Joseph Anton Koch and the Extractive Landscape

Stephanie O'Rourke

Under the felicitous arc of a full rainbow, a verdant landscape extends far into the distance. *Heroic Landscape with Rainbow* (Fig. 1), by the Tyrolian artist Joseph Anton Koch, includes many of the elements expected in landscape paintings of the late eighteenth and early nineteenth centuries.[1]

Fig. 1. Joseph Anton Koch, *Heroische Landschaft mit Regenbogen*, 1805. Oil on canvas, Kunsthalle Karlsruhe.

It presents a broad spatial expanse populated with grazing animals, lush vegetal growth, and rustic classical architecture. Alternating passages of light and shade draw the viewer's eye across the depths of the scene toward far-off mountains. In the foreground human figures, whether implicitly or explicitly allegorical, interact with their surroundings in a leisurely manner: this is not a landscape worked by intensive labor. *Heroic Landscape* portrays an environment that offers

[1] Koch would go on to paint three additional versions of the composition over nearly two decades. Key discussion of this painting and its place within Koch's oeuvre can be found in: Christian von Holst, *Joseph Anton Koch: Ansichten der Natur* (Stuttgart: Staatsgalerie Stuttgart, 1989), 55–56, 215–22; and Otto Ritter von Lutterotti, *Joseph Anton Koch, 1768–1839. Leben und Werk* (Vienna: Herold, 1985), 36, 52–53, 290–91.

Nb. This essay will be part of a collection that examines nature and landscape in Schubert's Vienna. In it, I'm experimenting with something that is new to my work: incorporating analysis of miners' songs within an art historical argument about landscape. I'm also very interested in hearing your thoughts about how technical diagrams and decorative objects can be brought to bear on 'landscape' as a category and as a genre.

its resources freely to its painted inhabitants, much as it offers its aesthetic pleasures to the painting's viewer. Such features were characteristic of the classical landscape tradition in which Koch was trained in Italy.

The inclusion of dramatic mountains and imposing rock formations, though, was less typical: these elements rooted Koch's artistic sensibility in the distinctly mountainous landscape of Tyrol. Born in the remote Lechtal Valley that runs through the Northern Limestone Alps, Koch would have grown up surrounded by distinctive stone peaks that tower over the valley. Beyond its biographical significance, the mountains glimpsed in Koch's composition registered significant changes taking place. In this essay, I chart the rise of an extractive view of nature that was ascendant in the early nineteenth-century Austrian Empire. As I have argued elsewhere, extraction brought new pressures to bear upon landscape as a pictorial genre in early nineteenth-century Europe.[2] Focusing on mining, I propose that both the landscape format and the view of nature on display in *Heroic Landscape* were coming under enormous pressure with the rise of industrial resource extraction. Rather than explore 'industrialization' in a generic sense, I am specifically interested in how the practices and logic of mining transformed the landscapes to which Franz Schubert and his circle would have had access in early nineteenth-century Vienna.

The landscape tradition

Heroic Landscape with Rainbow conveys a vision of the natural world as a space apart from the social and political realities of early nineteenth-century Europe, a domain of suspended temporality and effortless abundance. The classical elements of Koch's early landscape painting are generally understood to stand in contrast with the growing importance of a topographical model of representing landscapes. Closely associated with cartography and widely taught in technical and military academies, the topographical landscape was defined by its rejection of the generalizing and idealizing features of classical landscape. Often associated with the Italian School, classical landscapes typically featured a lush foreground with somewhat generic natural features, evenly distributed illumination, and distant mountains – elements seen in many of Koch's paintings such as his *Landscape near Ronciglione* (*Landschaft bei Ronciglione*, 1815,

[2] Stephanie O'Rourke, *Picturing Landscape in an Age of Extraction: Europe and its Colonial Networks 1780–1850* (Chicago: University of Chicago Press, 2025).

Hamnburger Kunsthalle).[3] In contrast, topographical landscapes (such as Koch's *Der Untere Grindelwaldgletscher* 1792/94, Kunst Museum Winterthur) portrayed a specific, identifiable location with precision. Details, often captured in pen and wash on paper, were usually recorded by an observer physically located in a given landscape. Allegorical figures were excluded and so too were fictional temples and other classical built structures. Instead, topographical landscapes claimed to represent the natural world as it actually appeared: a specific environment, seen from a specific vantage point, as it looked at a specific time of day.

In visual terms, this topographical appeal to accuracy was expressed through a high level of pictorial detail including elements that might appear unimportant, such as a small rock in the foreground. Additionally, topographical landscapes recorded features of a landscape that did not align with academic ideals of classical beauty: asymmetry, the uneven distribution of light and shadow, malformed vegetation, bad weather, and so on. As topographical landscapes grew in practical importance and artistic status, they were often accompanied by a title that described both a place and the vantage point from which it was seen. For example, a topographical drawing executed in pen and watercolor on paper by Koch bears the title: *Jungfrau und Eiger von Unterseen aus* (The Mönch and Jungfrau seen from Unterseen, c. 1792–4, private collection). Like many of Koch's works on paper, the title indicates a specific view as well as a precise vantage point. Artists such as the English painter Thomas Girtin went even further, identifying the time of day when the landscape was viewed.[4]

Topographical landscapes served important technical functions. They were commissioned by landowners to record the physical extent of their estate. They were also used as an instrument for the production of cartographic knowledge. Map-making drew upon a combination of topographical views and more technical land surveying measurements. In terms of sheer quantity, a significant portion of the topographical landscapes produced in late eighteenth- and early nineteenth-century Europe were likely to have been made by and for militaries. In that context they were created as part of ordonnance surveys, the mapping of colonial spaces, reconnaissance, and record-keeping.[5]

