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To what extent are the instrumental temperature time series represented by isotope records of Alpine ice cores ?

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The isotope (dO18 or dD) variability in ice cores from non-tempered Alpine glaciers might provide long term temperature proxy records at mid-latitudes supplementing respective Polar records. Concerning the last millennium, this exclusively applies to the low accumulation Colle Gnifetti (4450 m asl, Swiss-Italian Alps), though depositional noise challenges reliable temperature reconstruction there. For two ice cores from this drill site a substantial covariation in trends between atmospheric temperature and water isotopes has already been found for the last 250 years- including important exceptions, however. Thus, the decadal isotope variations remain still to be proved as a faithful temperature signal. For Colle Gnifetti, this task is adressed on the basis of the extensive instrumental temperature records provided by the HISTALP network. Here we restrict ourselves as a first step on the last century, where shortcommings in both archives are not yet obstructive- such as ice core dating uncertainties and ambiguities associated with the early instrumental period. Aimed at assessing the temperature related signal embedded in the isotope variability we include isotope time series from four down-to-bedrock ice cores subject to different glaciological regimes. Dedicated time series analysis yields a common signal in the decadal components. For a sound comparsion, a special Colle Gnifetti relevant temperature time series is constructed from the high elevation stations of the HISTALP network. This attempt includes weighting for precipitation and net accumulation, resulting in an ice core relevant temperature record mostly associated with growing seasons. The intercomparison of trends yields a common decadal variability between temperature and ice core isotope data. Thereby the potential of the Colle Gnifetti ice cores in Alpine paleoclimate research is assessed, which may include the early instrumental correction debate.