

1. Record Nr.	UNINA9910865270103321
Autore	Cas Ray
Titolo	Volcanology : Processes, Deposits, Geology and Resources
Pubbl/distr/stampa	Cham : , : Springer International Publishing AG, , 2024 ©2024
ISBN	9783319666136 9783319666129
Edizione	[2nd ed.]
Descrizione fisica	1 online resource (1854 pages)
Collana	Springer Textbooks in Earth Sciences, Geography and Environment Series
Altri autori (Persone)	GiordanoGuido WrightJohn V
Disciplina	551.21
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di contenuto	Intro -- Preface -- Introduction: Aims, Scope, Approach, and Structure of the Book -- Background -- Aims of the Book -- Structure, Scope, and Approach of the Book -- Laying the Foundations -- 1 Introductory Concepts -- Abstract -- 1.1 Introduction -- 1.2 The Importance of Volcanism During Earth History and Today -- 1.3 Volcanoes and Their Diversity -- 1.4 Volcanic Provinces: Their Tectonic and Paleoenvironmental Context Through Geological Time -- 1.5 Effect of Environment on Eruption Styles, Processes, and Volcano Type -- 1.5.1 The Inaccessibility of Ocean Floor Volcanism, and the Technological Developments That Now Allow It -- 1.5.2 Benefits and Limitations of Studying Uplifted, Ancient Subaqueous Volcanic Successions -- 1.6 Process Spectrum in Volcanic Settings -- 1.7 Introduction to Terminology -- 1.8 The Facies Concept -- 1.8.1 Defining Facies and Understanding Facies Variations -- 1.8.2 Describing and Documenting Facies -- 1.8.2.1 Geometry -- 1.8.2.2 Lithology -- 1.8.2.3 Depositional Structures -- 1.8.2.4 Depositional Structures and Paleoflow/Paleotransport Directions and Patterns -- 1.8.2.5 Fossils -- 1.9 Facies Analysis, Interpretation, and the Importance of Associations of Facies -- 1.10 The Importance of Geological Mapping and Establishing Stratigraphy -- References -- 2 Properties of Magmas -- Abstract -- 2.1 Introduction -- 2.2 Magmas-An Introduction to Their

Chemical Diversity -- 2.2.1 Classification of Magmas and Igneous Rocks -- 2.2.2 Magmatic Associations -- 2.3 Magma Physical Properties -- 2.3.1 Heat Capacity and Temperature -- 2.3.2 Density -- 2.3.3 Viscosity and Yield Strength -- 2.3.4 Strength -- 2.4 Factors Controlling Viscosity in Magmas -- 2.4.1 Chemical Composition -- 2.4.2 Volatile Content -- 2.4.3 Temperature and Glass Transition -- 2.4.4 Pressure -- 2.4.5 Bubble Content -- 2.4.6 Crystal Content -- 2.5 Fluid Flow State.

2.6 Introduction to Lava Flows and Their Rheological Behaviour -- 2.6.1 Prerequisites for Lava Forming Eruptions -- 2.6.2 Aspect Ratio of Lavas -- 2.6.3 Factors Affecting the Form of Lavas -- 2.6.3.1 Effusion Rate -- 2.6.3.2 Physical Properties -- 2.6.3.3 Slope of Terrain -- References --

