

Homogenized observations from Peru and reconstructed datasets: how well do they compare?

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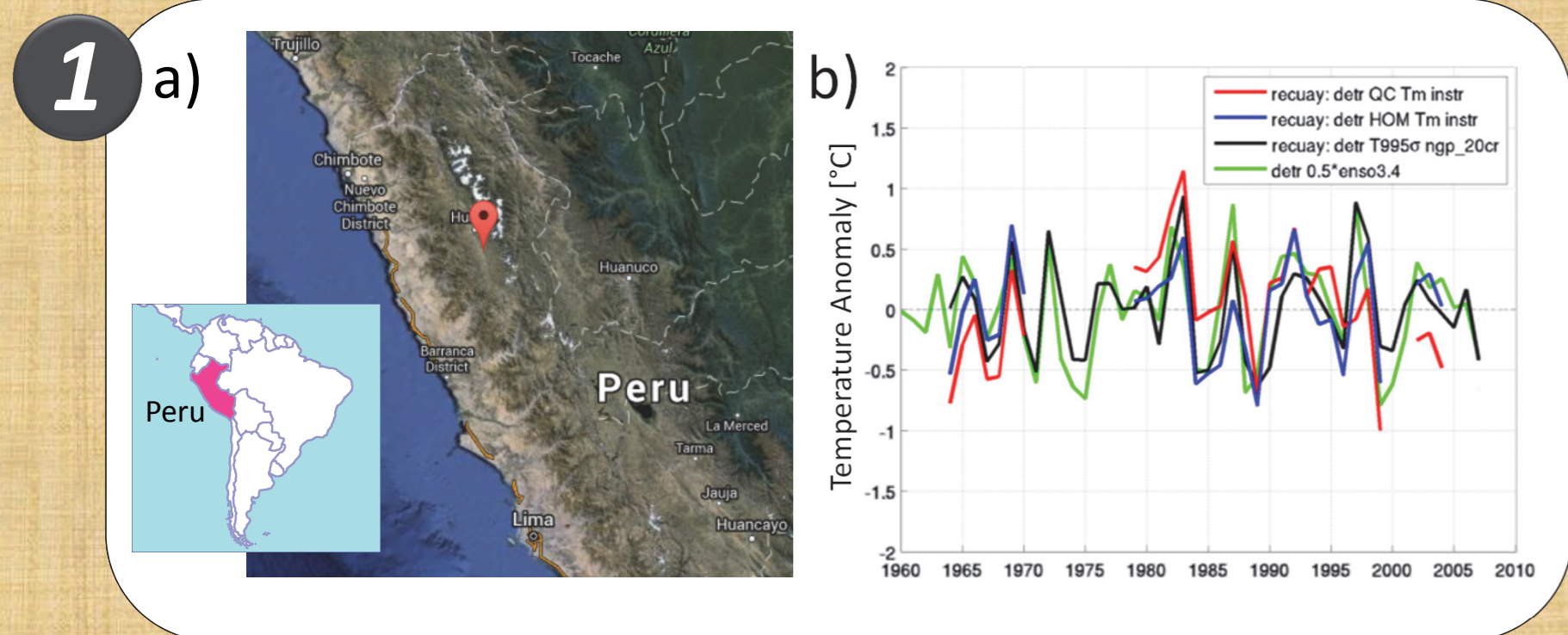
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1) interannual variability

