

No Earth from Nowhere: Jules Verne's Critique of Terraforming

Jules Verne's work examines an environmental question of utmost importance: What role does man play in the regulation of nature? While research in climate fiction often deals with contemporary texts, nineteenth-century France was characterised by theoretical and fictional speculations about planet management, climate change, and anthropogenic power. In this context, Verne's novels strike us as more contemporary than ever. The purpose of his *Sans dessus dessous* (1889) is a scalar critique that highlights the catastrophic potential of engineering Earth: When terraforming is premised upon extraplanetary sight – seeing Earth from nowhere –, it becomes an objectifying instance of 'anthropoforming' that mechanically forms Earth in the image of mankind. Reading *Sans dessus dessous* today reevaluates the historical specificity of the phenomenon of terraforming, while illuminating how ecological crisis become the opportune moment for privatising the engineering of Earth.

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In 1993 the physicist P.C. Jain penned a short essay in which he proposed that the effects of global warming could be countered by expanding the Earth's orbit around the Sun (271-2). An idea sprang from Jain's proposal: we should send nuclear-armed rockets to the asteroid belt beyond our solar system to nudge one of them into an orbit that would pass close to Earth. The sling-shot effect from the asteroid's gravity would enlarge the Earth's orbit, limiting the effects of global warming (Hamilton 2013, 4). While the idea seemed ludicrous, the atmospheric chemist and co-author of the term *Anthropocene* Paul Crutzen changed the academic and public perception of geoengineering in his editorial essay "Albedo enhancement by stratospheric sulfur injections: A contribution to resolve a policy dilemma?" published thirteen years later (2006).ⁱ Since then, an ever-increasing number of conferences,

academic articles, and books for the public have been devoted to the question of engineering Earth. However, this is but the latest iteration of humanity's historical quest for climate control.

As it turns out, French fiction from the end of the nineteenth century certainly seems preoccupied with issues of climate engineering. Science-fiction novels such as Didier de Chousy's *Ignis* (1884), Louis-Henri Bousсенard's *Les Secrets de Monsieur Synthèse* (1888), and Gabriel Tarde's *Fragment d'histoire future* (1896) evidence the vogue of planet management that took root during the French fin de siècle. It should, nevertheless, be noted that this wave, constituting a part of the bigger splash that was the genre of 'le merveilleux scientifique', seems to be greatly indebted to the geographical and technological visions of imaginative French author, Jules Verne.

His novels deal consistently with the spatial exploration of remote planetary regions such as the geological underground (*Voyage au centre de la Terre* (1864)), the deep sea (*Vingt Mille Lieues sous les mers* (1870)), or interplanetary space (*De la Terre à la Lune* (1865)). Verne's geodetic novels are exactly characterised by their description of the entangled relations between man, nature, and space (Dupuy 2017, 9). The discovery and exploration of geographical space is among Verne's core subjects, treated in works such as *Les Indes noires* (1877), where a coal mine is developed into a techno-pastoral world, or *Vingt Mille Lieues sous les mers*, where Nautilus functions as the artificial wonder of the deep sea, running exclusively on the utopian source of energy, electricity, hailed in the famous chapter XII.

The tendency to examine the dialectic between the virgin 'natural' space and its man-made modifications seems to reach its fantastic acme in one of Verne's lesser-known novels, *Sans dessus dessous* (1889). This novel concerns the spectacular actions of the opportunistic Baltimore Gun Club, already encountered in *De la Terre à la Lune* and *Autour*

de la Lune (1869). In *Sans dessus dessous*, the group acquires the North Pole for 2 cents an acre to the surprise of the nations of the world. It is revealed that the club wants to liquidise the ice into cash: it aspires to alter the Earth's axis, causing the Sun to melt the North Pole, revealing rich and profitable beds of coal. Formally and thematically, the novel deals with the deliberate alteration of the Earth's climate to enrich the terraformers behind the plot.

