Layering and ores in igneous complexes: a result of seismic pulses and a seismographic record of the formation of stratified intrusions

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It is shown that many structural and compositional features of stratified igneous complexes and their related ore deposits cannot be adequately explained based on the hypothesis of multiple magma injections and mixing of magmas which is presently in common use. Injection and mixing are local processes, and they are gradient with respect to time, composition and temperature. Such processes could not provide for synchronous formation of like rock sequences and common layering over the entire area of a magma chamber which may range up to many thousands of square kilometers. For this to occur, there must be some universal force which could have a simultaneous action on the whole magma reservoir. In all likelihood, seismic pulses (earthquakes) which are typical of magma-active zones may represent such a force (and process) which could have a simultaneous action on the whole magmatic mass and cause an overall change in modes of crystallization, accumulation and separation of mineral phases resulting in the formation of thin layering throughout the area of an intrusion. Two types of seismic effect are distinguished: the seismo-gravitational and seismic-wave effects. The seismo-gravitational factor is deemed responsible for the formation of successive layering and ore accumulation, and the seismic-wave effect for multiple alternation of thin layers known as inch-scale layering. Potholes and pegmatoids pipes had their origin in material transport from unconsolidated layers to underlaying incompletely consolidated ones as a result of compression of these latter due to seismo-gravitational the factor. Pegmatoids pipes thereafter behaved as fluid-rich autoclave-type thermogradient reactors. Experiments were made to simulate many of these effects.