

Developing and providing high quality climate information for the agricultural sector

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MOTIVATION

Climandes, a twinning project between two weather services (Peru and Switzerland), aims at developing climate services for the agricultural sector in the Peruvian Andes. The target of the **technical activities** is to develop high quality climate information relevant for the users and ensure the sustainability of these products beyond the project timeline.

CHALLENGES

The largest challenge for the provision of reliable climate services in the Andean region is the **quality of observational datasets**:

- Low station density:
 - Peru: 1 station per ~5.000km²
 - CH: 1 station per ~500km²
- Data quality of station data
- Re-analysis datasets show problems in complex topography
- No gridded observational datasets are available at start of project

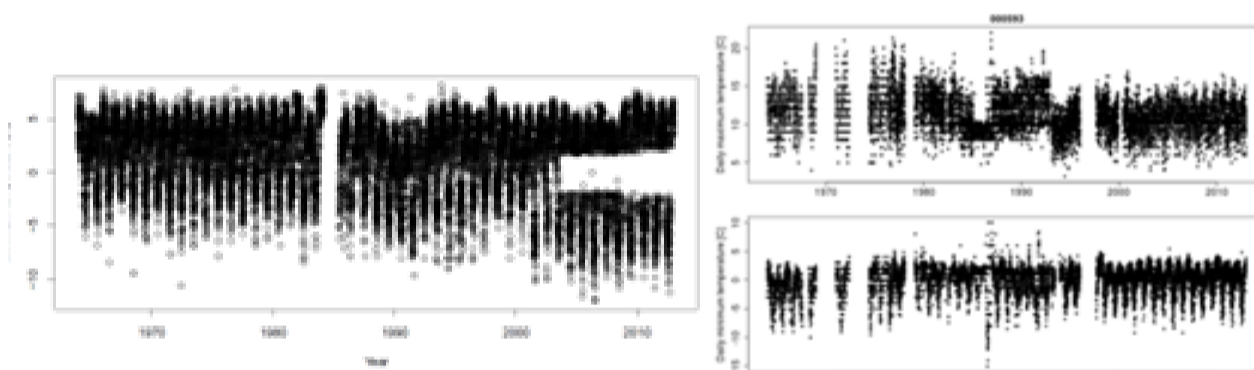


Fig.1: Examples of non-homogenized time series

This affects climatological analysis as well as verification of seasonal forecasts.

Another issue is the low **skill of seasonal forecast** especially for precipitation.