Curiously, Verne's prescient depiction of greedy businessmen wanting to engineer the planet seems strikingly contemporary in our current age of climate change. Collectives such as the self-proclaimed Ecomodernists, based at the Breakthrough Institute in San Francisco, argue for a so-called "good, or even great, Anthropocene" (Asafu-Adjaye et al. 2016, 6), where "Earth is remade by human hands" (6), and environmental impact is 'decoupled' from economic development (31). In the Ecomodernists' view, engineering Earth is not only about counteracting climate change, but also about satisfying our desires for environmental control, becoming the benign sky captains of our planetary ship. Elon Musk, entrepreneur in both space and green technology, should be understood as the spiritual synecdoche of the Ecomodernists, wanting to "Nuke Mars!" while resting his hand on Earth's climatic thermostat (Woods 2019). In this context, Verne's work, written over 130 years ago, examines environmental questions of utmost importance today: What role does man play in the regulation of nature? And which catastrophes could follow in the wake of humanity's planetary play? Novels such as Verne's forgotten *Sans dessus dessous* represents a critical archive concerning the values that underpin the technological shaping of our environmental future.

While it is only recently that literary scholars have turned their attention to nineteenth-century climate fiction, they usually focus on the impact that climate changes have had historically on literature (e.g., Taylor 2016) rather than on fictional accounts of deliberately changing the climate. Terraforming has a history and a philosophy, but – apart

from recent cases focusing either on British (Fleming 2010) or American science fiction (Pak 2016) – literary scholars, historians, and philosophers have not paid it nearly as much attention as they have past environmentalisms. This is a significant omission, because a cultural history of terraforming can shed valuable light on our present era. My article aims to demonstrate this.

I am inspired by the growing field of French ecocriticism as it has been developed in Alain Suberchicot's *Littérature et environnement* (2012), the anthology *French Ecocriticism: From the Early Modern Period to the Twenty-First Century* (Finch-Race and Posthumus 2017), and recent special issues of journals such as *L'Esprit créateur* (2017). I also seek to contribute to the ecocritical trend in Nineteenth-Century French studies manifested in recent issues of *Dix-Neuf* (2015; 2019) by illustrating that our understanding of the long nineteenth century may benefit from being considered from an ecological viewpoint. As a result, my historical method stages a dialectical exchange between past and present – exploring how “the nineteenth century can inform our understanding of issues today, just as our current situation can help us to reassess the nineteenth century” (Finch-Race; Gosetti 2019, 153). In line with Andrew J. Counter (2021), my article is premised on the insight that contextualising a text – the etymology of *context* being ‘weaving together’ – also describes the local act of reading a historical text, entangling the *pastness* of literature with the *now* of reading. Consequently, I place my work in the nascent historicist field of what one could call ‘Nineteenth-Century French Studies for the Twenty-First Century’ (Belenky, Kleppinger, and O’Neil-Henry 2017). This means that my historical research, albeit rigorous, seeks to intervene in present ecological concerns regarding climate change and terraforming.

The article starts out by providing a historical account of how the French philosophers, scientists, and businessmen of the nineteenth century prefigure notions of terraforming. Due to these historical conjectures, in line with recent research, I argue that the

shock of the Anthropocene should not be understood as an event of the twenty-first century, nor should the notion of terraforming Earth. I analyse how the author Jules Verne portrays the Baltimore Gun Club's idea of engineering the planet as a uniquely American form of colonialism in which geographical regions are not discovered but moved owing to mankind's telluric power. This extreme form of colonialism is a result of the club's extraplanetary viewpoint achieved in *De la Terre à la Lune* and *Autour de la Lune*, envisioning the planet as a smooth mechanical globe, a billiard ball, without multiple nuances, characteristics, or agencies. Verne's satirical description of the ecological calamities engendered by the club shows the importance of the partial perspective that makes Earth's local dimensions intelligible, thus anticipating new approaches to planetary cartography that underline that all living entities co-form Earth, not just humanity. In this perspective, *terraforming* denotes an eminently terrestrial practice shared by all living others, while the concept of *anthropoforming* could account more specifically for the utilitarian, techno-political dimension of the Anthropocene.