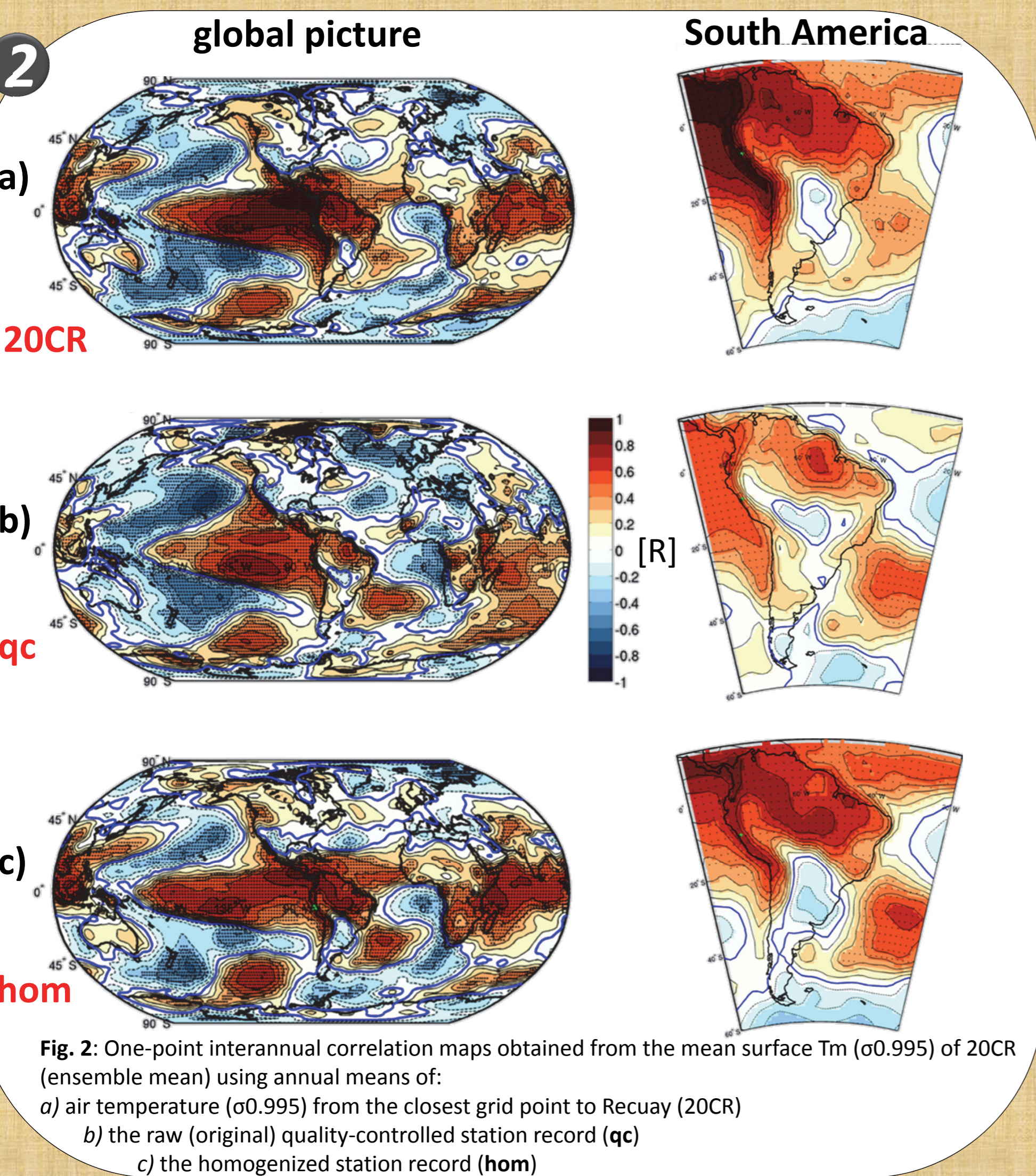
1.1/ a homogenized temperature dataset from *climandes*

Homogenized temperature time series from Peruvian regions along the Central Andes, most of them covering the last 50 years, have been produced within the **CLIMANDES** project (www.senamhi.gob.pe/climandes/). Ongoing efforts aim to **quantify the added value** brought by the homogenization procedure and to place the homogenized station records in a broader climatological context. For that, we explore the way the quality-controlled-only (**qc**) and homogenized (**hom**) data compare with reanalyses.



