The average difference in seasonal rainfall between the northern (stations 1–47) and southern sub-areas (stations 48–70), over this 10-year record, was (221±36) mm/y, but during the extreme wet year 1933/34 this difference increased roughly by the factor of two. Concerning both subsequent extreme Namibian rainfall years, the sea surface temperature anomaly (SSTA) of the South-East Atlantic shows slight negative values for the dry season 1932/33. Fig 4 (left panel). During the wet year 1933/34, however, there is a significant dipole between enhanced negative SSTAs in the south-west and positive anomalies in the north-east of the study area, Fig 4 (right panel).

Fig.4: Composite picture of the climatic surface air temperature over the South-East Atlantic Ocean (SST) for the years 1933–1942 (left panel) and 1943–1952 (right panel). The negative SSTA anomaly is shown by grey shaded areas (3°C below the climatic mean). The climatic mean is shown by the bold line. The grid line represents the climatic axis of the Intertropical Convergence Zone (ITCZ) over Africa during the austral summer (January) modified from NICHOLSON (2000); bold ... while the left box schematically shows meridionally distributed convection cells of the atmospheric circulation (arrows).

Discussion and Conclusions:
While the ocean and the atmosphere exhibit vertical convection in reaction to regional unstable stratification, the heating at the air-sea interface tends to make the air more instable and this releases upward fluxes of heat and moisture. Concerning year-to-year changes in the Namibian rainfall, which reach peak values in the austral fall (1983), and NICHOLSON and ENTEKHABI (1986), reported some evidence that the Namibian rainfall should be modulated frequently by positive SSTA's in the sub- equator zone, whereas local winds only control about 9%. Furthermore, the eastward propagating equatorial counter current (SECC) involves this 'wind-information'. It establishes/ strengthens the thermal contrast between positive SSTA's in the coastal belt (CB) and negative SSTA's in the south of St. Helena Island (SHH). Consequently, the difference series (CB-SSH) well characterizes wind- and/or sea surface temperature anomalies.

In summary, our reanalysis of the strong Benguela Niño event of 1933/34 suggests that moisture fluxes and associated multi-year changes in the SST of the South-East Atlantic might be a more important factor in Namibian rainfall anomalies than previously thought and might even be of comparable importance to originating in the West Indian Ocean, especially on the decadal scale.

References:

II. Long-term Series
In addition, two long-term precipitation records were available. The first results from the farm ‘Molkenhof’ [21° 07’S, 15°44’E, not considered by GELLERT (1955)] and was kindly provided by the library in Kalkrandlpark Namibia (1906–1969). The other results from the climatic data bank of the German Weather Service for the regular weather station Windhoek (1922–1999). Both long-term series have been standardized (mean=0, standard deviation=1) for comparison with comparable long-term series of other quantities such as the air temperature of Luanda/Angola, see Fig. 1. Consequently, these standardized time series are expressed by multiples of the underlying standard deviation (STD). Because NICHOLSON (1986) reported quasi-cycles between 2 and 3 years for the rainfall variability over South-West Africa and we were interested in much longer quasi-cycles, all standardized series were additionally smoothed by three year running means (R.M.). Because the Benguela Niño event of 1933/34 was exceptionally strong (see TAUNTON-CLARK and SHANNON, 1988), all historical rainfall records result to be potentially very useful for understanding the influence of such SO-like events in the rainfall. However, it seems not to have been a component of previous studies and therefore worth further analysis, especially in context with the world-wide gridded SSTA data compiled for 5° by 5° grids by KAPLAN et al. (1998). Its spatial version was the base for yearly averages (July 1906 – June 2000) and is available at www.ceda.ac.uk/cape-

Download PDF