Terraforming the Nineteenth Century

As Christophe Bonneuil and Jean-Baptiste Fressoz have argued, the kingpins of the Industrial Revolution were very much aware of their planetary reach. Philosophers and businessmen such as Henri de Saint-Simon heralded the global transformation effected by the evolution of large-scale industry (Bonneuil and Fressoz 2016). From Enlightenment naturalist Comte de Buffon to utopian socialist Charles Fourier, from the Saint-Simonians to physicist Joseph Fourier, modernity carried a spectre of "environmental reflexivity" (Locher and Fressoz 2012). The shock of the Anthropocene, then, does not belong solely to the twenty-first century, and nor does the notion of engineering Earth.

After long neglect, nineteenth-century French fiction has recently been looked at from an ecocritical perspective, although this has been done predominantly from an eco-poetic or ecoregional standpoint (Finch-Race and Weber 2015; Finch-Race and Gosetti 2019) while the issue of terraforming has yet to be considered. This seems curious considering the seminal work of Bonneuil and Fressoz. In *L'Évènement Anthropocène: La Terre, l'histoire et nous* (2013), they make the overarching claim that human technology “semble avoir pris une échelle globale” in the 1850s (200). They use the example of French lawyer and scientific writer Eugène Huzar,ⁱⁱ who predicted as long ago as 1857 that the world would emit billions of cubic metres of carbon dioxide in one or two hundred years’ time (12). They argue convincingly that the men of ‘la première modernité’ were well aware of the catastrophic potential that global technology possessed: Huzar’s book *La fin du monde par la science* (1855) had a significant reception in the major magazines, and in 1888 the book was in its fourth edition (Fressoz 2010, 103).

Although Huzar is a prime example, he was not the first Frenchman to envision the terraforming power of humanity. One preliminary example is the Enlightenment mathematician, cosmologist and encyclopedist Comte de Buffon, who described an Anthropocene era in his condensed piece of natural history *Les Époques de la nature* (1778), “lorsque la puissance de l’homme a secondé celle de la nature” (Buffon 1778, 225-55). Buffon deemed this period the seventh and last period of Nature’s epoch, the one in which humans would modify key Earth processes. The naturalist’s “imaginative piece of science fiction” did (Rudwick 2014, 68), however, see human influence as a good thing: by foresting and deforesting, humanity could rationally “modifier les influences du climat qu’il habite, & en fixer pour ainsi dire la température au point qui lui convient” (Buffon 1778, 244). Buffon’s cosmological perspective entails a static view of Earth as a sphere to be reformatted according to human will.

Another early example from the early nineteenth century is Charles Fourier's diagnostic paper "Détérioration matérielle de la planète" (c. 1820-1821) in which the utopian socialist maintained that "le genre humain qui entoure partout et exploite le globe est réellement plus grande que la planète même" (33), iterating the fundamental idea of the Anthropocene, as has been recently remarked (Goldstein 2019). Among other things, Fourier saw humanity's power cementing itself on a climatological scale, asking rhetorically: "Ne voyons-nous pas le travail de l'homme opérer des modifications climatériques vraiment énormes ?" (33). His "Détérioration matérielle de la planète" constituted a starkly negative appraisal of the climatic disorders initiated by fossil-fueled European industrialisation. Fourier called for a new kind of science, a sort of planetary medicine taking as its vantage point the analogies between the human and planetary bodies – a gentle, holistic approach to the notion of engineering Earth.