3 Influence of Environment on Magma Properties, Eruption Processes, and Deposits -- Abstract -- 3.1 Introduction -- 3.2 Lithospheric Conditions, Properties, and Effects on Magma Behaviour -- 3.2.1 Density of Earth's Crust, Mantle, Magmas, and Magma Buoyancy -- 3.2.2 Confining Lithostatic Pressure, Pressure Gradients, and Effects on Magma Behaviour -- 3.2.2.1 Magma Density Decrease with Lithostatic Pressure Decrease -- 3.2.2.2 Magma Viscosity Decrease with Lithostatic Pressure Increase -- 3.2.2.3 Lithostatic Pressure as a Control on the Depth of Volatile Exsolution in the Crust, and Magma Viscosity -- 3.2.2.4 Lithostatic Pressure as a Control on the State of Exsolved Volatiles and the Depth of Explosive Potential: The Critical Point of Volatiles -- 3.2.2.5 Lithostatic Pressure as a Mechanism for Driving Magma Upwards -- 3.2.3 Mechanical Strength of Country Rock -- 3.2.4 Deformability/Compressibility of Rock-Why Volcanic Vents Are Excavated Upwards and Explosive Energy Goes Up -- 3.2.5 Temperature Gradient in the Earth's Crust and Mantle -- 3.2.6 Fluids in the Crust -- 3.3 Atmospheric Effects -- 3.3.1 Density and Density Gradient of Air, and Effects on Explosive Eruption Columns -- 3.3.2 Pressure and Pressure Gradient in the Atmosphere -- 3.3.3 Wind and Effects on Dispersal of Gas and Volcanic Fallout Deposits -- 3.3.4 Temperature, Thermal Conductivity, and Heat Capacity of Air: Effects on Explosive Eruption Columns -- 3.3.5 Deformability/Compressibility of Air-Why Subaerial Explosions Are so Intense -- 3.4 Vegetation.

3.5 Subaqueous Environments: Effects on Volcanic Eruption Styles and Deposit Characteristics -- 3.5.1 Thermal Properties of Water and Steam -- 3.5.2 Quench Fragmentation and the Role of Steam and (Super) Critical Fluid Films -- 3.5.2.1 Quench Fragmentation Mechanisms -- 3.5.2.2 The State of the Fluid Film (Steam, Critical Water, Supercritical Water) and Water Depth Constraints for Quench Fragmentation to Occur -- 3.5.2.3 Hyaloclastite Breccia: The Product of Quench Fragmentation -- 3.5.3 Hydrostatic Pressure and Effects on Volatile Exsolution and Magmatic Explosive Eruption Processes -- 3.5.3.1 Extra Pressure on Columns of Magma Erupting in Deep Water -- 3.5.3.2 Hydrostatic Pressure Effect on Timing, Degree, and Depth of Volatile Exsolution in Deep-Water Settings -- 3.5.3.3 Hydrostatic Pressure Effect on Retention of Volatiles and Magma Viscosity -- 3.5.3.4 Hydrostatic Pressure and Water Depth Constraints for Subaqueous Magmatic Explosive Eruptions: The State of Exsolved Magmatic Volatiles -- 3.5.4 Hydrostatic Pressure and Water Depth Constraints for Subaqueous Phreatic and Phreatomagmatic Explosive Eruptions: The State of Superheated Ambient Water -- 3.5.4.1 Molten Fuel-Coolant Interaction (MFCI) Explosive Eruptions -- 3.5.4.2 Induced Fuel-Coolant Interaction (IFCI) Explosive Eruptions -- 3.5.5 Implosions in Deep Water -- 3.5.6 Compressibility of Water/Young's and Bulk Modulus of Water, Air, and Rock, and Effect on Explosive Intensity -- 3.5.7 Subaqueous Eruption Columns, Thermal Plumes, and Their Density: Effects of Heat Capacity

and Thermal Conductivity of Water -- 3.5.8 Density of Water and Effects on Eruption Columns, Pumice Clast Dispersal, and Depositional Processes -- 3.5.9 Viscosity of Water, and Viscous Drag Effects on Clasts and Plumes -- 3.5.10 The 15 January 2022 Explosive Eruption of Hunga Tonga-Hunga Ha'apai Volcano -- 3.6 Glacial Ice.

3.7 Summary: Why Deep Water and Subglacial Volcanic Processes Are so Different from Subaerial Volcanism -- References -- 4

