HARMONIE-CLIMATE AT SMHI

Experiences and status

ALARO Working Days 2016

Petter Lind

September 13, 2016

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Research group:

· The HARMONIE-Climate group is expanding!
  Now 5 researchers

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Scientific focus & competence:

· High-resolution modeling, convection, precipitation, extremes, PBL physics.

· Computer science/technical development

· Model development

· Analysis tools (python based)

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HCLIM collaboration:

· In-house collaboration with NWP group (e.g. land surface scheme)

· International collaboration in initial stages but growing.
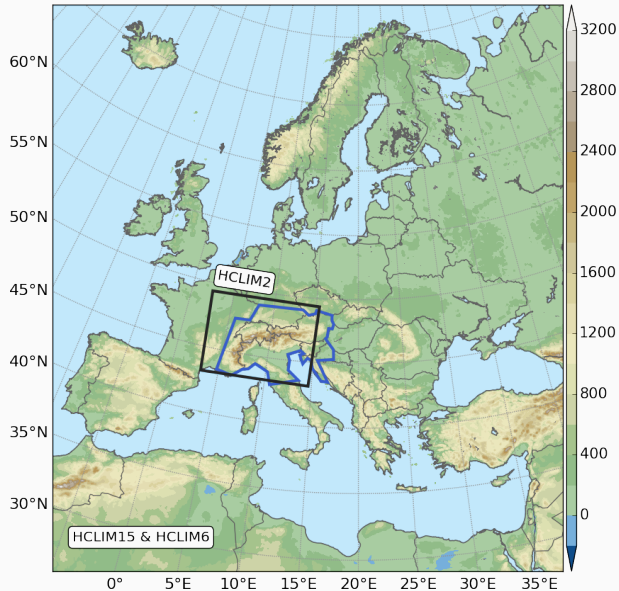
Experiment configuration:

Physics: ALARO-0 and AROME

Versions: cy36, cy37, cy38

Domains: Europe (ALARO-0) and Central Europe (AROME)

Resolutions: 15, 6 km (pan-Europe) and 2 km (Central Europe), 60/65 vertical levels

LBCs: ERA-Interim, EC-Earth

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Papers with cy36 & cy37:

I. Lindstedt, D., P. Lind, E. Kjellström, and C. Jones (2015): A new regional climate model operating at the meso-gamma scale: performance over Europe, *Tellus 67A* (**13**), 7889-7907.

II. Lind, P., D. Lindstedt, E. Kjellström, and C. Jones (2016): Spatial and temporal characteristics of summer precipitation over Central Europe in a suite of high-resolution climate models, *Journal of Climate* (**29**), 3501-3518.

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Ongoing work

cy37: Case studies of heavy rainfall events over Crete (part of ECLISE EU project).
Paper: Koutroulis *et al.* (2015), *Earth Perspectives*

cy38: Sensitivity study – effect of afforestation/deforestation over Europe. Comparing HCLIM with RCA.

