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Quiescent prominence dynamics: an update on Hinode/SOT discoveries

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Abstract. We present new detailed measurements of the turbulent upflow plumes and large-scale "bubble" flows discovered in visible-light quiescent prominences by Hinode/SOT. Local correlation tracking is combined with manual tracking to measure flow characteristics, morphology, lifetimes, and contrast. A unified picture emerges in which the small-scale 1–6 Mm plumes are formed from a Rayleigh-Taylor (RT) instability on the boundary between dense prominence plasma and buoyant magnetic flux emerging from below. The buoyant flux systems either break down to form small-scale plumes or in some cases continue to grow to become the large-scale "bubbles" that are occasionally seen to disrupt large sections of prominences. We compare the observations to the results of a compressible 2.5D MHD simulation showing that double-diffusive convection may generate the plumes from proto-plumes formed at the primary wavelength (< 1 Mm) of the RT unstable density discontinuity.