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TERRA StandAlone : towards a consolidated TSA synchronised with COSMO v6.0

Varun Sharma^{2,3}, Sascha Bellaire¹, Louise Braud¹, Michael Lehning^{2,3}, Jean-Marie Bettems¹

¹MeteoSwiss, Zurich, Switzerland

²WSL Institute for Snow and Avalanche Research SLF, Davos, Switzerland

³CRYOS, School of Architecture, Civil and Environmental Engineering, EPFL, Lausanne, Switzerland



Snowpolino in Terra StandAlone (TSA) !

- Snowpolino implemented in Terra-Standalone for proper ‘Soil-Snow’ coupling.
- Testbed for year-long / climate scale simulations.
- Terra-Standalone updated for Snowpolino variables I/O (finalization of GRIB codes for COSMO implementation as well).
- Perfect for debugging – Terra-Standalone very similar to COSMO for land-surface coupling
- Ability to force Terra-Standalone with COSMO analyses or station data.



Agenda

- Future of Terra-Standalone
 - investments in improvements for I/O , Parallelization ?
- StandAlone tools : new options ?
 - 'Land' surface modelling vs
 - 'All' surface modelling – combining land / lakes / sea-ice
 - 'ICON'-ic standalone tool ?
- COSMO-Consortium vs MCH Ops vs Research Groups
 - COSMO to ICON



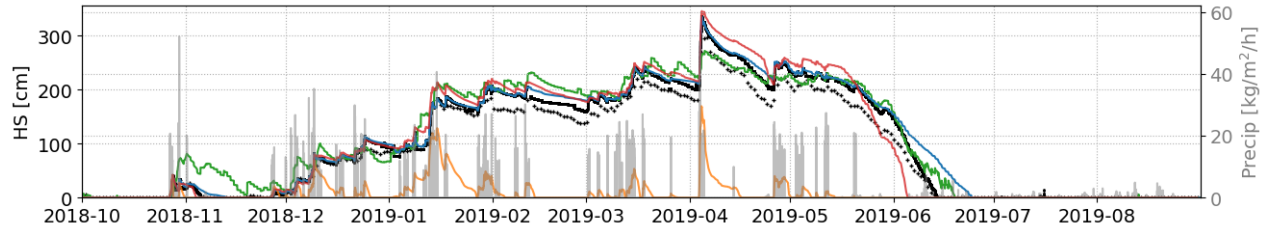
PT Saint : Outlook (2021-2022/2023)

- Bringing SNOWPOLINO to ICON's 'tiled' approach
- Additional physics: Snow on forest canopies
- Additional physics: Aerosols and their impact on snow albedo



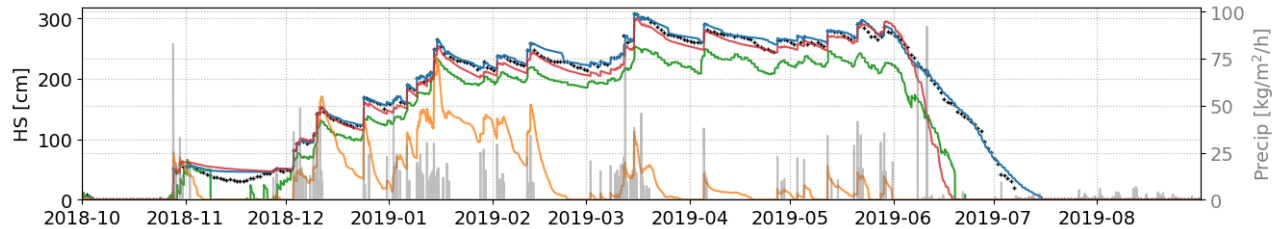
Results : Forcing with Station measurements

GRH - Grimsel Hospiz - (lat, lon, alt)=(46.572, 8.333, 1980.0)



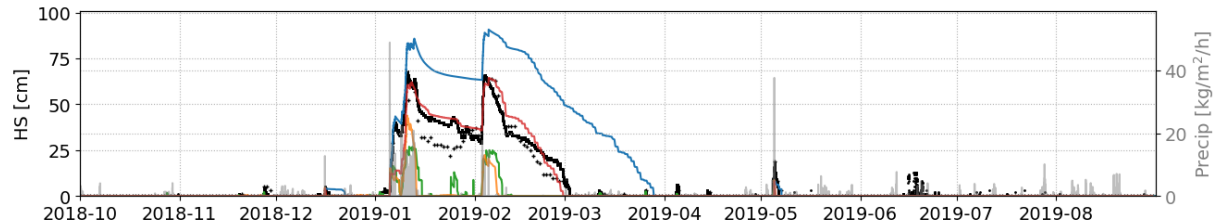
- manual meas.
- automatic meas.
- COSMO-1 analysis
- SNOOWPACK
- TSA_{SLS}
- TSA_{SNOWPOLINO}

