SCALES OF RECENT SUBMARINE VOLCANISM

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ABSTRACT

Submarine volcanic activity is confined to (1) rift zones of mid-ocean ridges (MOR) and transform faults, (2) hot spots (HS) and belts of hot spots («hot lines»), (3) systems of island arcs (IA) and (4) marginal seas (MS). Volcanic activity may occur on the oceanic flanks of deep-sea trenches and marginal swells between trenches and the ocean floor.

Rift zones of MOR exhibit the deep-sea fissure eruptions of low-potassium oceanic tholeiites with some variations of mineralogical and chemical compositions. They produce pillow and ropy flows, volcanic cones generally being not formed. As a result of these eruptions, more than 1×10^{10} t of lava per year pour out on the ocean floor.

HS volcanoes pass through the submarine and insular stages of their development. During the submarine stage outpourings of tholeiites occur which differ from oceanic tholeiites in high content of TiO_2, K_2O, P_2O_5 and some other characteristics.

They form shield volcanoes rising from depths of 4 to 6 km. Rocks of alkalic and nepheline series constituting commonly not more than 1-2 % pour out at the final stages. However, for the HS belts alkalic basalts are more characteristic. HS volcanoes supply to the surface about 1×10^9t of volcanic material per year, more than 90 % appearing as lava.

IA submarine volcanoes are close in composition of erupted products to terrestrial volcanoes. They are composed of rocks of calc-alkalic series from basalts to dacites. Lava outpourings are characteristic of submarine volcanoes whose tops are located deeper than the first hundreds of meters. Explosive eruptions are indicative of shallow-sea volcanoes whose tops appear periodically above sea level. According to approximate estimates, the «output» of IA submarine volcanoes is $1\text{-}1.5 \times 10^9$t/yr. Terrestrial volcanoes, according to calculations made by E. K. Markhinin, supply about 3×10^9t of volcanic material per year.

Fissure outpourings of basalts differing in composition from other types of submarine basalts are characteristic of MS. The total amount of MS volcanites does not exceed $0.5 - 1 \times 10^9$t of lava per year.

The total «output» of all the Recent submarine volcanoes is more than 1.3×10^{10}t of volcanic material per year, that is four times greater the «output» of terrestrial volcanoes of IA and inner parts of continents.

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