While Charles Fourier suspected the influence of industrialisation on the weather in 1821, three years later, physicist Joseph Fourier laid the foundation for the modern theory of the greenhouse effect by comparing Earth's atmosphere with the contained environment of the hothouse in his article "Remarques Générales Sur Les Températures Du Globe Terrestre Et Des Espaces Planétaires" (1824), envisioning that the heat "s'accumulerait dans les couches inférieures de l'atmosphère, qui acquerraient ainsi des températures élevées" (155). At the end of the century his theory was developed by Swedish meteorologist Nils Ekholm, who explained that carbon dioxide played a key part in the greenhouse effect (Fleming 1998, 4)

These theoretical and scientific conceptualisations of nineteenth-century France were not formulated in a vacuum but were highly influenced by the political, scientific, and socioeconomic evolutions that manifested themselves at a national level. A case in point was the theoretical and practical evolutions propounded by Saint-Simon. For his followers, the

Saint-Simoniens, technological progress constituted a utopian process that would “s’appropriier la matière de mille façons différentes pour les besoins toujours croissants de l’humanité” and intensify “l’embellissement et l’exploitation du globe terrestre” (cited in Meyer 2016, 54). The key word for human well-being was ‘industry’, leading to the implementation of engineering projects, initiated by the Saint-Simonians: the improvement of the Paris water system, the cultivation of the Vendée region, and the establishment of the French railway network, etc. (16). Resulting, at the end of his life, Barthélémy Prosper Enfantin, Saint-Simon’s most immediate successor, could proudly proclaim: “[n]ous avons enlacé le globe de nos reseaux” (2008, 92). While Saint-Simon and his disciples sought to lead France to happiness through industry and engineering, their ambitions were evidently planetary: the drawing up of the early plans for the futuristic Suez Canal and the envisioning of the eventual Panama Canal – the distinguished geoengineering projects of the nineteenth century – testifies to the group’s influence on a global level.

The eruption of the volcano Krakatoa in Indonesia from May 1883 to October 1883 and the subsequent global spread of its ash cloud furthermore provided empirical evidence that the climate could be dramatically changed. The eruption, called “le plus grand phénomène géologique de l’histoire” by contemporary scientist and astronomer Camille Flammarion (1900), was among the most far-reaching geomorphological events at the time, the explosion being heard in places as far from each other as Australia and Mauritius according to the 1888 report from the Royal Society (Symons et al.). Due to the new age of the telegraph the Europeans knew about the eruption within hours and could monitor its effects on their own skies, the reddish atmosphere in Norwegian painter Edward Munch’s *The Scream* (1893) ostensibly evidencing the comprehensive atmospheric effects the eruption had on the sky of Northern Europe (Panek 2004).

Due to the volcano's injection of an obscene amount of sulfur dioxide into the stratosphere, in the following year, 1884, a volcanic winter was experienced in the Northern Hemisphere, average summer temperatures dropping by a whopping 0.5 °C (Bradley 1988), causing European poets such as Gerard Manley Hopkins lyrically describing how the effects of the eruption filled the sky, "optically chang[ing] the season" (Hopkins, 222). As the first globally experienced environmental event, its atmospheric disturbance being detected all over the world, it enabled scientists to recognise the physical interconnections that existed in the planetary macrocosm: environmental disasters could no longer be viewed as isolated and regional events. This global climate was not localised but unified (Scott 2014, 61-62).

I would argue that these engineering projects, climatic events, and ideas of humanity's planetary influence make a reading of terraforming in French speculative fiction from the end of the nineteenth century pertinent.

Verne's Ecological Thought

It has long been a commonplace to describe Jules Verne's oeuvre as the celebratory cycle of technology and Progress. While there is consensus that the author's posthumously published novel *Paris au XXe siècle* is a resoundingly pessimistic depiction of a future techno-society, there is less tendency to see any of Verne's other novels – such as *Sans dessus dessous* – as inquiries into the perils of technology. In contrast, I argue that Verne's *Voyages extraordinaires* should not just be interpreted as geographical phantasms of anthropogenic domestication. In line with Lionel Dupuy, I believe that the author's ecological thought arose directly from his 'imaginaire géographique.' (Dupuy 2017). In this sense, Nemo's Nautilus in *Vingt mille lieues* "est un sous-marin écologique", running on a clean source of energy (electricity) while offering the ideal frame for discovering a 'virgin' environment (the deep sea) that humanity has not polluted yet (13).

