

A prototype seasonal forecast system for the agricultural sector in Peru

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MOTIVATION

Prediction of user relevant indices may be more beneficial for specific applications than predicting mean values at the seasonal scale. Indices are defined based on user enquiries and plant specific climatological thresholds. In this poster, a prototype seasonal forecast system, developed within the project Climandes, is introduced

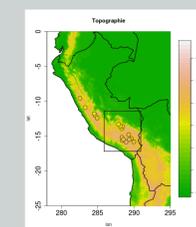
The different steps of the forecast system are shown for one exemplary index:

- % days within optimal temperature range for beans (growing phase)
- Additionally, verification results relevant for different growing phases of beans are shown.

DATA

Seasonal forecasts: ECMWF system 5 seasonal prediction system (bias corrected with quantile mapping to observation sites)

Verification data: Homogenized station data from SENAMHI for the Puno and Cusco regions
Time period (verification): 1981-2010



TOOLS

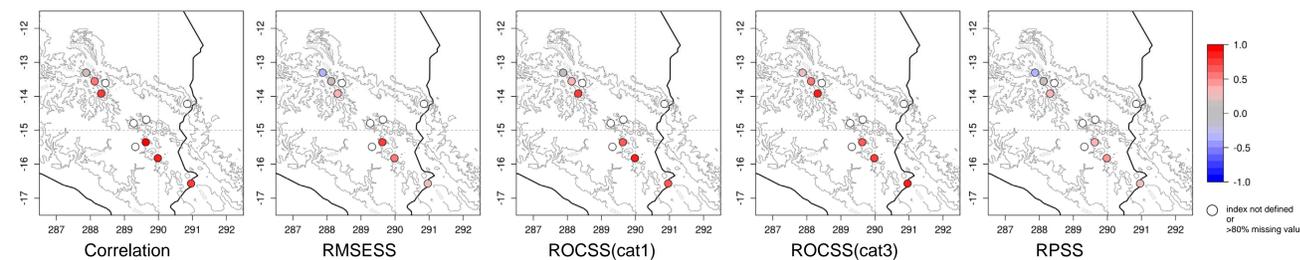
The R-package **ClimIndVis** was used for the calculation and generation of all graphics. For verification it relies on the easyVerification package. The package will be available on github in Mai 2019.



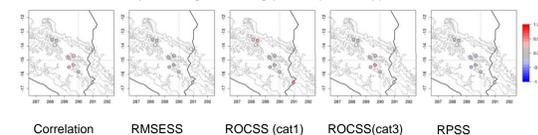
Verification

Figure show verification of selected indices using different verification metrics (1981-2010)

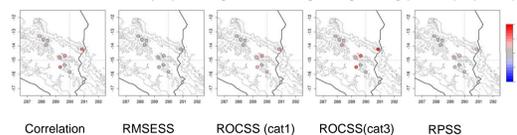
Index: % days within optimal temperature range for beans during flowering phase (Feb-May), Jan forecast



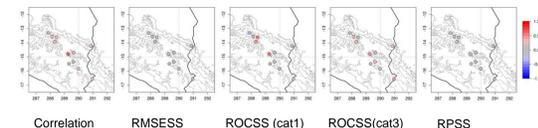
Index: frost days during flowering phase (Feb-May), Jan forecast



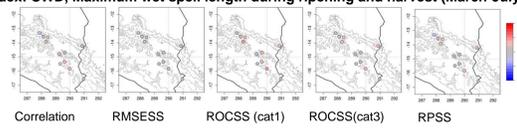
Index: CDD, Maximum dry spell length in seeding and growing phase (Sep-Dec), Aug forecast



Index: RX5, monthly max consec 5-day precipitation during Feb-May, Dec forecast



Index: CWD, Maximum wet spell length during ripening and harvest (March-July), Jan forecast



Selection of skill criteria

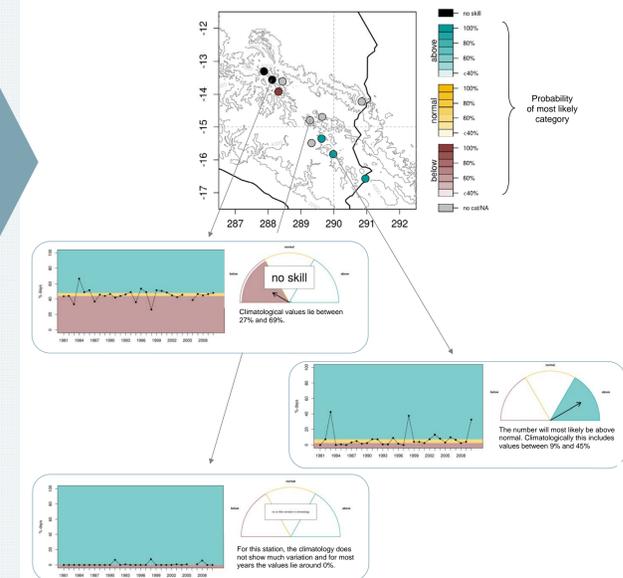
Our (arbitrary) choice: ROCSS with minimum skill of 0.5

What is your opinion?

- Which skill metric is most relevant for users? Or should a combination of skill metrics be used?
- How „good“ does a forecast have to be in order to be „useful“?
- Which information should be included in a forecast product?

Please comment!

Prototype seasonal forecast



Example prototype forecast including uncertainty and skill information. The boxes show pop up information for selected stations. All forecasts with an EnsRocss of the respective category above 0.5 are considered skillfull.

VERIFICATION METRICS

In addition to correlation, different skill scores are used for verification of seasonal forecasts, thus the added value of the forecast over using the climatology is assessed. For all scores, the perfect value is 1.

- Correlation:** (Pearson) Measures strength of linear association between ensemble mean and observations
- RMSESS[1]:** Measures the average magnitude of forecast errors compared to climatology (accuracy)
- ROCSS[2]:** Measures how well forecasts can distinguish between categories compared to using climatological probabilities (discrimination)
- RPSS[3]:** Measures how well the given categories can be predicted compared to using climatological probabilities (discrimination, reliability and resolution)

References: [1] Jolliffe, I. and D. Stephenson, Eds., 2003: Forecast Verification, John Wiley and Sons, 257 pp. [2] Mason I., 1982. A model for assessment of weather forecasts. Aust. Meteorol. Mag. 30: 291-303 [3] Epstein, 1969. A Scoring System for Probability Forecasts of Ranked Categories J Appl. Meteor. 8: 985-987

CONCLUSIONS & OUTLOOK

Verification:

- Skill depends on station, index and metric
- Often not high enough to be „useful“
- ⇒ process oriented bias-correction has shown to be promising for skill improvement

Prototype Forecast

- Challenge: Definition of „useful“ forecast
- Open question: which metric meets users needs best?
- ⇒ Test forecasts on users
- ⇒ Adjust visualisation for better understanding