---

[3] On Koch's relationship to the classical landscape tradition and especially to Poussin, see Lutterotti, *Joseph Anton Koch,* 36–63.
[4] For example: Thomas Girtin, *Kirkstall Abbey, from the Canal, Evening*, 1802. Private Collection.
[5] The best overview of this is: Matthew Edney, *Mapping an Empire: The Geographical Construction of British India, 1765–1843* (Chicago: University of Chicago Press, 1999). See also: Matthew Edney, "British Military

In the first decade of the nineteenth century, academic landscape paintings incorporated key elements of topographical illustration: the transcription of fleeting weather conditions, the inclusion of a high degree of detail, the alternation of light and dark, and a taste for asymmetrical views. Such features can be glimpsed in many of Koch's own landscape paintings from the 1820s and 1830s.[6] These topographical elements were integrated with the highly idealizing, Italianate style of the elite classical landscape tradition.

These two approaches to landscape looked quite different at the turn of the nineteenth century, but they held a few important things in common. Both the topographical and classical traditions were premised on the notion that landscape provides the viewer with significant, meaningful access to a natural environment. In the latter, this was conveyed through the portrayal of vast spatial recesses, in which a verdant foreground gradually gives way to distant mountains. In the former, extensive perceptual access to a scene was promised in its very style: whether or not one could see all the way to far-off mountains, the detail-rich and site-specific topographical view provided the viewer with considerable *information* about a place.[7] These two landscape formats shared something else, too. Both were premised on a fundamentally horizontal way of representing space. The horizon line had long been an organizing principle of pictorial space in the Western tradition, and its importance grew with the rise of geometric perspective during the Italian Renaissance. In the context of landscape painting, the horizon line marked both the spatial limits of human perception and the boundary between the sky and the material surface of the earth. Although late eighteenth- and early nineteenth-century maps represented space very differently, they shared with artistic landscapes an understanding of the natural world as something defined by its lateral extension in space, its horizontality.

The mine shaft

This artistic transition – in which the classical landscape tradition came to absorb aspects of the growing practice of topographical draughtsmanship – coincided with a broader reconfiguration of how the natural world was understood and treated. Koch, having tended cattle in his youth,

---

Education, Mapmaking, and Military 'Map-Mindedness' in the Later Enlightenment," *Cartographic Journal* 31, no. 1 (1994): 14–20.

[6] On Koch's 'romanticism', see Brad Prager, *Aesthetic Vision and German Romanticism: Writing Images* (Rochester, NY: Camden House, 2007), 93–122.

[7] For an effective and concise account see Edward S. Casey, *Representing Place: Landscape Painting and Maps* (Minneapolis: University of Minnesota Press, 2002), 9–12.

would have known first-hand that the rural environment was not just an object of aesthetic contemplation. It was a site of labor and economic activity. By the early nineteenth century, in fact, it was being visibly transformed by increasingly regulated and technical systems of centralized management. Tyrol was one of the key mining regions of the Habsburg Empire. South of the Lechtal Valley, the extraction of silver, zinc, copper, and lead played an important role in the empire's economic engine as well as its bureaucratic state apparatus.[8] Mining was not the only form of large-scale resource extraction taking place in the Austrian landscape at the turn of the nineteenth century, but it had the most concentrated impact on the period's artistic activities.

Since the middle ages, closed-pit mines had appreciably grown in their physical extent and their economic importance across central Europe. In the early modern period, the extraction of silver, copper, gold, and salt significantly determined the prosperity and the political power of European sovereign states. Silver production peaked in the first half of the sixteenth century, declining swiftly with the rise of colonial silver mining in Central and South America.[9] Mining more generally, though, continued to spread.

Mining districts were distributed widely across the region. In the early nineteenth century deposits of silver, copper, iron, cobalt, and lead were being extracted across the Austrian Alps; Moravia and Silesia were known for mining coal and slate; Lower Hungary for gold-, silver-, and copper-bearing ore; and Bohemia, Carinthia, and Styria were among other regions that hosted profitable mining enterprises. Coal and iron would prove particularly important for industrialization. The scale of such operations was highly variable. In some cases, underground networks of tunnels and shafts reached deep into the earth, supported by complex systems for transporting water, minerals, and people up from their depths. Increasingly sophisticated machinery used waterpower (rather than animal power) to enable mines to reach hundreds of meters deeper than before over the course of the eighteenth century.[10] (The gradual adoption of

---

[8] Klaus Oeggl et al., "The History of Mining Activities in the Tyrol and Adjacent Areas: Impact on Environment and Human Societies (HiMAT)," *Antiquity* "Project Gallery82," no. 317 (2008), https://antiquity.ac.uk/projgall/oeggl317.

[9] John U. Nef, "Silver Production in Central Europe, 1450–1618," *Journal of Political Economy* 49, no. 4 (1941): 575–91, at 575.

[10] Paul Warde, "Fear of Wood Shortage and the Reality of the Woodland in Europe, c. 1450–1850," *History Workshop Journal* 62, no. 1 (2006): 28–57.

steam-power to support mining occurred later than it did in neighboring Britain.[11]) Entire towns and rural communities were employed extracting, processing, refining, and transporting the mineral riches across the Habsburg Empire.