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- Seven summers sampled over Europe (ALARO-0, 15/6 km resolution) and Central Europe (AROME 2km resolution)
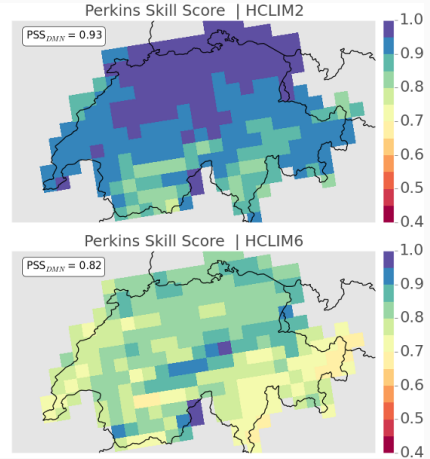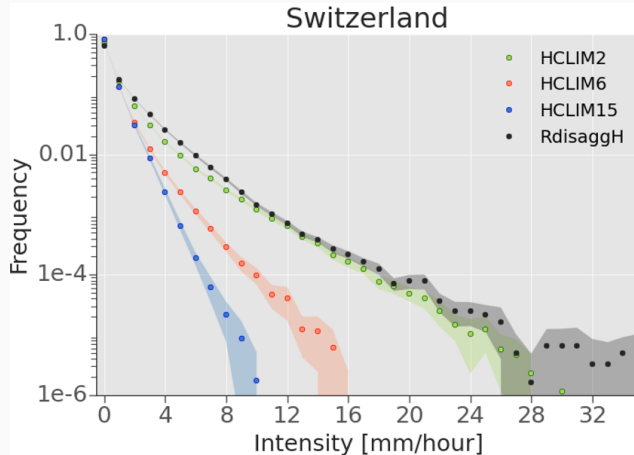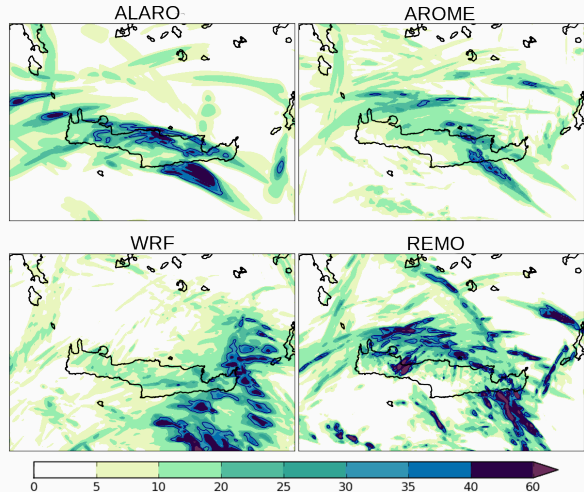
· Multi-model (convection-permitting) study; reproducing extreme rainfall over Crete (ALARO-0 & AROME @2km resolution)
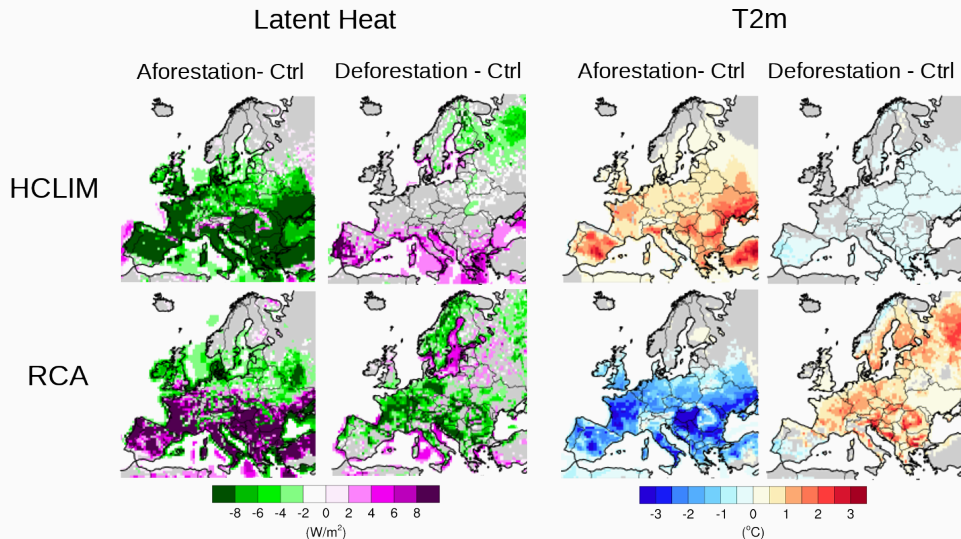

Crete 1994 flash flood
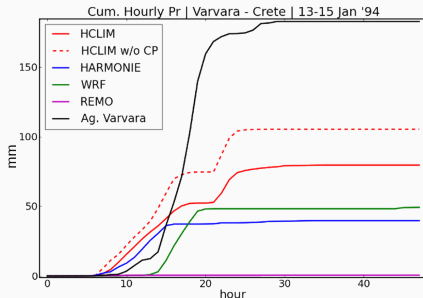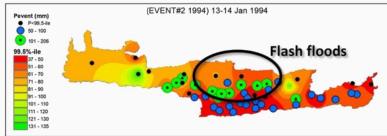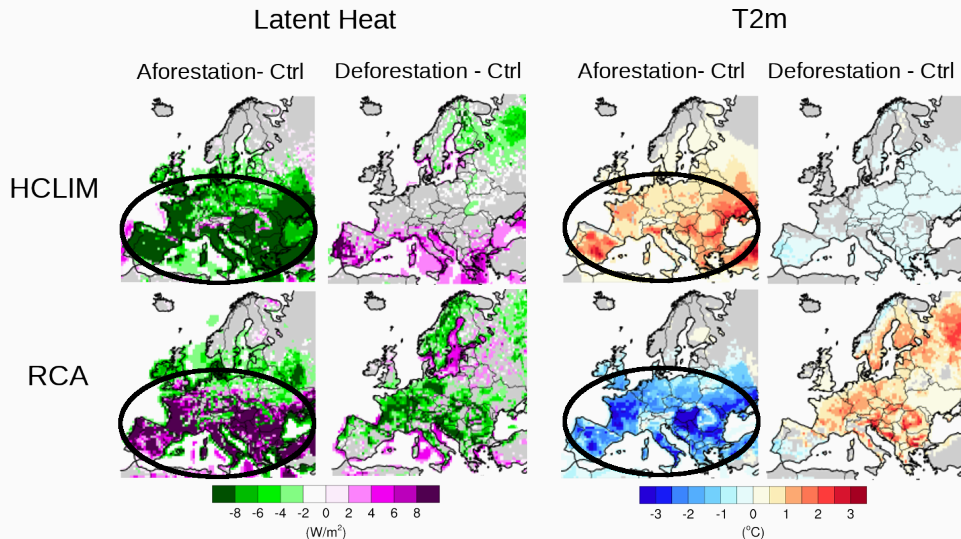
Max. intensity [mm/h] | Crete 11-16 Jan 1994

