

Anniversaries

A Voyage to Lipari published 240 years ago



DÉODAT DE DOLOMIEU AND THE VOLCANOES OF THE AEOLIAN ISLANDS IN THE MEDITERRANEAN SEA (1783)

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In the early morning of July 13, 1781, the French geologist Déodat Gratet de Dolomieu (1750-1801) arrived to Vulcano, one of the Aeolian Islands (or Lipari Islands), located north east from Sicily. He had left Milazzo (in northern Sicily) on the evening of the night before, in a boat with six oarsmen, in order to visit and study these islands, that he regarded as "very little known and rarely visited by travellers". In fact, the Aeolian Islands, which included active volcanoes such as Stromboli and Vulcano, had been previously visited in 1757 by the Swiss naturalist Guillaume-Antoine Deluc (1729-1812), who inserted the results of his observations on Vulcano in the second volume of the *Lettres physique et morales sur l'histoire de la terre et de l'homme* published by his brother Jean-Andrè in 1780. Ten years later, also William Hamilton (1730-1803), English envoy to the court of Naples, had observed Stromboli and the other Aeolian Islands, but only from a distance, while he was sailing from Messina to Naples in 1768: later he had printed some nice plates in his *Observations on mount Vesuvius, mount Etna, and other volcanos* (Hamilton, 1772) and in particular in the wonderfully illustrated *Campi Phlegraei: observations on the volcanos of the Two Sicilies* (Hamilton, 1776).



Figure 1. Portrait of Dolomieu by Nicolas Gossé, 1843 (École des Mines, Paris)



Figure 2. The Aeolian Islands in William Hamilton's *Campi Phlegraei* (1776)

In the summer of 1781 Dolomieu travelled extensively in southern Italy in order to study volcanoes and volcanic phenomena (Vaccari 2005): he climbed Mount Etna and explored most of Sicily, visiting many sites little known to travelers, such as the extinct volcanoes of Val di Noto and "a kind of air volcano" called "Macaluba" in south-central Sicily, now known as a pseudo-volcanic phenomenon. The results of this fieldwork were partially published some years later (Dolomieu 1784, 1788) and in particular in the book *Voyage aux Iles de Lipari* (Dolomieu 1783), which contains the detailed account of Dolomieu's stay in the Aeolian Islands, from 13 to 21 July 1781 when he visited Lipari, Stromboli, Salina, Panarea and Vulcano. Other unpublished manuscripts, letters and notebooks relating to this trip were edited by Alfred Lacroix (1918, 1921), but still need further analysis and investigations.

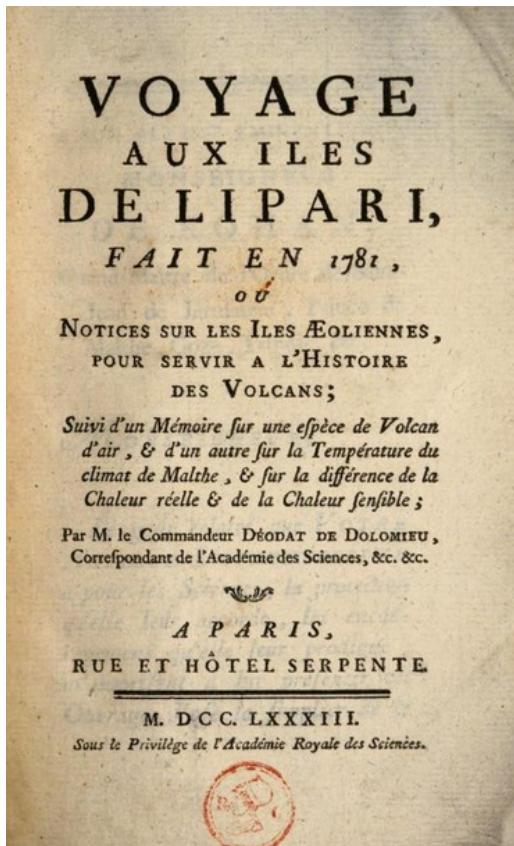


Figure 3. Title page of Dolomieu 1783

Within Dolomieu's important role in the history of the late 18th century geology (Taylor 1981, Gohau 1982, Gaudant 2005), his studies on lithogenetic processes and on several aspects of Alpine geology has been rightly emphasized (Zanzi 2003): however, also his volcanological contribution was significant and also concerned some original reflections on the formation and structure of volcanoes within the the debate on the "classification" of mountains and rocks according to the chronological order of their formation.