The task of managing, monitoring, and improving mining operations was increasingly formalized according to camerialist principles that aligned the economic interests of the state with centralized systems of administration.[12] In other words, because it was a significant source of state income, successive Habsburg rulers had asserted control over and intensively centralized mining administration in the imperial capital. Surveys collected and systematized information about mining; they were also used to fill the extensive royal natural history collections through which European sovereigns asserted and performed their superiority. "As early as the reign of Maria Theresa," Jakob Vogel notes, "the officials of the Habsburg mining administration were mandated to immediately set aside exceptional discoveries in the mines for the imperial collections and to have them dispatched to Vienna without delay."[13] Elite mineral collections reflected both the widely acknowledged importance of mining for the economic and political power of the state as well as the special aesthetic value placed upon extracted specimens.[14]

Closed-pit mining transformed its immediate surroundings and also impacted regional land management practices. Embedded metal tracks and roadways extended across the site and reached far beyond it connecting rural mines to transportation arteries. Around the mine, one would find large wood piles and numerous structures housing pumps, smelters, and various machinery for crushing, rinsing, and sorting the ore. Energy infrastructure, typically employing animal- and waterpower, featured prominently on the site. Tailings – the crushed rock left over once the valuable mineral has been removed from the ore – rose in large heaps and were often deposited in nearby waterways, where they could destroy aquatic life and agricultural growth downstream. Because enormous quantities of wood were required for smelting, forests

---

[11] Simone Gingrich, "Foreign Trade and Early Industrialisation in the Habsburg Monarchy and the United Kingdom – Two Extremes in Comparison," *Ecological Economies* 70, no. 7 (2011): 1280–88.
[12] Marten Seppel and Keith Tribe, eds., *Cameralism in Practice: State Administration and Economy in Early Modern Europe* (Woodbridge: Boydell & Brewer, 2017).
[13] Jakob Vogel, "Stony Realms: Mineral Collections as Markers of Social, Cultural and Political Spaces in the 18th and Early 19th Century," *Historical Social Research / Historische Sozialforschung* 40, no. 1 (2015): 301–20, at 306–7.
[14] Johannes Mattes, "Mining, Collecting, Knowing: Habsburg State-Building, Resources, and Geographies in the Context of Archduke Leopold's Mineralogical Catalog," in *Collectio Mineralium: The Catalog of Holy Roman Emperor Leopold II's Mineralogical Collection*, ed. Annarita Franza, Johannes Mattes, and Giovanni Pratesi (Florence: Firenze University Press, 2022), 1–30.

surrounding metal mines were quickly depleted. Eventually, centralized systems ensured that both adjacent and distant woodlands were managed in a way that optimized the consistent supply of wood for furnaces and forges. In doing so, however, they deprived rural laborers of their longstanding access to woodlands for grazing, gathering wood and thatch, food, and a host of other essential uses.[15]

Mining the landscape

Beyond these physical interventions into what were mostly rural environments, mining entailed a profound conceptual shift in how the landscape was understood – and, to a certain extent, how the landscape was visually represented. This engraved illustration of a mining town (Fig. 2) in present-day Hungary was published in a 1726 multi-volume natural history encyclopedia of the lower Danube. The town, now called Banská Štiavnica, was one of the largest in the Kingdom of Hungary and had been a center of gold- and silver-mining since the early modern era.[16] In the eighteenth century a new, sophisticated hydraulic system employing reservoirs and water channels enabled the transfer of water, ore, and workers from greater depths than before. A complex system of reservoirs was installed in Banská Štiavnica by Sámuel Mikovíni in the decades immediately following the creation of this print, which was used to pump water up from the mine shafts and to provide power for local industries.

[15] Sebastian Nemestothy and Michael Grabner, "Austrian Logging: A Historical Account of the Time of Felling and Debarking, and Transportation Practices," *International Journal of Wood Culture* 1 (2021): 180–95. On the development of forest management in a broader sense see Richard Hölz and Jan Oosthoek, eds., *Managing Northern Europe's Forests: Histories from the Age of Improvement to the Age of Ecology* (Oxford: Berghahn Books, 2018).
[16] Peter Siems, "A History of the Schemnitz (Banská Štiavnica) Silver-Gold Mines," *The Mining History Journal* 15 (2008): 65–82.

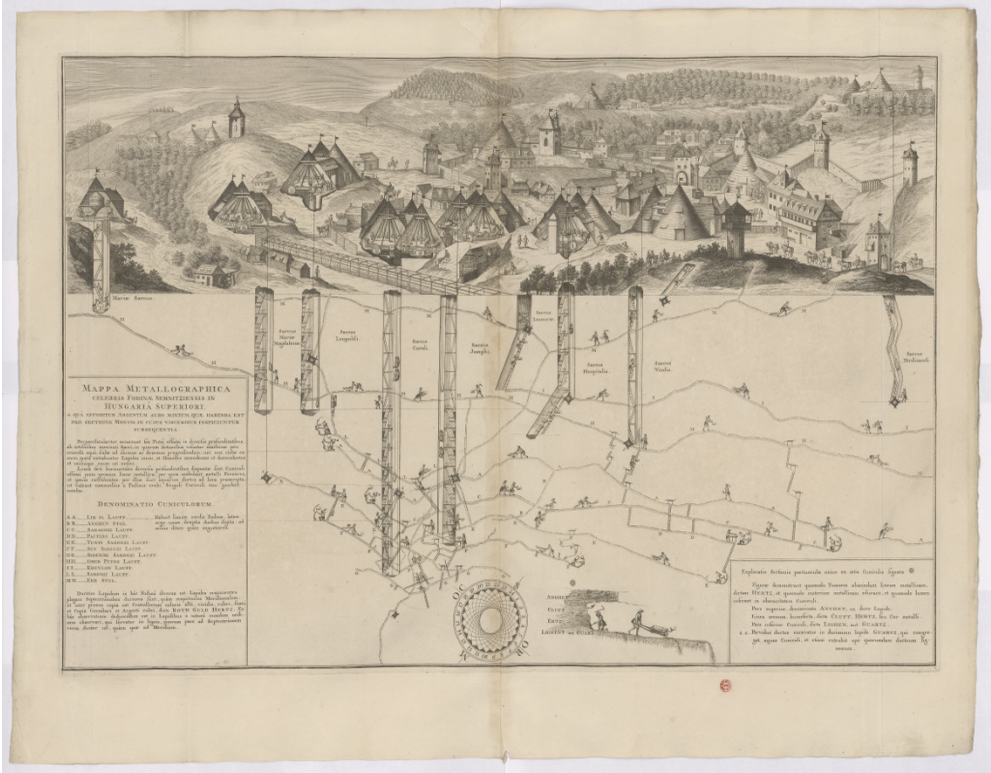
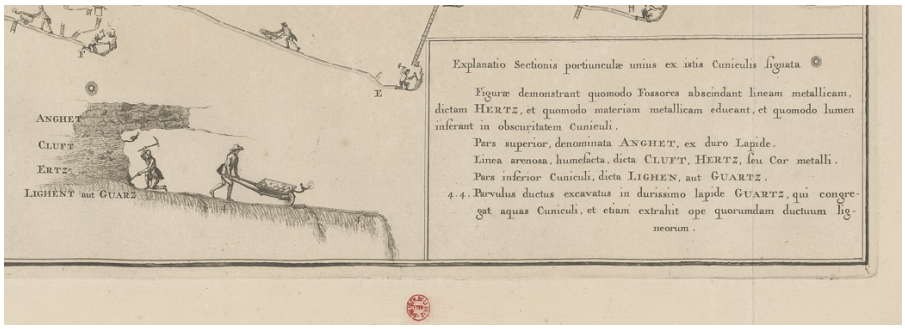