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· Ongoing work to finalize and tag cycle 38 version for operational use.
· Still technical issues and some model biases.

HCLIM in cy38

	Default	Climate
Soil scheme	3-L	DIF (Diffusion) 14L
nPatch	1	2
Snow scheme	D95	ES (Explicit Snow)
Sea-ice model	-	HM-1
Lake model	-	FLake
SFX Version	7.2	7.3 + 8.0 (ISBA)
SST+SIC	Const.	Update from file
Radiation (ACRANEB)	1	2
RCP data	-	Update from table
Aerosols (scenario)	-	Update from table

For a complete list see https://hirlam.org/trac/wiki/HarmonieClimate

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- · ALARO-0: Radiation bias (underestimated down-welling SW) in spring/summer
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- · Update of aerosols for scenarios (CMIP5 data)

Some initial experiments and tests with HCLIM cy38 (ALARO-0):

· Sensitivity of afforestation/deforestation (grid size: 50km)

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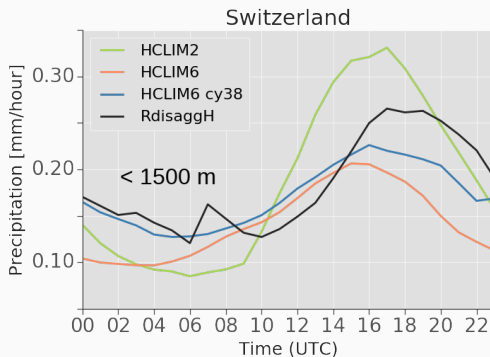
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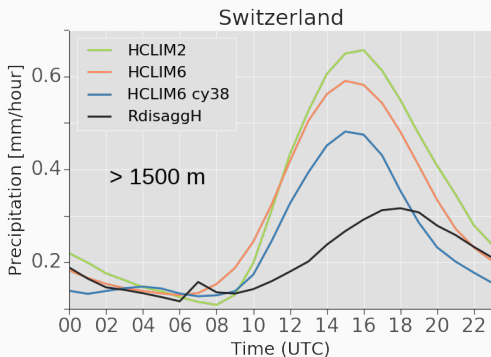- Summer samplings (grid size: 6km)

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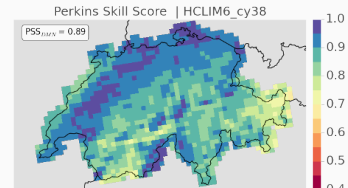
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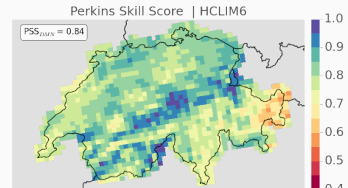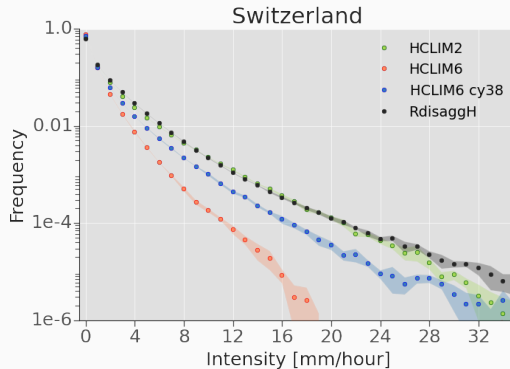
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Planned/ongoing experiments

· High-End cLimate Impacts and eXtremes (HELIX)
  – EC-Earth T511 (40 km), 30-year time slices, historical + scenario
  – RCP8.5, centered around 4^oC warming
  – EC-Earth –> ALARO @20km
  – EC-Earth –> ALARO @6km (full years or summer samplings)

· Urban-SIS (Proof-of-concept)
  – ALARO @20km –> AROME @1km over cities.
  – AROME with TEB. Input to urban model.

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· Further expand and deepen collaboration

THANKS! QUESTIONS?

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