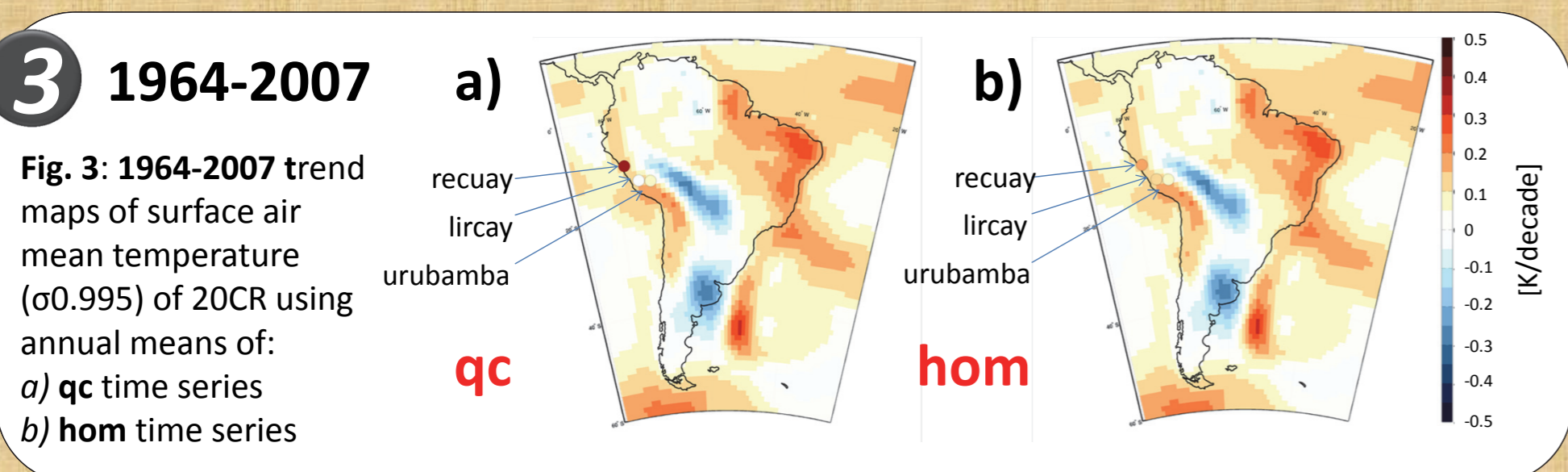
1.2/ recuay: the global picture

Recuay is located in the Ancash Department (Fig. 1a). Its meteorological station (09°44'S; 77°27'W, 3'444 masl) has been recording since 1964. The interannual variability of the local mean temperature (Tm) is highly correlated with the Tropical Pacific SST (inst. hom Tm [blue curve] vs ENSO3.4 [green curve]: R=0.67; Fig. 1b & 2). Using annual mean surface air temperature ($\sigma 0.995$) from the 20 Century Reanalysis (20CR [1]), we compare the **spatial patterns of the one-point correlation maps** obtained from following time series: Fig. 2a) air temperature ($\sigma 0.995$) from the closest grid point to Recuay (20CR); Fig. 2b) the quality-controlled-only station record (**qc**); Fig. 2c) the homogenized station record (**hom**).



Qualitatively, we find that the surface air temperature pattern based on 20CR only (ENSO-like spatial pattern depicted in Fig. 2a) is better reproduced using the **hom** instrumental record (Fig. 2c) than the **qc** one (Fig. 2b).

