Unravelling the origin of the atmospheric moisture deficit that leads to droughts

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Drought is one of the most catastrophic natural hazards, and precipitation plays a major role in the development and intensification of drought events. The amount of precipitation resulting from humidity transported from a given moisture source can be key in revealing the origin of the atmospheric moisture deficit underlying drought occurrence. Here this study demonstrates, for the first time, the predominant role of moisture transport deficit in drought genesis. In most land areas, the estimated conditional probability of drought given an equivalent moisture deficit received either from the ocean or from the continents is higher than 10%. This probability is over 15% in the regions where the main atmospheric moisture transport mechanisms are active and over 20% in some hotspot regions, such as central-east North America, south-east South America and east Europe, where lower incoming moisture is almost synonymous with drought occurrence. The results indicated that the contribution deficit of the dominant moisture source to the precipitation of a region could improve the predictability of droughts, with enormous hydrological, socioeconomic and environmental implications.

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