Fig. 2: "Mappa Metallographica, Celebris Fodinae Semnitziensis," in Luigi Ferdinando Marsigli, *Danubius Pannonico-Mysicus*, vol. 3 (The Hange, 1726).

The sinking of shafts hundreds of meters into the depths of the earth over the course of the century brought about an increasingly vertical spatial orientation.[17] In Banská Štiavnica, they extended up to 600 vertical meters during this period. In the context of the Harz Mountains in Germany, Patrick Anthony has argued that miners developed what he calls a "vertical consciousness," a way of relating to their environment in terms of verticality. Using wooden ladders – like those seen in the Marsigli print – miners spent up to three hours each day ascending and descending the shafts.[18] Elizabeth Miller's work on industrial mining in nineteenth-century Britain has likewise identified the emergence of a way of thinking that was oriented around a "downward delving into the earth."[19]

[17] Although Anthony focuses on the Harz Mountains, the dynamic he describes would have extended across German-speaking mining districts in Central Europe. Patrick Anthony, "Mines, Mountains, and the Making of a Vertical Consciousness in Germany ca. 1800," *Centaurus* 62 (2020): 612–30.
[18] Anthony, "Mines, Mountains, and the Making," 612.
[19] Elizabeth Carolyn Miller, *Extraction Ecologies and the Literature of the Long Exhaustion* (Princeton: Princeton University Press, 2021), 19.

In very practical terms, then, at the turn of the nineteenth century ore mining required thinking about and interacting with the earth along a vertical axis. This coincided with the emergence of stratigraphy, a branch of geology dedicated to mapping the layering of rocks in "strata." At the mining academy founded in Banská Štiavnica by Mikovíni in 1735 (shortly after this print was made), students would have been instructed to study and diagram the subterranean world in terms of successive vertical layers of rock.[20] A vignette in the lower right portion of the diagram, placed between the compass and an explanatory note, indicates that stratigraphic thought was already present in the visual culture of mining. Two men are shown in the hypothetical interior of a mine. Along the left-hand margin of the rock wall, different layers of earth are identified: Anghet ("hanging rock"), Cluft ("cleft"), Ertz ("ore"), and Lighent aut Quarz ("lying rock of quartz").[21] The detail gives diagrammatic form to a way of thinking about the subterranean world as a succession of layers organized along a vertical axis.



Verticality shapes the Marsigli print in a broader sense as well. In contrast with the traditional format of Marsigli's mineral map of Hungary included in the volume, this illustration combines a topographical landscape with a large vertical diagram of the subsurface structures of the mine. Less than half of the image is dedicated to a topographical view showing the surface structures and landscape of the town, with several cutaways revealing the activities taking place within structures. A dotted line marks the boundary between the surface world and the hypothetical cross-section of the mine beneath it. The text in the lower left margin explains that we are viewing a "section of the mountain" within which "there are six wells dug at different depths, called sacks [sacci] by the artisans." Within the rectangular mine shafts, we see ladders used by the miners for "ascending and descending" – another reminder that transit was oriented

[20] Martin J. Rudwick, "The Emergence of a Visual Language for Geological Science, 1760–1840," *History of Science* 14, no. 3 (1976): 149–95.
[21] I take the translations from David Oldroyd, "Maps as Pictures or Diagrams: The Early Development of Geological Maps," *Rethinking the Fabric of Geology: Geological Society of America Special Paper* 502 (2013): 41–101, at 44.

vertically within the space of the mine. Pumping and pulley mechanisms are shown bringing ore and water to the surface. Within a network of smaller horizontal and vertical tunnels, dozens of miners can be glimpsed cutting and transporting rock, delivering it to the large vertical shafts through which it will be extracted.

Beneath the surface of a conventional landscape, in other words, lay an intricate and substantial network of physical structures teeming with human activity.[22] For the most part, these two domains had little to do with one another. The dotted line separating the surface and subsurface worlds of the print is crossed by just the margins of four vertical shafts indicating points of ingress and egress. Beyond the narrow confines of these shafts, the only correspondence between above and below is diagrammatic. In appearance, scale, orientation, and pictorial mode, they are entirely different.

