Abstract  For GMTI radar processing, space-time adaptive processing (STAP) is a standard technique to mitigate clutter while preserving moving targets. STAP relies on an accurately estimated covariance matrix, which is traditionally computed from localized training around the range gate under test. This presentation suggests a new approach to covariance training. Power variable training combines phase-selective covariance training, which restricts range gate training to the most powerful range gates that lie on the clutter ridge, and a new technique that scales the covariance matrix power to prevent over-nulling. The new algorithm exhibits improved minimum detectable velocity (MDV) and fewer false alarms from clutter discretes as well as increased performance with extended-range targets. The proposed technique is demonstrated and compared to localized training on Tuxedo data.