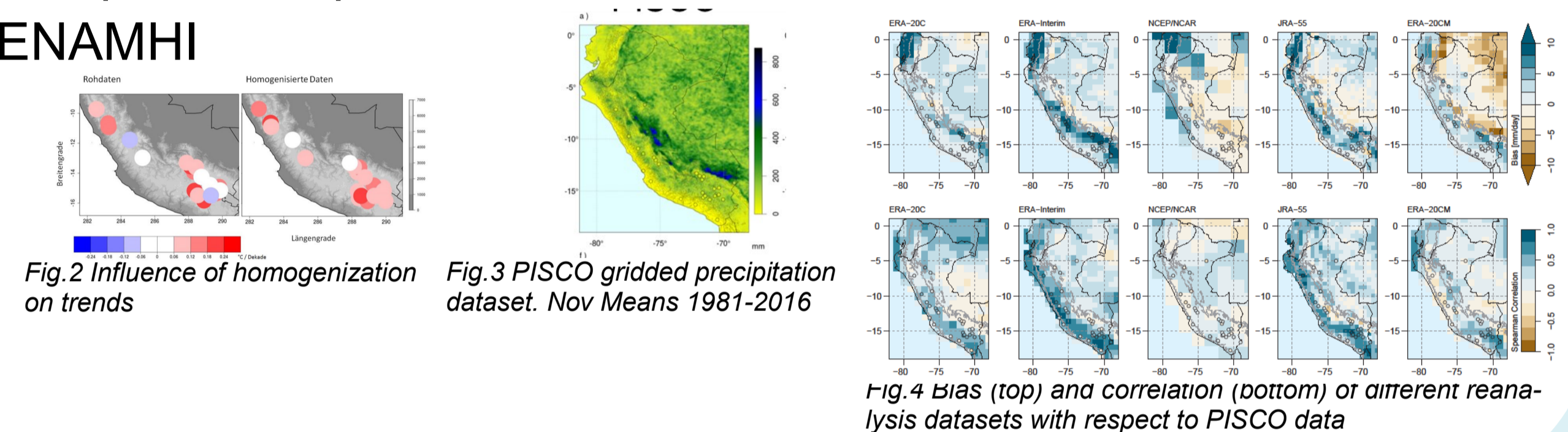
DISSEMINATION

- “Data Management for Climate Services” Workshop at SENAMHI with sessions on metadata, homogenization, gridded datasets and climate services
- Publication of results:
 - Gubler S. et al. (2017), *The influence of station density to climate data homogenization using HOMER*. Int. J. Climatol. 10.1002/joc.5114
 - Hunziker, S. et al. (2017), *Identifying, attributing, and overcoming common data quality issues of manned station observations*. Int. J. Climatol. doi:10.1002/joc.5037
 - Rosas G., et al. (2016): *Towards implementing climate services in Peru – The project CLIMANDES*, Climate Services
 - Aybar, et al. (2017), *Uso del Producto Grillado “PISCOP” de precipitación en Estudios, Investigaciones y Sistemas Operacionales de Monitoreo y Pronóstico Hidrometeorológico*. Nota Técnica 001 SENAMHI-DHI-2017, Lima-Perú

TECHNICAL ACTIVITIES/ACHIEVEMENTS

Generation of a high quality observational database

- Homogenisation of station data (Gubler2018, Hunziker2018)
- Generation of daily gridded temperature and precipitation datasets at ~5km resolution for Peru (PISCOp and PISCOt) based on station and satellite data (Aybar et al, Huerta et al. (in prep.))
- Evaluation of reanalysis datasets → *Poster P.165*
- Concept for a improved datawarehouse architecture at SENAMHI



Monitoring and Climatology

- Identified indices and time periods relevant for agriculture, e.g. drought, plant specific temperature thresholds
- Analysis of climatological means, variability and trends → *Poster P.120*

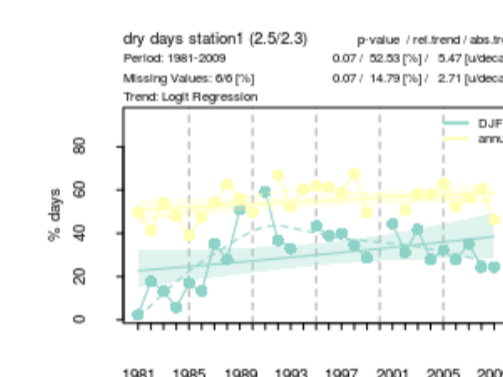


Fig.5 Dry days climatology and trends for two different temporal aggregations (DJF and annual)

Verification

- of seasonal forecasts (mean values and indices) against homogenized and gridded observations
 - Dynamical forecasts (ECMWF System 4+5)
 - Statistical forecasts (CPT)

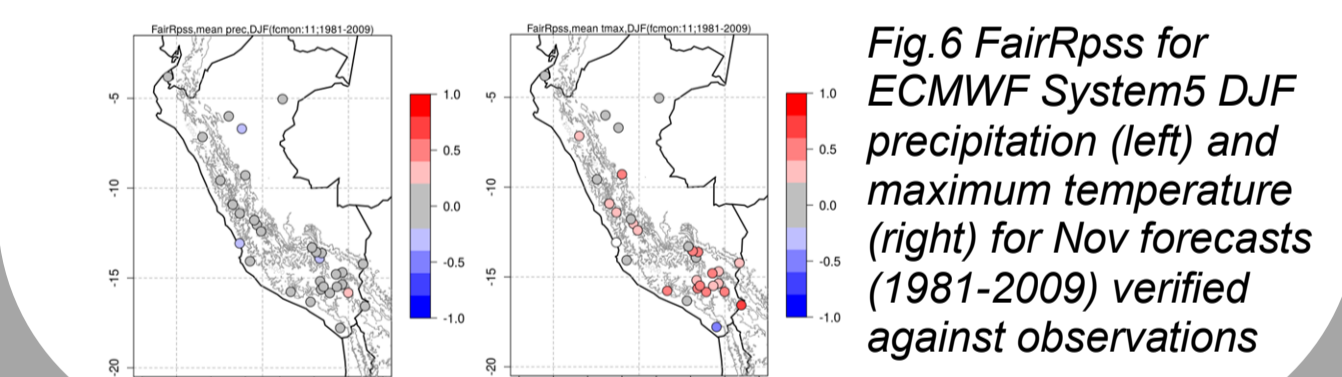


Fig.6 FairRps for ECMWF System5 DJF precipitation (left) and maximum temperature (right) for Nov forecasts (1981-2009) verified against observations



