

# MULTIRESOLUTION IMAGE FUSION: PHASE CONGRUENCY FOR SPATIAL CONSISTENCY ASSESSMENT

A. Makarau<sup>\*a</sup> G. Palubinskas<sup>a</sup> P. Reinartz<sup>a</sup>

<sup>a</sup> Remote Sensing Technology Institute (IMF), German Aerospace Center (DLR),  
Photogrammetry and Image Analysis (MF-PB), Muenchnerstr. 20, D-82234 , Weßling, Germany

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## ABSTRACT:

Multiresolution and multispectral image fusion (pan-sharpening) requires proper assessment of spectral consistency but also spatial consistency. Many fusion methods resulting in perfect spectral consistency may completely leak spatial consistency and vice versa. Therefore a proper assessment of both spectral and spatial consistency is required. Not many works on multiresolution image fusion make assessment of spatial consistency. A few approaches were proposed for spatial consistency assessment using edge maps comparison. Usually edge maps are calculated by gradient-like methods (Sobel or Laplace operators). Since image fusion may change intensity and contrast of the objects in the resulting image, gradient methods may give disagreeing edge maps of the fused and reference (panchromatic) image. Unfortunately, this may lead to wrong conclusions on spatial consistency. In this paper we propose to use an additional measure for spatial consistency assessment. This measure uses phase congruency for feature extraction. Phase congruency is an intensity and contrast invariant measure of feature significance, which is used for signal matching, feature and edge detection. Numerical assessment of fusion results on IKONOS imagery illustrate that phase congruency is more stable to an intensity/contrast change and allows more precise and adequate assessment of spatial consistency, comparing to single-scale edge detectors.

**TOPIC:** Data fusion and data assimilation

**ALTERNATIVE TOPIC:** Image processing and pattern recognition