WFJ - Weissfluhjoch - (lat, lon, alt)=(46.833, 9.806, 2691.0)



- manual meas.
- automatic meas.
- COSMO-1 analysis
- SNOOWPACK
- TSA_{SLS}
- TSA_{SNOWPOLINO}

STG - St. Gallen - (lat, lon, alt)=(47.425, 9.399, 776.0)

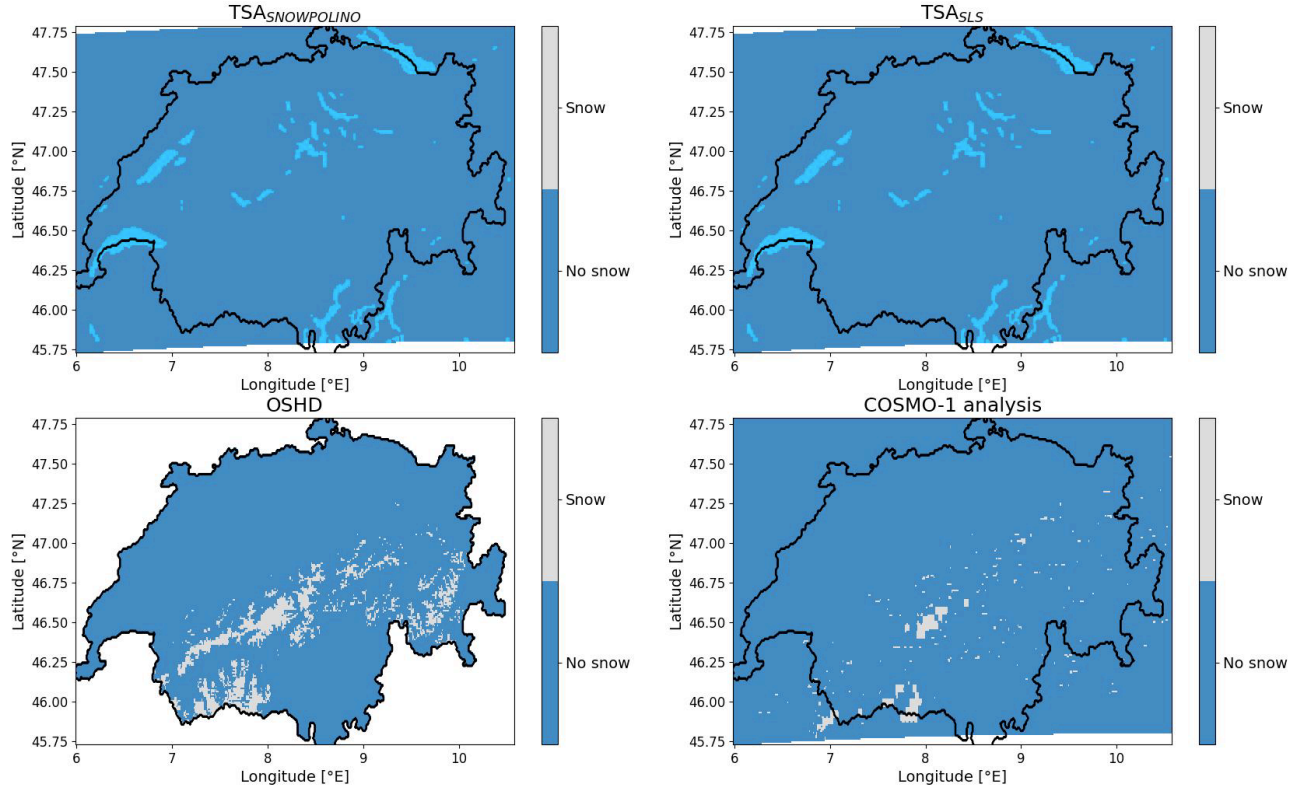


- manual meas.
- automatic meas.
- COSMO-1 analysis
- SNOOWPACK
- TSA_{SLS}
- TSA_{SNOWPOLINO}



Results: TSA + Snowpolino driven by COSMO-1 analyses

2018-10-01





Summary and Discussion

- PT-SAINT coming to a wrap: multilayer snow model becomes operational in Fall 2021
- TSA + Snowpolino to be tested for potentially replacing the snow analysis at MCH
- COSMO 6.0 to include Snowpolino
- Operational Weather Prediction vs Climate Simulations
 - Current snow treatment in TERRA is of no use WITHOUT analysis
 - CMIP5 snow results !? (most models used single layer snow treatment)
 - What are the analyses / tuning hiding ?
- Snowpolino is agnostic to soil models – i.e., can be quickly coupled to JSBACH for example.



