

ABSTRACT

Between 2008 and 2010, the number of unmanned aircraft systems (UAS) in the military increased by 30% in support of operations throughout the Middle East (Iraq, Afghanistan, Iran, etc.). The Pentagon has developed numerous initiatives to enhance the overall performance of UASs, demonstrating that reliance on and deployment of these systems is expected to continue. Via real-time aerial imagery, UASs provide commanders with continuous intelligence-gathering in hostile territories, without placing personnel in imminent danger; however the intelligence collected is valuable only if it is accessible. The data communications capabilities of UASs are severely restricted due to the limitations of bandwidth in the battlefield. Transmission of imagery, in raw form, consumes large amounts of bandwidth. Increasing transmission bandwidth is not a feasible solution in battlefield conditions. Reducing the size of transmissions, imagery in this case, is the only realistic approach. This thesis demonstrates the use of wavelet compression on UAS imagery to better support military combat operations, thereby reducing the “fog of war” and saving lives. Specifically this thesis studies ERDAS®’ Enhanced Compression Wavelet (ECW) technology, which allows compression and decompression of imagery without placing a large burden on processors and memory (necessarily limited in UASs) and thereby economizing the use of data communications networks. Tests using simulated battlefield equipment show that image compression of 93%, and a concomitant decrease in bandwidth demands, is possible.