R-package for automatic generation of climate products-
www.github.com/Climandes/ClimIndVis

Generation of **prototype forecast products** including uncertainty and skill and reference climatology → *Poster P.67*

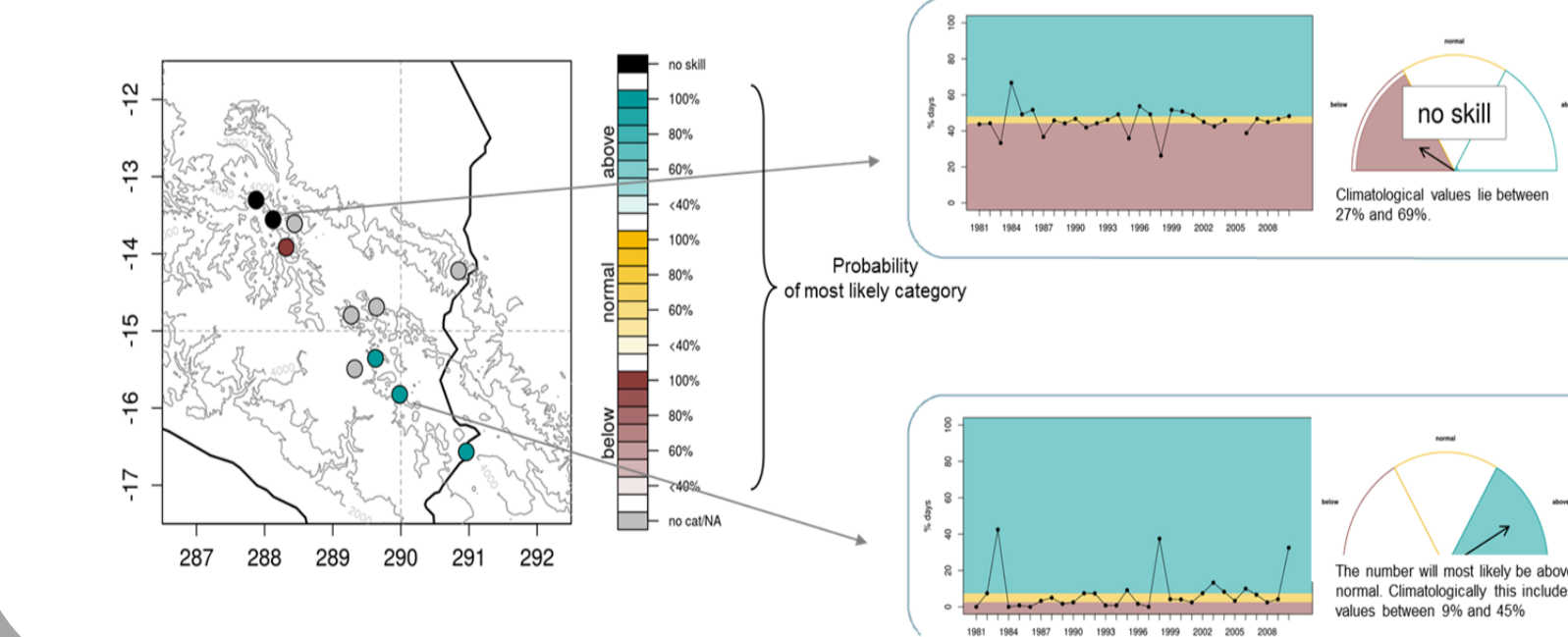


Fig.7 Example prototype forecast for days within optimal temperature range for beans during flowering phase (Feb-May) including uncertainty and skill information. The boxes show pop up information for selected stations. All forecasts with an EnsRoccs of the respective category above 0.5 are considered skillfull.

CONCLUSIONS

While data quality and availability issues still remain an issue in the study region, through the Climandes project, the data basis of observational records has been largely improved. Based on this data, new prototype products have been developed for monitoring past and current climate and seasonal prediction. Tools for automatization have been provided and results have been published or are being prepared for publication to ensure the sustainability of the project results.