Fragmentation Processes in Magmas and Volcanic Rocks -- Abstract --

4.1 Introduction-Understanding the Spectrum of Syn-eruptive to Post-eruptive Fragmentation Processes in Volcanic Settings -- 4.2 Autoclastic Fragmentation Processes -- 4.3 Autobrecciation -- 4.3.1 Processes -- 4.3.2 Characteristics of Autobreccia Clasts and Deposits -- 4.4 Quench Fragmentation -- 4.4.1 Film Boiling at the Interface Between Magma and External Water -- 4.4.1.1 Film Boiling at Subcritical Point Pressure and Water Depths -- 4.4.1.2 Film Boiling at the Critical Point Pressure and Water Depths and Beyond -- 4.4.2 Formation of Glass Through Supercooling, and Its Properties -- 4.4.3 Quench Fragmentation or Thermal Shock Fracturing of Glass by Ambient Water or Ice -- 4.4.4 Effects of Crystals and Bubbles in Glass on Quench Fragmentation -- 4.4.5 Quench Fragmentation of Pyroclasts During Phreatomagmatic Explosive Activity and Submarine Fire Fountaining -- 4.4.6 Summary of Applications of Glass Fracture Theory to Formation of Hyaloclastite -- 4.4.7 Hyaloclasts, Hyaloclastite Deposits, and Their Characteristics -- 4.4.8 Limu o Pele-Pyroclastic or Hyaloclastic? -- 4.4.9 Peperite-A Special Type of Hyaloclastite -- 4.5 Explosive Fragmentation -- 4.5.1 Introduction -- 4.5.2 Magmatic Explosive Fragmentation and Magmatic Volatiles -- 4.5.3 Volatile Exsolution and Nucleation of Volatile Bubbles in an Open Vent/Conduit -- 4.5.3.1 Decompressional Exsolution and Vesiculation -- 4.5.3.2 Crystallisation-Induced Exsolution and Vesiculation -- 4.5.3.3 Homogeneous and Heterogeneous Bubble Nucleation -- 4.5.3.4 The State of Exsolved Volatiles (Supercritical, Gas) and Impact on Magmatic Explosive Fragmentation -- 4.5.4 Diffusional and Decompressional Growth of Gas Bubbles.

4.5.5 Magmatic Explosive Fragmentation Processes -- 4.5.5.1 Fragmentation by Rapid Acceleration -- 4.5.5.2 Fragmentation by Rapid Decompression -- 4.5.5.3 Mechanisms of Magma Fragmentation During Explosive Eruptions of Normal Silicate Magmas -- 4.5.5.4 Mechanisms of Magma Fragmentation During Explosive Eruptions of Ultra-Low-Viscosity Magmas (Some Basalts, Kimberlites, Carbonatites) -- 4.5.6 Magmatic Explosions from Lava Domes and Flows -- 4.5.7 Magmatic Explosions from Sealed Subaerial Vents -- 4.5.8 Sub-surface Magma Mingling, Mixing, and Gas Sparging in Triggering Magmatic Explosions -- 4.6 Subaqueous/Subglacial Explosive Eruptions and the Constraints -- 4.6.1 Effects of High Confining Pressure on Magmas Erupting on the Seafloor in Deep Water -- 4.6.2 Effects of High Ambient Hydrostatic/Glaciostatic Pressure on Exsolution and Vesiculation of Magmas in Subaqueous/Subglacial Environments -- 4.6.3 Effects of Hydrostatic Pressure on the State of Exsolved Magmatic Volatiles in Deep Water -- 4.6.4 Effects of Hydrostatic Pressure on Rate of Expansion of Exsolved Volatiles and Explosive Eruptions -- 4.6.5 Effects of Bulk Modulus and Shock Wave Attenuation in Water -- 4.6.6 Implosions -- 4.6.7 The Nature of Observed Deep-Water "Explosive" Eruptions at N.W. Rota 1, (Marianas Arc), and West Mata (Lau Basin) Volcanoes -- 4.6.8 Is Deep-Water Magma ("Fire") Fountaining Necessarily Explosive? -- 4.6.9 Phreatic, Phreatomagmatic and Hydrothermal Explosive Eruptions -- 4.6.9.1 Introduction -- 4.6.9.2 Fuel-Coolant Magma-Water Explosive Interaction (MFCI) -- 4.6.9.3

Induced Fuel-Coolant Interaction (IFCI) -- 4.6.9.4 Fragmentation of Magma During Phreatomagmatic Explosive Activity -- 4.6.10 Situations in Which Phreatic-Phreatomagmatic-Hydrothermal Explosive Eruptions Occur -- 4.6.10.1 Phreatomagmatic Explosions from Subaqueous Vents.
4.6.10.2 Subglacial to Emergent Phreatomagmatic Explosive Eruptions.