The map underscores the complex relationship between mining and landscape in the Habsburg Empire. Firstly, it signals the importance of mining as a source of economic and political power. Although the extraction of silver and gold declined following the expansion of colonial mining in Latin America, at the turn of the nineteenth century a wide range of valuable metals and minerals were being extracted across the territorial expanse of Habsburg rule.[23] Mines were deeper and more complex than ever before, and formal institutional structures had emerged to standardize and centralize mineralogical and geological knowledge. In the early nineteenth century, Vienna was the administrative center through which mining was monitored and regulated.

Secondly, mining required conceptualizing, interacting with, and visually representing the earth in a vertical format. Exemplified in the print's awkward and extremely limited efforts to identify points of interaction between the above-ground space of a topographical landscape and the below-ground space of a mining diagram, the extraction of mineral resources was not representable within the existing conventions for representing the natural world. It required distinct, novel pictorial techniques that were unassimilable with the period's landscape

---

[22] On the broader Enlightenment project of visualizing the subterranean world of mining, see E. P. Hamm, "Knowledge from Underground: Leibniz Mines the Enlightenment," *Earth Sciences History* 16, no. 2 (1997): 77–99.

[23] Renate Pieper, "The Impact of Early Iberian Globalisation on Austrian Mining Ventures," in *The Fruits of the Early Globalization: An Iberian Perspective*, ed. Rafael Dobado-González and Alfredo García-Hiernaux (Cham: Palgrave Macmillan, 2021), 173–88.

tradition.[24] Mining diagrams offered neither the horizontal logic nor the depth-intensive views promised by both topographical and classical modes of representing landscape.

Handsteine

In 1764, when Joseph II visited the mining town of Kremnica, a few dozen kilometers from Banská Štiavnica, he was gifted with a modestly sized sculptural object (Fig. 3) to commemorate the occasion.[25]

Fig. 3: *Handstein mit Bergwerk*, c. 1764. Minerals, silver, gold-plating, Kunsthistorisches Museum Wien.

[24] Johannes Mattes, "Mapping the Invisible: Knowledge, Credibility and Visions of Earth in Early Modern Cave Maps," *The British Journal for the History of Science* 55, no. 1 (2022): 53–80.
[25] Annarita Franza, Johannes Mattes, and Giovanni Pratesi, eds., *Collectio Mineralium: The Catalog of Holy Roman Emperor Leopold II's Mineralogical Collection* (Florence: Firenze University Press, 2022), 55.

Known as a *handstein*, or hand stone, such objects were often gifted from mining regions to the sovereign. They had featured prominently in royal collections since the early modern era. The Imperial collection in Vienna housed dozens of *handsteine*, many of them originally acquired by Ferdinand II in the mid-sixteenth century.[26] Small enough that one could hold them in one's hands, *handsteine* were made of precious extracted minerals and metals. They usually represented the subterranean activities of mining in the lower portion of the sculpture, with the upper portion dedicated to religious scenes or to aboveground mining infrastructure. These artworks gave material form to the verticality called forth by mining. They were able to accommodate, in ways that landscape painting could not, an understanding of the natural world as a site of interactivity between above and below.

Like most *handsteine*, the bulk of the sculpture is made up of multiple rocks and crystals glued together with a kind of paste. Unrefined ore is accompanied by lavender-hued and white crystalline formations, whose varied surfaces project laterally off of the sculptural base. Smaller passages of semi-refined metals trace their way around the object, with glittering metal deposits suspended in a bed of partially-crushed rock – an allusion to the intermediate stage of mining between the physical removal of raw ore and the production of smelted, pure metal. Combined asymmetrically without an obvious pattern, the different samples create a sense of both mineral abundance and diversity. They reflect the heterogeneous nature of the subsurface world while advertising the very real mineral riches of the region. The *handstein* physically conjoins rock in its "original" state, the physical infrastructure of extraction and refinement, and the aesthetically and economically valuable metals produced at the end.

The sculpture celebrates the infrastructure of the mine.[27] Around the base, small rectangular openings represent the mine's entrances and hypothetical cross-sections of its tunnels. In one, a human figure can be seen pushing a barrow of ore into its depths. Atop this dense jumble of rock, punctuated by small dark openings, luminous refined gold and silver structures celebrate the complex workings of the operation. As glimpsed in the earlier mining map, a wheel turned by horses inside a conical structure powers a pulley system for hoisting ore

---

[26] The most comprehensive English-language account of his collection is Stella Wisgrill, "A Rustic Style? Archduke Ferdinand II's Handsteine and the Meaning of Materials" (MPhil. diss., University of Cambridge, 2019).
[27] Andrés Vélez-Posada, "Handsteine: The Generative Powers of a Mineral Artifact," in *Ingenuity in the Making: Matter and Technique in Early Modern Europe*, ed. Richard Oosterhoff, José Ramón Marcaida, and Alexander Marr (Pittsburgh: University of Pittsburgh Press, 2021), 50–64.

to the surface. Metal wagon-ways facilitating the transportation of ore across the site snake around one side, leading to smaller rectangular buildings made out of silver which demonstrate the basic mechanisms of crushing and smelting ore to extract its metal. The largest structure, portrayed in great detail with both gold and silver, advertises the mine's use of an atmospheric steam engine to pump water up from the depths of the mine, a new technology adopted in the first half of the eighteenth century. The mechanism attests both to the technological sophistication of this specific mine and to the importance of advances in hydraulic systems more generally, which, as discussed, enabled the profound vertical expansion of ore mines in central Europe through the century.