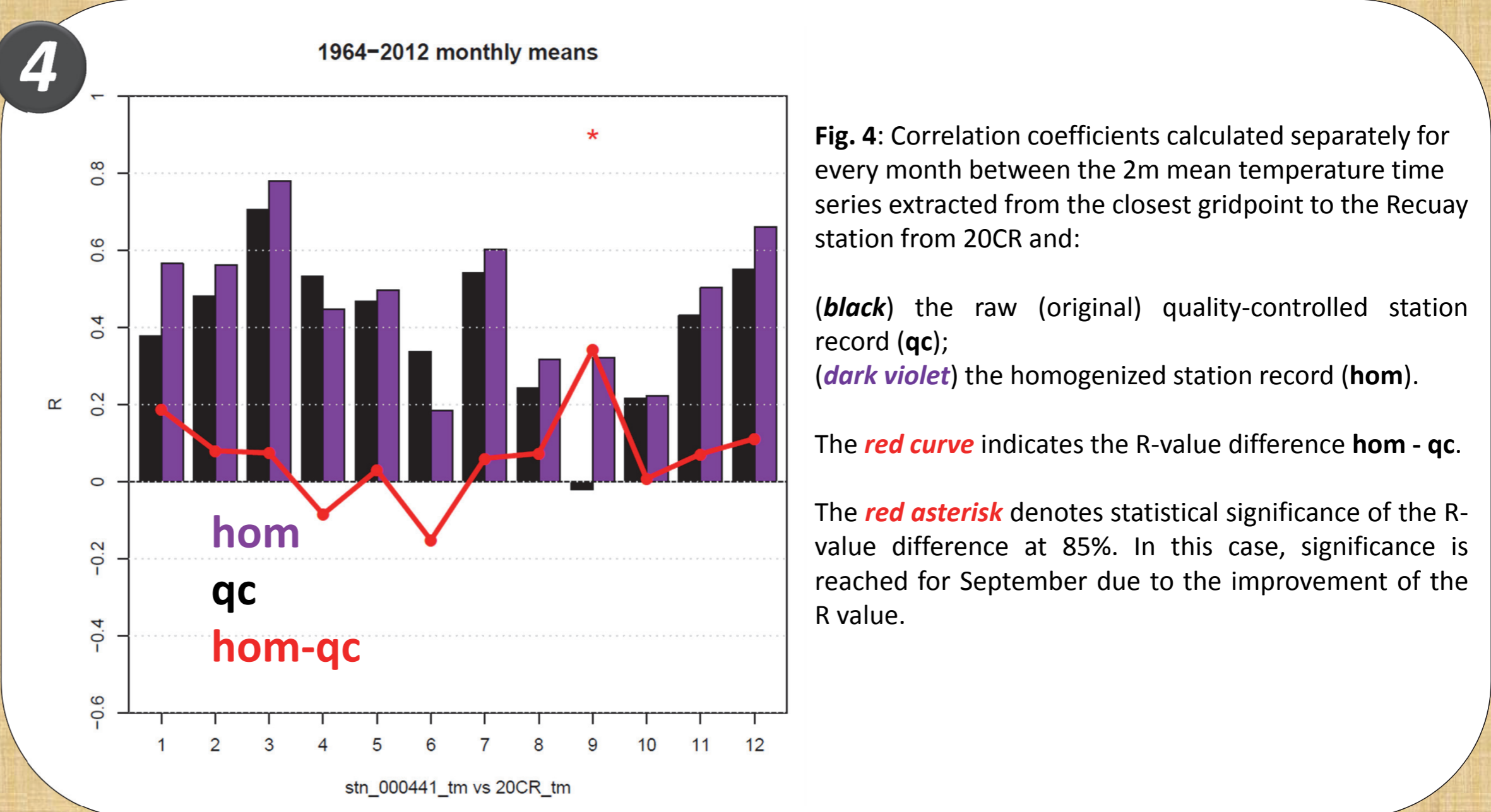
A similar result arises from the comparison of the annual 1964-2007 Tm trends calculated from the **qc** and **hom** records (3 stations) with 20CR (Fig. 3).