PT Saint : Outlook (2021-2022/2023)

Additional physics: Snow on forest canopies

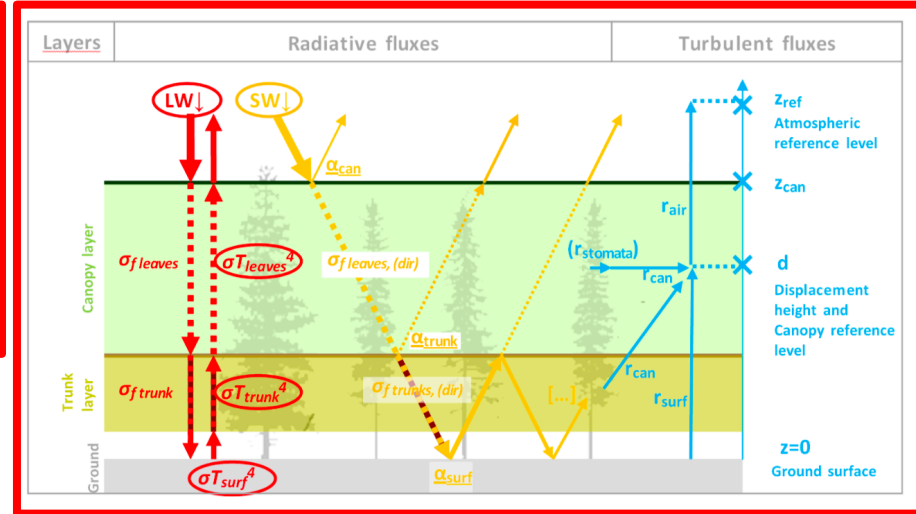
Geosci. Model Dev., 8, 2379–2398, 2015
www.geosci-model-dev.net/8/2379/2015/
doi:10.5194/gmd-8-2379-2015
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A two-layer canopy model with thermal inertia for an improved snowpack energy balance below needleleaf forest (model SNOWPACK, version 3.2.1, revision 741)

- Trunk and leaf spaces separated
- Simple radiative transfer through canopy including effect of snow accumulation in the leaf space
- Consistent energy and mass balance in the two-layer canopy

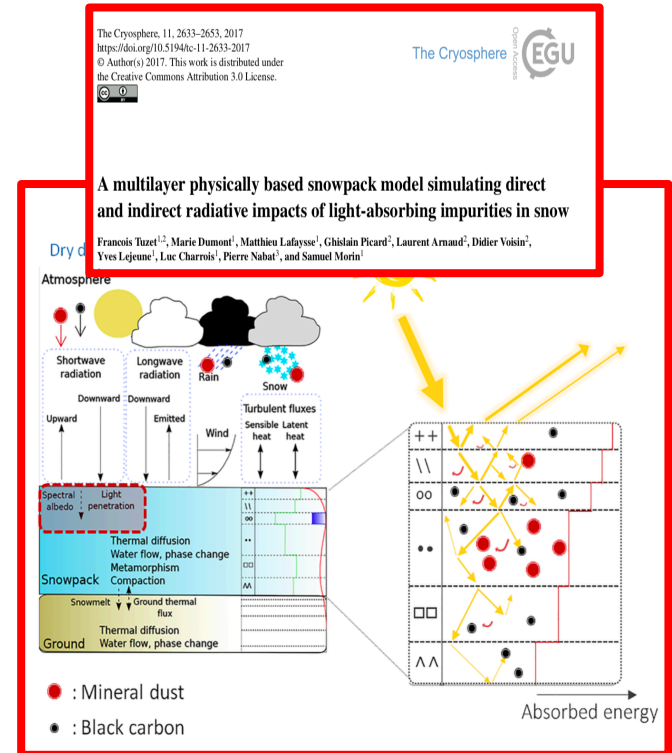




PT Saint : Outlook (2021-2022/2023)

Additional physics: Aerosols and their impact on snow albedo

- Need for multi-layer snow modelling is clearly motivated by this problem
- Snowpolino is equipped by design to easily be expanded to tackle this issue.
- Guidance from recent work at KIT (Rohde et al.) as well as recent implementations in CROCUS





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Thank you!

Questions or Comments?

Varun Sharma, Sascha Bellaire, Louise Braud, Michael Lehning, Jean-Marie Bettems

Contact: varun.sharma@slf.ch