ATMOSPHERIC ENERGY HARVESTING: USE OF DOPPLER WIND LIDARS ON UAVS TO EXTEND MISSION ENDURANCE AND ENABLE QUIET OPERATIONS

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Abstract

The investigators are developing a system tool that utilizes both pre-flight information and continuous real-time knowledge and description of the state of the atmosphere and atmospheric energetics by an Airborne Doppler Wind Lidar (ADWL) to provide the autonomous guidance for detailed and adaptive flight path planning by UAS and small manned aircraft. This flight planning and control has the potential to reduce mission dependence upon preflight assumptions, extend flight duration and endurance, enable long periods of quiet operations and allow for the optimum self-routing of the aircraft. The ADWL wind data is used in real-time to detect atmospheric energy features such as thermals, waves, wind shear and others. These detected features are then used with an onboard, weather model driven flight control model to adaptively plan a flight path that optimizes energy harvesting with frequent updates on local changes in the opportunities and atmospheric flow characteristics. We have named this package AEORA for the Atmospheric Energy Opportunity Ranking Algorithm (AEORA).

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