Handsteine were elite objects that did not circulate among wider publics. But they exemplify how far-reaching the material logic of mining had become at the turn of the nineteenth century. In addition to its administrative oversight of Habsburg mining operations, Vienna housed valuable art objects that took the mine as their subject. The *handstein* serves as a reminder that while mines were largely confined to remote mountainous regions, the broader endeavor of mining left a large cultural footprint. The collection of exceptional mineral specimens was, by comparison, a more widespread practice. Those who received a classical education often collected natural history objects, and impressive mineral specimens were commonly found in the collections of bourgeois households and artist studios.[28] Vienna was arguably the most important and active European center for the late eighteenth-century commercial trade in minerals.[29] The *handstein* should thus be understood as part of a constellation of artworks and natural history objects that registered the cultural and economic significance of mineral resource extraction in the late eighteenth and early nineteenth centuries.

Schubert and the mine

The artists, composers, writers, and philosophers of early nineteenth-century Vienna would have found it difficult to avoid some knowledge of the mining operations that remained critical to the political and economic power of the Habsburgs. Extracted metals and minerals would have been physically present in their daily lives, and some knowledge of mineralogy and geology was expected of educated men. The mining industry was regularly discussed in mainstream

[28] Vogel, "Stony Realms."
[29] Ibid., 308. Mattes, "Mining, Collecting, Knowing," 26.

newspapers and journals, as well as the popular genre of travel literature. Mining and geology were also important elements of a constellation of cultural practices through which Central and Northern European writers and artists engaged with and conceptualized the natural world.[30] As Theodore Ziolkowski notes, "virtually every major writer as well as numerous lesser ones" wrote about mining in the late eighteenth and early nineteenth-century German states.[31] Literary luminaries including Johann von Goethe and Georg von Hardenberg (better known as Novalis) wrote about mining and were also employed as mining administrators.

Elite travel within the mountains of Central Europe often included visits to active mines and historical mining sites. It was hardly unusual, then, for Franz Schubert to have made multiple visits to the iron-mining center of Steyr in the Austrian Alps: in 1819, 1823, and 1825.[32] On his first visit, he composed *The Trout* piano quintet, a work commissioned by a local mining engineer and amateur cellist named Sylvester Paumgartner. While Schubert's oeuvre is generally understood to have embraced a pristine vision of nature unchanged by industrialization, it bears recalling that in August of 1815 – just a few years prior to his 1819 journey to Steyr – Schubert set to music *Bergknappenlied* (A Miners' Song), a poem published by the romantic writer Gotthold Friedrich Stäudlin in 1791.

The original text makes repeated reference to the uncanny verticality called forth by the expansion of ore mining in eighteenth-century Central Europe. It opens with an invitation for readers to join the miners in their descent into the depths of the earth: "Down, brothers! into the shaft! / Down with good cheer!"[33] The text then directs attention back upwards, "There is a God who watches over us, / A Father great and good!"[34] Schubert's composition "plunges" downward here, to invoke the words of Graham Johnson, yet the words themselves move in the opposite direction.[35] On a narrative level they reassure the miners of their safety and their promised

---

[30] The literature on this topic is vast. For a recent account that takes a broader view, see Jason Groves, *The Geological Unconscious: German Literature and the Mineral Imaginary* (New York: Fordham University Press, 2020).
[31] Theodore Ziolkowski, *German Romanticism and Its Institutions* (Princeton: Princeton University Press, 1990), 19.
[32] Piero Weiss, "Dating the 'Trout' Quintet," *Journal of the American Musicological Society* 32, no. 3 (1979): 539–48.
[33] "Hinab, ihr Brüder! in den Schacht! / Hinab mit frohem Mut!" – see Gotthold Friedrich Stäudlin, *Gedichte*, vol. 2 (Stuttgart: Gebrüdern Mäntler, 1791), 153.
[34] "Es ist ein Gott, der für uns wacht, / Ein Vater gross und gut!" – Stäudlin, *Gedichte*, 153.
[35] See Graham Johnson's liner notes for *The Hyperion Schubert Edition,* Vol. 20, *An 1815 Schubertiad*, with Patricia Rozario, John Mark Ainsley, Ian Bostridge, Michael George, Graham Johnson, and The Schubert Chorale, recorded 1993, Hyperion Records, CDJ33020, 1994, compact disc, https://www.hyperion-records.co.uk/notes/33020-B.pdf, 27.

spiritual salvation. They further register the intensely vertical directionalities – up and down – through which miners experience landscape.

Stäudlin's lyrics describe a subterranean light source leading the miners, in place of the sun: "joy and hope beckon you, / When a gold seam here, a silver seam there / Shine brightly at you! Climb ever deeper, without fear! Dig deeper into the shaft!"[36] As the text brings the reader further into the depths of the mine shaft in pursuit of luminous metal deposits, they are reassured that "[God] will lead us out of the pit again / With a Fatherly hand!"[37] This promised upwards trajectory at the end of the downward journey might be physical or it might be religious, for in the closing lines the miner is encouraged to embrace the possibility of their death underground: "And if the earth trembles and crashes, / And falls upon us – / Bury us deep in rubble and night /And become our grave! / So be it, brothers, we will never waver! / We bless our fate!"[38] If the miner never physically returns to the surface, they can count upon their spiritual elevation to Heaven. This repeated, almost emphatic, description of mining in exclusively vertical terms recured in mining songs of the period. "High the Harz and deep the ore!" goes one famous refrain about the ore-rich Harz mountain in Germany.

