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A processes-based anatomy of the deadly 2015 Karachi heatwave

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The frequency of dangerously hot weather conditions is expected to increase steeply as global mean temperatures continue to rise. In this context, the deadly heat waves that struck South Asia during the boreal summer of 2015 may be viewed as a preview of things to come. However, the extent to which climate change may have contributed to these extreme conditions has yet to be determined. Here we make progress in this regard by providing a detailed, process-based anatomy of the physical drivers behind the Karachi heatwave of June 2015. We find that the conditions were characterised by a large increase in the heat index, associated with a sharp rise in the dry-bulb temperature and a decline in specific humidity. A Lagrangian assessment suggests this resulted from anomalous large-scale subsidence and the intrusion of potentially-warmer air from higher in the troposphere. While we detect no direct influence of long-term temperature increases, we note that the anomalous circulation, forced by strong convection over the Arabian Sea, may be consistent with changes in thermodynamic forcing expected under a warming climate at low latitudes.