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Field data and numerical simulations of the July 19th, 2004 debris flow event (Cortina d'Ampezzo, Northern Italy)

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On July, 19th 2004, on the western slope of the Monte Pomagagnon, located north of Cortina d'Ampezzo (Dolomites, Eastern Apls, Italy), a debris flow event occurred, obstructing the Alemagna road and partially the Boite riverbed below. The upper part of the slope is caracterised by a rock cliff, 400 m high, formed by Upper Triassic to Lower Giurassic dolomites and limestones. A thick talus covers the slope from the base of the rock clif to the bottom of the valley. The talus, 1-2 hundreds meters thick, consists of poorly sorted debris including heterogeneous scree, residual moraines and old debris flow deposits. The slope angle is about 23° as a mean. The slope is caracterised by the presence of a series of debris flow channels, whose source area is located at the base of the rock cliff. The climatic conditions of the area are tipical of an Alpine environment, caracterised by annual precipitations between 1100 and 1150 mm/y with maximum in spring and in autumn and maximum intensities during the summer period. Triggering rainfall have been estimated based on the data recorded at three metereological stations existing in the Municipality of Cortina d'Ampezzo and at a pluviometer located about 5 Km south, in the source area of a debris flow with similar morphological and geological conditions and characteristics. Field investigations were carried out the day after the event: three different flows were observed in the deposition area with thicknesses of 2.4 m, 1.6 m and 2.3 m respectively. Ten samples have been collected along the flow channel and in the deposition area: the grain size distributions indicate coarse debris (5%), gravel (68%), sand (13%) and fines (14%). Image analysis of debris flow particles provided roundness values of about 0.7 for material coarser than 0.2 mm with no variations with grain size. Drained shear box tests have been carried out providing values ranging from 39.3° to 36.9°, that are typical

of this kind of material. A two-dimensional flow routing model, Flow-2D, has been used, based on a detailed DEM of the site. The simulations were carried out varying viscosity and shear strength values and the duration and intesities of the idrogramm. Thickness values obtained from the simulations are always lower than those measured in the field. This results have been compared with those obtained from the analyses performed with the software DAN.