Whether or not Schubert was especially invested in the spatial logic of ore mining described in the song, it was something he came into direct contact with – both in having set the poem to music and in his subsequent visits to Steyr, which was then known for its iron manufacturing and its surrounding mines. Those who travelled through the Alps, a reasonably popular practice among the educated classes, would have routinely encountered the large-scale hydraulic systems used to pump water from mine shafts as well as the ongoing transformation of woodlands into modern tree plantations to support mining. Without even visiting a mine, a great many would have found their experience of the natural world visibly transformed by that industry. Mineral extraction reached far into lived experience: from the refined ores present in the everyday activities of rural and urban working-class households to the sophisticated infrastructure of extraction celebrated in elite royal collections.

---

[36] "Wenn Freud' und Hoffnung winkt, / Wann Goldstuff' hier, dort Silberstuff' / Euch hell entgegenblinkt!" (Stäudlin, *Gedichte*, 155).
[37] "Er führt uns wieder aus dem Schacht / Mit väterlicher Hand!" (Stäudlin, *Gedichte*, 155).
[38] "Und ob die Erd' erbebt und kracht', / Und stürzt auf uns herab – / Vergrüb' uns tief in Schutt und Nacht / Und würde unser Grab! / Sei's, Brüder, nimmer zagen wir! / Wir segnen unser Loos!" (Stäudlin, *Gedichte*, 156).

The painted mountain

Koch may have been more responsive to the vertical orientation of ore mining than his *Heroic Landscape with Rainbow* lets on. The artist's interest in Alpine geology and waterfalls was reflected in his numerous paintings of rocky falls including an initial version of *Schmadribach Falls* begun the same year as *Heroic Landscape with Rainbow*.[39] His later *The Schmadribach Falls* (Fig. 4) was one of several landscapes in which the artist came to embrace verticality.

Fig. 4: Joseph Anton Koch, *Der Schmadribachfall*, 1822. Oil on canvas, Bayerische Staatsgemäldesammlungen.

[39] Surviving sketches of powerful waterfalls date to the very start of Koch's artistic career. His first painting of *Schmadribachfall im Lauterbrunner Tal* (Museum der bildenden Künste Leipzig), was begun in 1805 and completed in 1811. On Koch's interest in geology see von Holst, *Ansichten der Natur*, 24–27. On his time in the Alps see Lutterotti, *Joseph Anton Koch*, 31–35.

The scene differs noticeably from the lush, Italian setting of his earlier painting. The viewer is positioned at the base of a powerful alpine waterfall, over which distant rocky peaks loom. While not located in the ore mining mountains of the Habsburg Empire, the painting discloses Koch's familiarity with the dramatic alpine landscape that hosted ore extraction.

A single man holding a large wooden staff can be seen in a small clearing in the foreground. Probably a shepherd, he is accompanied by a few animals. Koch does not portray any actively laboring human figures. The artist does, however, portray the two resources that were essential to ore mining: waterpower and abundant timber. Water is present throughout the landscape, from the distant snow-covered peaks to the turbulent river that opens into the foreground. Traditionally used to power mills, in the second half of the eighteenth century water had also become the primary energy source for the pumping systems that drained mine shafts across the Austrian Empire. As mining operations extended further into the depths of the earth, the complexity of the hydraulic systems intensified. Interlinked reservoirs channeled water across mountainscapes, drawn down by gravity. There is no evidence of such activity in Koch's painting, but the latent power of the water flow is made apparent. The distant falls throw off an ambient mist where they enter the valley. The compressed intensity of its power is dramatized by its partial visibility: the falls disappear abruptly behind a thick wall of pine trees. Rushing towards the viewer with white foamy ripples, the water extends past the boundaries of the composition as if unending.

Considering the homogeneity of the trees – by this I mean the fact that they appear to be the same species, and of roughly the same height and age – they may even comprise a modern tree plantation. Timber plantations were regularly established in the ore mountains of Central and Northern Europe at the turn of the nineteenth century specifically to support regional mining. In the second half of the eighteenth century, a German system of forest management had emerged that would be adopted across Europe. Premised on the aim to maximize a consistent timber yield over several decades, this system advised that trees of the same species be planted at the same time at regular intervals, that undergrowth be regularly cleared, and that animals not be allowed to graze in the forest.[40] The forest Koch painted adheres to such principles. The painting's

[40] See Henry E. Lowood, "The Calculating Forester: Quantification, Cameral Science, and the Emergence of Scientific Forestry Management in Germany," in *The Quantifying Spirit in the Eighteenth Century*, ed. Tore Frängsmyr, J.L. Heilbron, and Robin E. Rider (Berkeley: University of California Press), 315–42.

animals are seen grazing in a separate, grassy clearing that is physically separate from the woods. The trunks of tall, straight evergreens are clearly visible, indicating minimal undergrowth. Whether or not this is an artificially planted and bureaucratically managed forest, the depiction broadly observes the principles of the scientific model of forest management that, by 1822, were embraced across Central Europe.

Of course, timber was valuable beyond its uses for mining: it was the primary building material and source of domestic heat in early nineteenth-century Europe. Nor is there especially strong evidence the forest in Koch's painting belongs to a modern, scientifically managed timber plantation. It could simply look that way naturally. My point here is not that Koch painted a landscape in which mining was taking place, but rather that he painted a landscape whose status and value had been permanently transformed by the ascendance of large-scale resource extraction. In the early nineteenth century it was newly possible to assess a natural environment in terms of its resources: evaluating the potential industrial value of the water and wood in a given landscape was an increasingly dominant and historically specific way of thinking about the natural world at the time of Koch's painting. In the case of large-scale mineral extraction, this reshaped both physical environments and their artistic representation in the early nineteenth century.

Attending to mining – both as a practice and as a conceptual framework – complicates our understanding of nature in European romanticism. Supposedly a pursuit of emotional or spiritual union between the human and the natural, romanticism actually coincided with the consolidation of what we now call extractive capitalism: an economic system predicated on industrial resource depletion enacted on a global scale. Whether directly or indirectly, Koch and his contemporaries heard the cry set to music by Schubert: "Climb ever deeper, without fear! Dig deeper into the shaft!"

