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Palaeoclimatic implications of summer breeding frog taxa from Langebaanweg at 5.1 Mya at the south-western tip of Africa

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Frogs are highly sensitive to fluctuations in moisture levels and temperature and fossil frog assemblages may thus potentially provide information on rainfall, seasonality, the types of water bodies available, and also the terrestrial environment (vegetation and substrate) as a great number of frog species are independent of water during various periods of their lifecycles. Until recently no direct palaeo-climatic proxies have been available to indicate the seasonality or amount of rainfall on the west coast of southern Africa during the Early Pliocene as the Neogene terrestrial fossil record is sporadic and incomplete due to the lack of preservation of terrestrial organic materials [1,2]. The Langebaanweg frog population has however provided evidence for substantial rainfall at 5.1 Mya at the south-western tip of Africa[3].

The Benguela Upwelling System (BUS) is today one of the main factors responsible for the present-day summer aridity on the west coast of southern Africa and the initiation of BUS (at ~10.5 – 10 Mya [4,5]) is frequently linked in the literature to the entrenchment of aridity, and the establishment of the current winter rainfall pattern on the west coast. However, marine proxies are inconclusive regarding the effects of past fluctuations in the BUS and sea surface temperatures (SSTs) on the rainfall regime. Neither the fossil evidence, nor the fact that plants using the C_3 photosynthetic pathway predominate at this time, provides direct evidence of winter rainfall at Langebaanweg. The recent identification of two species of frog from the genus *Ptychadena* from Langebaanweg provides new and compelling evidence for a summer rainfall regime, or of at least significant summer rainfall, some 5.1 Mya on the west coast of South Africa in the Langebaanweg region.

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