Characteristics of the surface ruptures associated with the 2016 Kumamoto earthquake sequence, Kyushu, southwestern Japan

*Yoshiki Shirahama[1], Masayuki Yoshimi[1], Yasuo Awata[1], Tadashi Maruyama[1], Takashi AZUMA[1], Yukari Miyashita[1], Hiroshi Mori[1], Kazutoshi Imanishi[1], Naoto Takeda[1], Tadafumi Ochi[1], Makoto Otsubo[1], Daisuke Asahina[1], Ayumu Miyakawa[1]

1.Geological Survey of Japan, AIST

The Kumamoto earthquake sequence that culminated in the Mj 7.3 event on April 16, 2016, produced the *ca*. 30 km long complex surface ruptures having a predominantly dextral with subordinately normal or reverse slip component along the eastern section of the Futagawa fault zone, the northern section of the Hinagu fault zone and previously unmapped faults including those across the Kiyama plain and across the western caldera rim of the Aso volcano, central Kyushu, Japan. Geological Survey of Japan, AIST, carried out urgent field investigation to explore and measure the surficial deformation associated with the Kumamoto earthquake during two weeks since the day of the mainshock. Our intensive field mapping revealed nature of the surface rupture in detail, including location, geometry, temporal growth and slip distribution of the complex ruptures. The remarkable features of the surface faulting were summarized as follows; i) the rupture zone is generally composed of a series of left-stepping *en echelon* array of discontinuous fault trace with various size; ii) the maximum dextral slip of *ca*. 2.2 m was measured at central part of the rupture zone, whose location and amount is consistent with InSAR analysis; iii) large slip (>1 m) occurred on the previously unrecognized fault traces that extend across the alluvial lowland; iv) slip is accommodated by complex rupture style, such as zigzag-shaped ruptures with ESE-trending dextral slip and NW-trending sinistral slip, slip partitioning that resolves oblique slip into dextral component and vertical component on sub-parallel traces, and widely developed grabens; v) accounts by eyewitnesses and repeated measurements show that part of the surface slip along the Hinagu fault has grown not only between the 14 April earthquake (Mj6.5) and mainshock (16 April) but also after the mainshock.

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