Upper thermosphere coupling with the lower atmosphere: the known and unknown

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Recently rapidly growing observations have revealed clear evidences for a close coupling between the upper thermosphere and the lower atmosphere. Some of these evidences are seen in the spatial structures (e.g. the terminator wave, the wave-4 structure), while others are more prominent in the temporal variations (e.g.16-day wave, and the Stratospheric Sudden Warming effect). In this talk, I try to review several aspects of the coupling by showing representative phenomena and their related known and unknown.