



Journal of Sedimentary Research

An International Journal of SEPM

Colin P. North and Kitty L. Milliken, Editors

A.J. (Tom) van Loon, Associate Editor for Book Reviews

DOI: 10.2110/jsr.2007.BR016

Review accepted 29 September 2007

Debris Flow – Mechanics, Prediction and Countermeasures, by Tamotsu Takahashi, 2007. Taylor & Francis/Balkema, P.O. Box 447, 2300 AK Leiden, The Netherlands. Hardbound, xvi + 448 pages. Price GBP 68.00. ISBN 978-0-415-43552-9.

The book entitled “Debris Flows” by T. Takahashi and published in 1991 by A.A. Balkema Publishers in the International Association of Hydraulic Engineering and Research (IAHR) monograph series, was the forerunner of the present volume. At the time, it aroused the enthusiasm of the scientific community because it constituted the first systematic approach to the subject, and it still continues to be a source of reference. Since the appearance of the 1991 book, many hundreds of additional studies on debris flows have appeared. Some of these focused on theoretical approximations to the facts, whereas many other works have been devoted to case studies.

The present book offers a new approach to the mechanics, prediction and countermeasures of debris flows from both theoretical and practical points of view. As is well known, a debris flow is a torrential flow consisting of a mixture of water, rock debris and mud, moving rapidly. The large frontal part made of boulders that jostle and roar downstream pushes ahead in sudden surges. The behaviour of these flows varies widely from a flow that cannot erode the basement to flows with large erosive power. This book seeks to gain insight into these phenomena. The present volume is an English version of the Japanese edition published in 2004.

The volume is divided into seven chapters. Chapter 1 introduces the reader to the definition of debris flows, their classification and characteristics, and details the significance of the mechanical classification of debris flows. Chapter 2 deals with the models for the mechanics of flow lighting to single-phase continuum models, two-phase continuum models, subaerial rapid granular flows, the role of interstitial fluid in inertial debris flows, mechanisms of immature and turbulent-muddy debris flows, a generalized theory for inertial debris flows and a Newtonian fluid model for viscous debris flow. Chapter 3 considers the initiation and development of debris flows. This chapter provides insight into gully bed erosion as a trigger mechanism for the initiation of debris flow, and into the landslide-induced debris flows and the debris flood flows induced by collapse of natural dams. Chapter 4 focuses on the characteristics of a fully developed flow. Here, the author considers the translation of debris-flow surges and the shape of the snout, the boulder accumulation at the forefront of stony debris flows, the ability to transport large boulders, the causes of intermittency, debris flow around bends, and the routing of debris flows in the transferring reach. Chapter 5 describes processes and geomorphology of deposition. Emphasis is placed on 1-D stoppage/depositional processes of stony debris flows, 1-D depositional processes of turbulent muddy debris flows, the formation of a debris-flow fan, the particle-size distribution in the fan formed by stony debris flows and on the erosion and deformation of a debris-flow fan. Chapter 6 is concerned with the debris-flow disasters and their reproduction by computer simulations. This chapter includes diverse examples, such as the rain-storm disasters at Okuetsu, the Horadani debris-flow disaster, the collapse of the tailings dam at Stava, the disasters caused by the eruption of Nevado del Ruiz volcano, the sediment disasters in Venezuela and the debris-flow disasters at Atsumari, Hougawachi of Minamata City. Chapter 7 provides possible countermeasures for debris-flow disasters. The chapter focuses on the methods of preventing debris-flow generation, debris-flow control by closed-type check dams, debris-flow control by

open-type check (sabo) dams, making debris flows harmless by channel works and walls, designing debris flows for countermeasure planning, debris-flow-prone ravines and hazardous areas, and on the prediction of debris-flow occurrence by rainfall.

The references include a total of 213 citations of which 49 are by Takahashi alone or with other authors. Many citations of papers and reports written in Japanese are also included because of their scientific interest. The end of the book contains a section with the notations utilized in the text. Finally, the index consists of 8 pages and is organized by means of keywords.

The book is very well produced in an elegant style and provides a welcome compilation of recently published data. Graphics and pictures in black-and-white illustrate the text. Both the publisher (Taylor and Francis) and the author are to be congratulated on this very fine volume. I strongly recommend it to advanced students, professional geologists and to those dealing with practical aspects of debris flows, such as civil engineers and researchers engaged in land management.

Ferran Colombo
Dept. Estratigrafia, Paleontología y Geociencias Marinas
Facultad de Geología
Universidad de Barcelona
Zona Universitària de Petralbes
08028 Barcelona
Spain
e-mail: colombo@ub.edu



SEPM - The Society for Sedimentary Geology