In the *Voyage aux Iles de Lipari*, Dolomieu described in detail also the lithology of the Sicilian mountains named "Pelorus" or "montes Neptunei" (Peloritain Mountains near Messina) to show the difference between the lavas of Mt. Etna (considered a mountain resting on a bedrock of shale and granite) and the Aeolian Islands (which, according to Dolomieu, had an entirely granitic base), because "the study of the mountains on the base of which volcanoes rest, can instruct the Naturalist on the theory of subterranean fires, as much as the study of volcanoes themselves; this point of view has been too neglected until now" (Dolomieu 1783, p. 127).

According to Dolomieu, these "volcanic mountains" were essentially primitive mountains, which had been torn apart by the volcanic force, which had mixed the material vomited by the bowels of the Earth (for example porphyry) with the surface rocks: "we see in the primitive mountains that the beds of the rocks which I have just designated to be the most common base of the lava, are composed of mixed micaceous foliated rocks, gneiss, granite, etc." (Dolomieu 1783, p. 130). Therefore volcanic activity was regarded by Dolomieu as one of the causes which had clearly modified the terrestrial orography, but could not be considered a real orogenic phenomenon, creator of new mountains, because the changes caused by the action of fire had not only affected the calcareous mountains called "secondary" but also, and above all, particularly in Sicily and the Aeolian Islands, the "primitive" mountains normally considered to be unalterable by 18th century geologists, such as for example Giovanni Arduino (1714-1795).

Dolomieu's descriptions and classifications of the "volcanic productions" observed in the Aeolian Islands, as well as on Mt. Etna, presented a numerous variety of lavas, which differed according to the period and the conditions of their formation. Moreover, the volcanic phenomenon was not considered a superficial fire, but rather a geological event linked to the deep structure

of the Earth: "Naturalists can look at underground fires as miners, who tear from the bowels of the globe the materials that form it" (Dolomieu 1783, p. 135). So the volcanic products of the Earth, according to Dolomieu, were not rare and not "accidental" materials, as stated by Abraham Gottlob Werner (1749-1817) and by the geologists who later defined themselves 'neptunists'. Dolomieu, like Arduino, clearly overcame the Neptunism / Plutonism dualism by considering equally important, if not essential, for the history of the Earth, the combined geological action of water and fire.