SELECTED BIBLIOGRAPHY

Anthony, Patrick. "Mines, Mountains, and the Making of a Vertical Consciousness in Germany ca. 1800." *Centaurus* 62 (2020): 612–30.

Casey, Edward S. *Representing Place: Landscape Painting and Maps.* Minneapolis: University of Minnesota Press, 2002.

Edney, Matthew. *Mapping an Empire: The Geographical Construction of British India*, *1765–1843*. Chicago: University of Chicago Press, 1999.

Franza, Annarita, Johannes Mattes, and Giovanni Pratesi, eds. *Collectio Mineralium: The Catalog of Holy Roman Emperor Leopold II's Mineralogical Collection*. Florence: Firenze University Press, 2022.

Gingrich, Simone. "Foreign Trade and Early Industrialisation in the Habsburg Monarchy and the United Kingdom – Two Extremes in Comparison." *Ecological Economies* 70, no. 7 (2011): 1280–88.

Groves, Jason. *The Geological Unconscious: German Literature and the Mineral Imaginary*. New York: Fordham University Press, 2020.

Hamm, E. P. "Knowledge from Underground: Leibniz Mines the Enlightenment." *Earth Sciences History* 16, no. 2 (1997): 77–99.

Holst, Christian von. *Joseph Anton Koch: Ansichten der Natur.* Stuttgart: Staatsgalerie Stuttgart, 1989.

Hölzl, Richard and Jan Oosthoek, eds. *Managing Northern Europe's Forests: Histories from the Age of Improvement to the Age of Ecology.* New York, Oxford: Berghahn Books, 2018.

Lowood, Henry E. "The Calculating Forester: Quantification, Cameral Science, and the Emergence of Scientific Forestry Management in Germany." In *The Quantifying Spirit in the Eighteenth Century*, edited by Tore Frängsmyr, J.L. Heilbron, and Robin E. Rider, 315–42. Berkeley: University of California Press.

Lutterotti, Otto Ritter von. *Joseph Anton Koch, 1768–1839. Leben und Werk*. Vienna: Herold, 1985.

Mattes, Johannes. "Mapping the Invisible: Knowledge, Credibility and Visions of Earth in Early Modern Cave Maps." *The British Journal for the History of Science* 55, no. 1 (2022): 53–80.

Miller, Elizabeth Carolyn. *Extraction Ecologies and the Literature of the Long Exhaustion*. Princeton: Princeton University Press, 2021.

Nef, John U. "Silver Production in Central Europe, 1450–1618." *Journal of Political Economy* 49, no. 4 (1941): 575–91.

Nemestothy, Sebastian, and Michael Grabner. "Austrian Logging: A Historical Account of the Time of Felling and Debarking, and Transportation Practices." *International Journal of Wood Culture* 1 (2021): 180–95.

Oeggl, Klaus et al. "The History of Mining Activities in the Tyrol and Adjacent Areas: Impact on Environment and Human Societies (HiMAT)." *Antiquity* "Project Gallery82," no. 317 (2008). https://antiquity.ac.uk/projgall/oeggl317.

Oldroyd, David. "Maps as Pictures or Diagrams: The Early Development of Geological Maps." *Rethinking the Fabric of Geology: Geological Society of America Special Paper* 502 (2013): 41–101.

O'Rourke, Stephanie. *Picturing Landscape in an Age of Extraction: Europe and Its Colonial Networks 1780-1850.* Chicago: University of Chicago Press, 2025.
Pieper, Renate. "The Impact of Early Iberian Globalisation on Austrian Mining Ventures." In *The Fruits of the Early Globalization: An Iberian Perspective*, edited by Rafael Dobado-González and Alfredo García-Hiernaux, 173–88. Cham: Palgrave Macmillan, 2021.
Prager, Brad. *Aesthetic Vision and German Romanticism: Writing Images.* Rochester: Camden House, 2007.
Rudwick, Martin J. "The Emergence of a Visual Language for Geological Science, 1760–1840." *History of Science* 14, no. 3 (1976): 149–95.
Seppel, Marten, and Keith Tribe, eds. *Cameralism in Practice: State Administration and Economy in Early Modern Europe*. Woodbridge: Boydell & Brewer, 2017.
Siems, Peter. "A History of the Schemnitz (Banská Štiavnica) Silver-Gold Mines." *The Mining History Journal* 15 (2008): 65–82.
Stäudlin, Gotthold Friedrich. *Gedichte*, vol. 2. Stuttgart: Gebrüdern Mäntler, 1791.
Vélez-Posada, Andrés. "Handsteine: The Generative Powers of a Mineral Artifact." In *Ingenuity in the Making: Matter and Technique in Early Modern Europe*, edited by Richard Oosterhoff, José Ramón Marcaida, and Alexander Marr, 50–64. Pittsburgh: University of Pittsburgh Press, 2021.
Vogel, Jakob. "Stony Realms: Mineral Collections as Markers of Social, Cultural and Political Spaces in the 18th and Early 19th Century." *Historical Social Research / Historische Sozialforschung* 40, no. 1 (2015): 301–20.
Warde, Paul. "Fear of Wood Shortage and the Reality of the Woodland in Europe, c. 1450–1850." *History Workshop Journal* 62, no. 1 (2006): 28–57.
Wisgrill, Stella. "A Rustic Style? Archduke Ferdinand II's Handsteine and the Meaning of Materials." MPhil. diss., University of Cambridge, 2019.
Ziolkowski, Theodore. *German Romanticism and Its Institutions*. Princeton: Princeton University Press, 1990.