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**The 2005 and 2010 dome collapse driven block and ash flows on Shiveluch volcano, Kamchatka: Morphological analysis using satellite- and field-based data**

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A new multi-scale investigation of recent block and ash flow deposits on Shiveluch volcano, Kamchatka, using satellite- and field-based data has produced a detailed description of the surface deposits. In February, 2005 and October, 2010 Shiveluch produced large dome-collapse block and ash flows that travelled more than 19 km down the southern flanks. These deposits have now been interpreted using high-resolution (~0.5 m) WorldView-02 and QuickBird-02 panchromatic satellite data to describe surficial morphologies, block distributions, forest devastation and the subsequent tree deposition. These data reveal complex deposits composed of overlapping flows and lobes with diverse morphologies including channel and levee structures, varying lobate terminations, compaction features, ridges, small hummock-like features, arcuate scarps, as well as post-depositional erosion and reworking, which were later investigated in the field. The deposits are composed of poorly sorted, porphyritic, dome material which is largely oxidized with rare evidence of hydrothermal alteration, as well as lithics eroded from older deposits, all within an ash-lapilli matrix. Large dome blocks up to 12 m in diameter are deposited to the distal edges of the deposit and are dominantly sub-rounded, and composed of banded, porphyritic, poorly vesicular, variably oxidized dome material with mafic xenolith inclusions. Many of these display fracturing and impact scours. This study links satellite-based interpretations of large block and ash flow deposits to field observations, allowing the remote identification of morphological features. This multi-scale investigation of these morphologies can be applied elsewhere for the rapid and safe identification of fresh deposits in dangerous or remote locations.