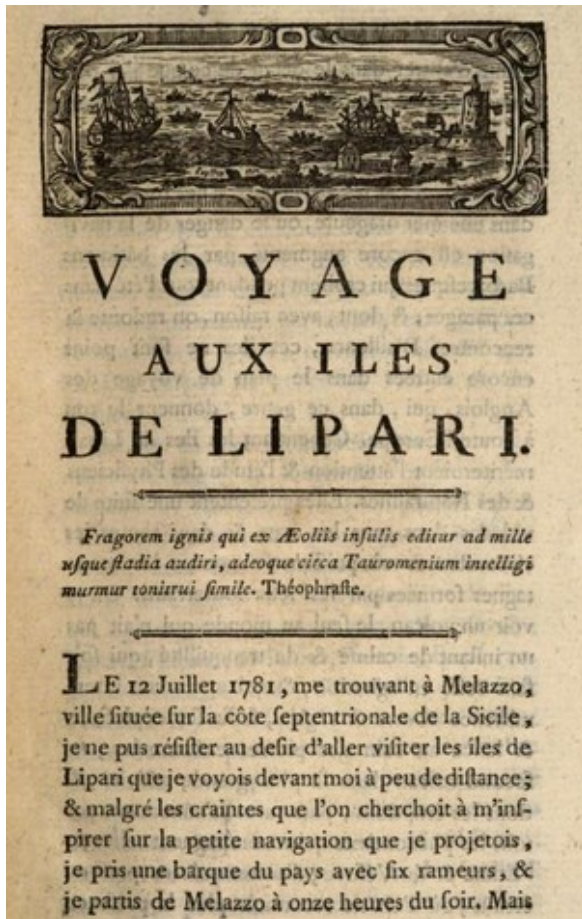


Figure 4. The beginning of the journey (Dolomieu 1783, p. 1)

Spallanzani was also influenced by other geological conceptions of Dolomieu, such as the hypothesis of an underground connection between the volcanoes of the Aeolian Islands, Vesuvius and Mt. Etna, as well as the idea that the volcanic arc of the *Ponziante* islands (including Ischia e Procida) near the coast between Rome and Naples represented the connection between the region of active volcanoes (Vesuvius and Campi Flegrei) and that of extinct volcanoes close to Rome (Dolomieu 1783, p. 139-141 Communication of the Lipari volcanoes with Ethna and Vesuvius; Spallanzani 1792-97, vol. 3, 1793, p. 142-154).

The research method adopted by Dolomieu in the Aeolian Islands was also taken up by the Italian naturalist Lazzaro Spallanzani (1729-1799) in his *Viaggi alle Due Sicilie* (1792-97). In the second and third volumes of this impressive work, which concerned Spallanzani's stay and fieldwork in the Aeolian Islands from mid-September to mid-October 1788 (Vaccari 1998), almost the same sequence of operations outlined in Dolomieu's *Voyage aux Iles de Lipari* is presented: preliminary reading of ancient literature devoted to the object of research, description and analysis of samples observed in the field, lists of rocks and minerals collected. However, there is a substantial difference among the two scientists, because Spallanzani believed in the usefulness of trying to replicate the fusion of lava and other rocks in the laboratory, whereas Dolomieu's point of view on this subject was very critical: "we have no measure to know the degree of the fire that we employ; its intensity and its activity are due to an infinity of circumstances that we cannot calculate" (Dolomieu 1783, p. 127-128).

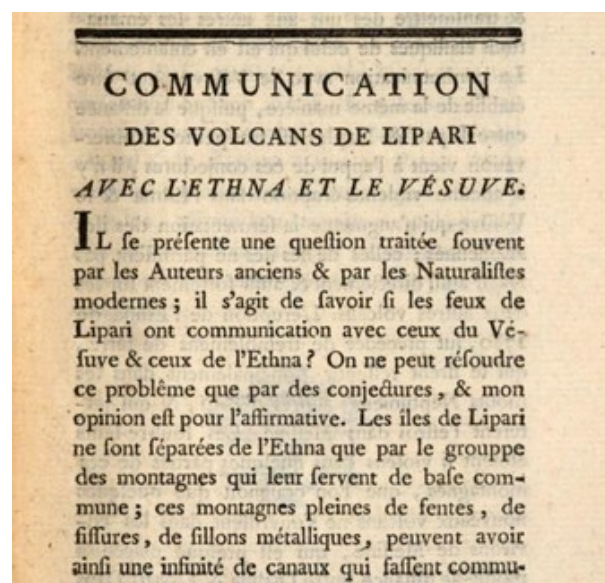


Figure 5. Dolomieu's theory on communication of volcanoes (Dolomieu 1783, p. 139)

Thanks to Dolomieu's *Voyage aux Iles de Lipari*, Lazzaro Spallanzani was able to improve his observations and publish in 1792-93 the most comprehensive and renowned 18th century geological and volcanological study of the Aeolian Islands. This led to the rediscovery and re-evaluation of Dolomieu's scientific contribution to the understanding of the volcanic phenomena in the Mediterranean region.

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