The species richness of an area is a function of its biogeographic context (e.g. proximity to potential immigrant source areas), its diversification history (e.g. speciation and extinction history) and any locally-deterministic, environmental features (e.g. environmental productivity, heterogeneity) that influence species persistence and coexistence (Ricklefs 1987, 2004). Since all three these effects are potentially influenced by environmental heterogeneity (EH), the latter may be a particularly important driver of regional species richness variation (refs), with physically-heterogeneous regions being especially prone to be species-rich (refs). For example, given that the recruitment success of immigrant lineages into a region is often dictated by the pre-adaptations of those lineages (Ackerly, Donoghue, Crisp), a physically-heterogenous environment may promote diversity by admitting a greater diversity of immigrant lineages (ref). In addition, by virtue of its central role in powering adaptive divergence and in promoting population isolation, environmental heterogeneity is central to most models of speciation (Wiens 2004a, b; Sobel et al. 2010; Nosil?). Likewise, enviromental heterogeneity may provide refuges for a greater diversity of lineages and so provide a regional buffer against lineage extinction (refs Byrne?). Finally, environmental heterogeneity has been shown repeatedly to facilitate species coexistence at a variety of scales, and so enhance regional species richness (refs). Differences in environmental heterogeneity may therefore be important in accounting for variation in regional species richness, particularly where the regions under comparison are similar in terms of area and the time-frames within which their biotas have assembled.

The floristically-rich South Western Australian Floristic Region (SWAFR; Hopper and Gioia 2004) and Greater Cape Floristic Region of South Africa (GCFR; Born et al. 2007) represent a case in point. Situated on the southwestern corners of their respective continents, the climates of both these regions have been oceanically-moderated at least since the Cretaceous, and both are dominated by a contemporary mediterranean-type climate whose origin can be traced to the Early-Middle (SWAFR: Rundel et al. 2016; Lamont and He 2017) or Late Miocene (GCFR: Dupont et al. 2011; Hoffmann et al 2015). In addition, both regions have been unglaciated since the Permian and are dominated by ancient, weathered landscapes whose soil-nutritional status is amongst the lowest of any landscape on Earth (Stock and Verboom); hence their designation as “OCBILS” or “old, climatically-buffered infertile landscapes” (Hopper 2009). As a consequence of this long-term climatic and geological stability, the floras of both the SWAFR and GCFR reflect long histories of assembly, extending back to the Palaeocene and possibly even earlier (refs), and both are species-rich with high levels of regional endemism.

Notwithstanding these similarities, the SWAFR and GCFR differ markedly in terms of their overall species-richness, particularly when considered in relation to their aerial extents.

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Despite both being characterized as “old, climatically-buffered landscapes with infertile soils (OCBILs)” (ref)