workshop All Staff.

Dedicated HCLIM Workshops.

A HIRLAM climate email list does now exist: [climate@hirlam.org](mailto:climate@hirlam.org)

---

Using HCLIM as RCM means in general multi-year transient simulations where the initial state is specified at the start of the simulation and a spinup period is used (a year or more) to minimize the influence of the initial state.

Focus has been on activating as much of the relevant physical processes offered by HARMONIE as possible. Thus, we do not stay close to NWP although much of the technical development will be applicable also for NWP in climate mode setup.

- Update of SST and SIC every 6<sup>th</sup> our from boundary condition
- Uses multiple streams for output, FA-files and IO-server
- Online conversion to NetCDF files
- Climate adjusted SURFEX options for e.g. hydrology
- Added functionality to read RCP greenhouse gas data
- Restart at every month shift but not yet bit identical
- Is running with AROME and ALARO in multi-year mode

	NWP	HCLIM
<b>Soil scheme</b>	Force restore (3-L)	Diffusion 14 layers (DIF)
<b>Snow scheme</b>	D95	Explicit snow (3-L)
<b>Sea-ice model</b>	-	A la Yurii Batrak
<b>Lake model</b>	-	FLake
<b>SURFEX version</b>	7.2	7.3 + ISBA v8
<b>Specific SURFEX output</b>	-	LSELECT=.T.
<b>Radiation ALARO ACRANEB</b>	v1	V2 (for RCP emission scenarios)
<b>SURFEX options</b>	Mostly default	Adjusted for climate, especially hydrology

See more details here:

<https://hirlam.org/trac/wiki/HarmonieClimate>

**Thanks!**