Modern text-books commonly explain volcanic activity as a direct consequence of plate tectonics, overlooking the different scales characteristic of both types of processes. Furthermore, the common volcano-tectonic relationship found on these books seems to be biased towards volcanic activity on Earth, disregarding the presence of volcanic activity in other planets, moons and even asteroids of our solar system. Such a bias is unfortunate because it prevents us from reaching a deep understanding of the real tectonic controls of volcanism on Earth. In this work I address two aspects of the volcano-tectonic relationship that benefit from the consideration of examples of volcanic activity beyond our planet. First, it is shown that considering the tectonic and volcanic systems as partly coupled, yet essentially independent systems, is not only justified but is also necessary to highlight the role of some parameters that otherwise remain overlooked. Second, by identifying key components of the volcanic system that need to be quantified in detail it is possible to construct a model of volcanism based on fundamental physical principles that can be used to analyze information in a different form than is allowed by the current tectonic plate-volcano paradigm held for Earth. Consequently, this new approach is important because it provides clues that can be used to explain problematic occurrences of volcanism on Earth in relatively simple terms, as will be illustrated by some specific examples.