2) annual cycle

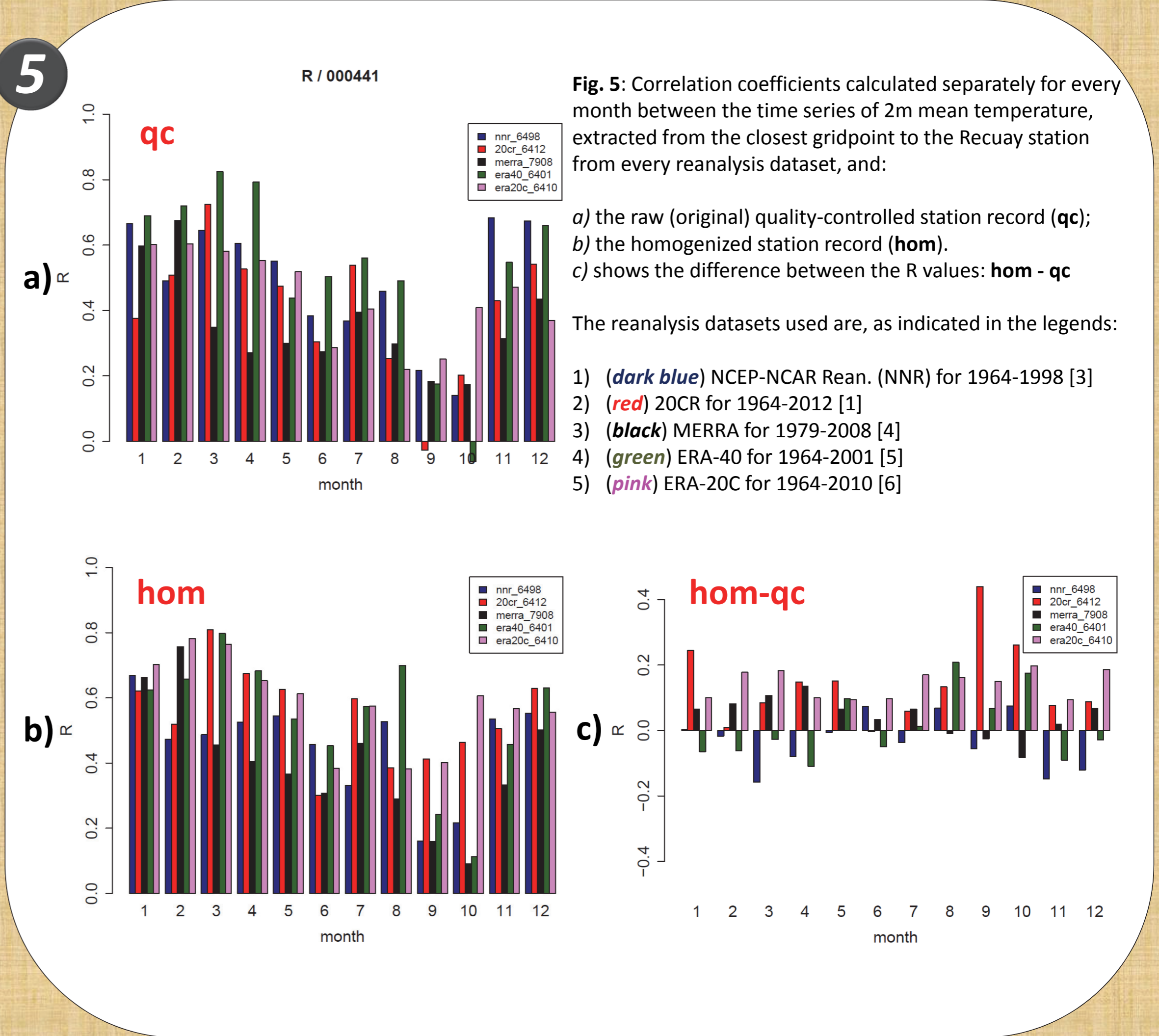
2.1/ is there a similar skill of 20CR for every month?

We calculate the correlation coefficient between the **qc** and **hom** time series and 20CR for every month separately (Fig. 4). An annual cycle of R is evident for Recuay.



2.2/ what about other reanalysis datasets?

We also assess the correlation coefficients obtained from further reanalyses (Fig. 5). We confirm that, in general, their agreement with the Recuay time series is better for November-April (extended austral summer, *rainy season*) than for May-October (extended austral winter, *dry season*). This behaviour was also observed by a previous study [2]. Moreover, for most reanalyses, higher R values result from the **hom** (Fig. 5b) than from the **qc** (Fig. 5a) time series (see Fig. 5c). This result is particularly interesting in the case of 20CR and ERA-20C [6], for which no air temperature observations have been assimilated and are thus *independent* datasets. Lower values are found for the NCEP-NCAR Reanalysis and for ERA-40, which are based on [not necessarily homogeneous] temperature observations.



2.3/ conclusions and outlook

We have shown that there is potential for qualitatively and quantitatively estimating the added value of the homogenization of temperature time series from the Central Andes, based on the coherence of the spatial correlation pattern and statistical metrics (R values), respectively.

Further steps will focus on more detailed climatological explanations for these findings (e.g. the annual cycle of R).

references

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