Magmatic processes and plate tectonics

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Abstract

This volume is a collection of papers to celebrate the life and work of Professor Ian Gass. The research themes cover many of the subjects which most interested him, especially processes operating in oceanic crust. The introductory papers examine evolution of magmas from mantle melting to eruption. A central section concerns ophiolite complexes. Several papers focus on different aspects of the Troodos ophiolite complex in Cyprus, where Ian first recognized that sheeted dykes within the ophiolite sequence must have formed in an oceanic spreading environment. In addition, ophiolites ,are reviewed and examined in terms of tectonics, magmatic and mantle textures, metallogenesis and hydrothermal alteration. A further section concentrates on tectonics and the genesis of magmas associated with collision and subduction. This contrasts with continental rifting and the effects of mantle plumes.   This collection of papers covers a broad range of topics from processes in the mantle to those in the oceanic crust. The volume will be of interest to all scientists concerned with igneous processes and global tectonics.

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Metamorphism and Plate Tectonics. Metamorphic rocks result from the forces active during plate tectonic processes. The collision of plates, subduction, and the sliding of plates along transform faults create differential stress, friction, shearing, compressive stress, folding, faulting, and increased heat flow. The tectonic forces deform and break the rock, creating openings, cracks, faults, breccias, and zones of weakness along which magmas can rise. Magma and Plate Tectonics - Magma is fluid molten rock that exists under the Earth's crust. Learn about magma and find out how plate tectonics can cause volcanic activity. This process, called subduction, typically forms a trench, a very deep ditch, usually in the ocean floor. As the rigid lithosphere pushes down into the hot, high-pressure mantle, it heats up. Many scientists believe that the sinking lithosphere layer can't melt at this depth, but that the heat and pressure forces the water (the surface water and water from hydrated minerals) out of the plate and into the mantle layer above. The increased water content lowers the melting point of the mantle rock in this wedge, causing it to melt into magma. This sort of magma production is called subductio