

# **HARMONIE for regional climate applications**

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# Background

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- Rossby Centre at SMHI has developed and applied the Rossby Centre Regional Climate modelling system since 1997.
- The system now includes atmosphere-land-lake (RCA), ocean (RCO) and dynamic vegetation (LPJ-GUESS) with couplings in between.
- RCA has its origin in HIRLAM and there have been some fruitful feedbacks between climate and NWP during the years.
- RCA and HIRLAM dynamics and physics are similar to >95%. The system setups are very different.
- The last(?) version of RCA (RCA4) will be released before summer.
- RCA core group at Rossby Centre has decreased the last years. This combined with new expectations (high resolution non-hydrostatic, earth-system components) asks for new strategy:

**Kill RCA and go for Climate-HARMONIE!**

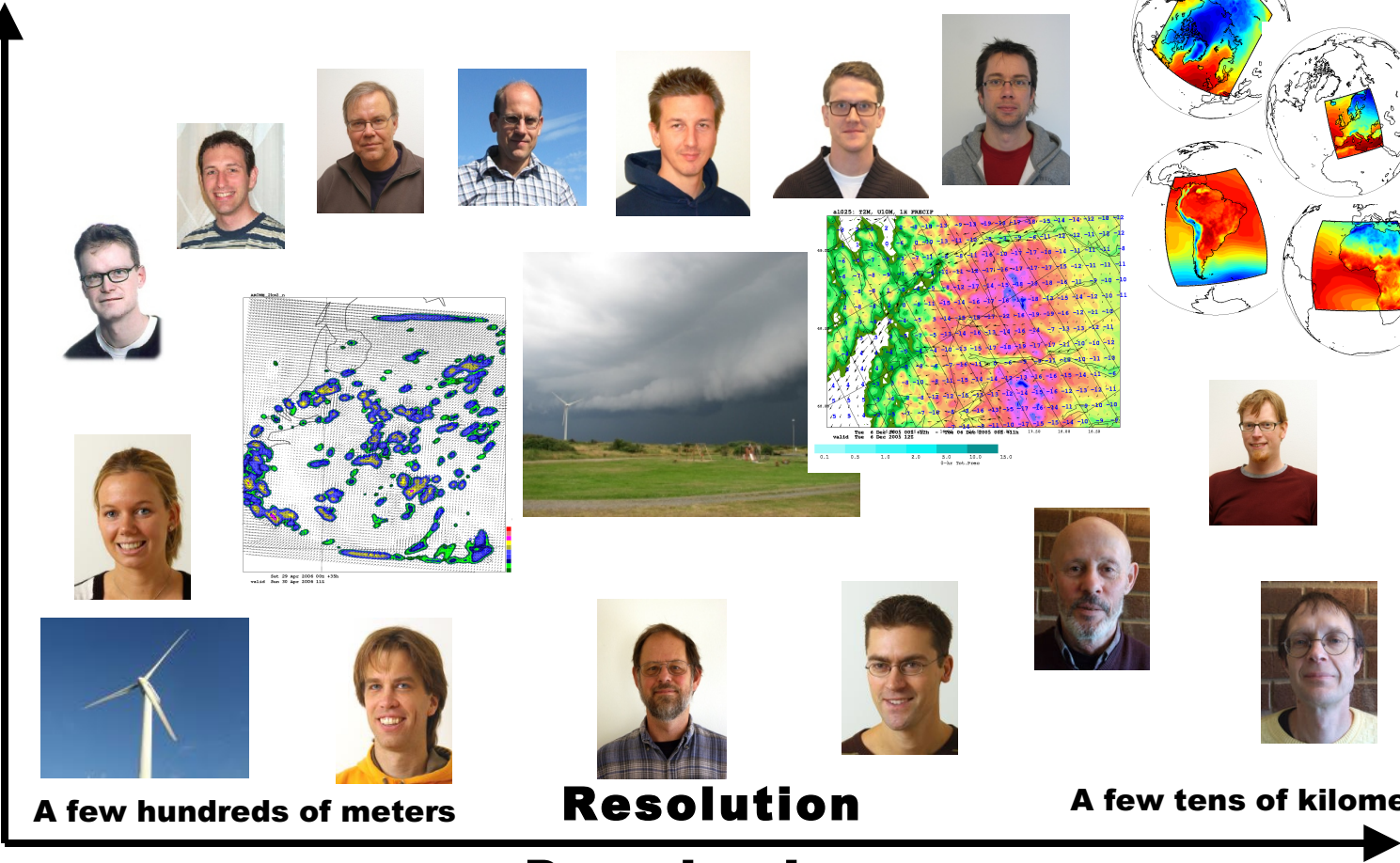
# Benefits with Climate-HARMONIE

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- The HARMONIE system will be developed and evaluated for time scales ranging from sub-diurnal processes to decadal processes which will be beneficial for both NWP and climate applications.
- A bigger group of people broadens the development potential
- Development resources (personnel) are used more efficiently
- It's even more fun 😊
  
- Are there any concerns?
  - The model system becomes more complex and less flexible...

# HARMONIE at SMHI (May 2010)

**Integration period** Many years  
A few hours



**Domain size**  
A few tens of kilometres      A few hundreds of meters      Resolution      A few tens of kilometres      Continent

A climate branch of HARMONIE now exists:

<https://hirlam.org/trac/browser/branches/climate/harmonie-36h1.3>

The current setup uses ALARO and SURFEX5

## Present Climate-HARMONIE

- Runs one month at a time with restart (first guess) from previous month (as climate ALADIN)
- Uses ERA-Interim as lateral boundary conditions
- Reads SST and ice every 6 hour from ERA-Interim
- Includes some modifications for storing data over long integrations

## Future perspective

- Use a logical climate switch in HARMONIE (eliminate climate branch )
- Identify other BCs than SST and ice that need sub-monthly update
- ...

## **Current:**

HARMONIE Europe domain runs at 6.25km for 1998-2009 with ERA-Interim boundaries.

Sorry, no figures but I have heard that results look promising 😊

## **Plans:**

Set up nested domains in certain combinations on e.g. 12.5, 6.25, 2.5 and 1 km resolutions over southern Norway and Sweden for evaluation of precipitation at different resolutions. Here we should consult our NWP friends for recommendations on physics setup.

# Interest in Climate-HARMONIE so far

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**SMHI**

- SMHI** - David Lindstedt and Ulf Andrae  
Focus on resolution on a few kilometres (ALARO)
- KNMI** - Ben Wichers Schreur and Geert Lenderin  
Implementing IFS-physics (synoptic physics) into HARMONIE  
(RACMO)
- AEMET** - Ernesto Rodriguez Camino and Juan Carlos Sanchez
- met.no** - Trygve Asplien and Hilde Haakenstad

**SMHI will take the initiative to call for a Climate-HARMONIE Workshop during autumn 2011. Interested people are welcome!**



**THANKS!**

Drakensberg, South Africa, August 2006