For Verne, discovery was not about appropriating the world but about understanding it: “la véritable supériorité de l’homme, ce n’est pas de dominer, de vaincre la nature ; c’est pour le penseur, de la comprendre, de faire tenir l’univers immense dans le microcosme de son cerveau” (Verne 1910, 224). While he was enlivened by the revolutionary possibilities offered by new technology – for instance electricity, which he regarded as “free energy without labor” (Pinkus 2018, 244) – Verne was wary about its pitfalls. It would be a mishap to understand the author’s *Voyages extraordinaires* as progressivist reveries of science, rather they seem to stage the exchange between “the dream as well as the nightmare of technology”, as David Pike has argued (2019, 11).

One example can be located microstructurally within the macrocosmic Vernian oeuvre. In *De la Terre à la Lune* and *Autour de la Lune*, Barbicane and co. are the heroes of a rather successful extraplanetary adventure; but in *Sans dessus dessous* the big guns of Baltimore are revisited “with a distinct scepticism for the wonders of technology” (Fleming 2010, 26). Verne’s dubious portrayal of techno-scientific intervention is cultivated by his critique of a dirty energy source being devoured at a rapid pace: “l’industrie est un animal ‘carbonivore’; il faut bien le nourrir” as the narrator notes ironically in describing the gun club’s plans to harvest ‘les houillères du pôle boréal’ (Verne 1889, 58). The club cunningly acquires the rights to the ‘undiscovered’ territory of the North Pole and then initiates its grand plan: to build and fire a huge cannon – the club’s speciality – into a drilled-out Kilimanjaro, thus altering the Earth’s axis with the blast, making the Sun melt the North Pole, revealing rich beds of the much-needed black gold.

In the end the endeavour fails because the club’s chief mathematician J.-T. Maston forgets to add a couple of zeroes at a crucial point in his calculations, prompting the narrator to conclude that the tale on a note of Promethean hubris: “Modifier les conditions dans lesquelles se meut la Terre, cela est au-dessus des efforts permis à l’humanité” (Verne

1889, 201). Verne's *Sans dessus dessous* should be understood within the frame of his overall ecological thought: the novel is an exploration nightmarish phantasm of terraforming

No Earth from Nowhere

At the start of *Sans dessus dessous*, a notice is sent out by the American government to the “habitants du globe terrestre” concerning the forthcoming auction of the “régions du Pôle nord”, which has not yet been “mises en exploitation par l'excellente raison qu'elles n'ont pas été découvertes” (6). From the point of view of the American government, the Arctic regions serve as ‘blank spaces’ waiting to be appropriated as soon as they have been ‘discovered’. The auction highlights the colonial coupling of *discovery* and *creation*: once explored, the regions can safely be exploited, recreated. Verne compares the club's worldview to that of the “hardi ingénieur” Ferdinand de Lesseps – the developer of the Suez Canal and mastermind of the eventual Panama Canal –, stating that the modern-day planetary engineer would be American above all (4-5).

To make their bid, the Baltimore Gun Club forms the *North Polar Practical Association*, acquiring the North Pole *tout court*. While there is no doubt that the club's acquisition of the North Pole is entangled within colonial logic, Verne adds a twist: the gun club does not need to go to the North Pole, the North Pole can come to them: “Ainsi, demanda le major Donellan, puisque l'homme ne peut aller au Pôle, c'est le Pôle qui viendra à lui ?... Comme vous dites ! repliqua le président Barbicane” (98). In the nineteenth century, the poles were described, dreamed of, and constructed as the final frontier of the planet, with Edgar Allan Poe's mystical ending at the South Pole in his novel *Arthur Gordon Pym* (1838) and George Sand's spiritual voyage to the crystalline centre of the Earth in *Voyage au cristal* (1864) constituting the two ends of the phantasmagorical spectrum. John Cleves Symmes Jr.'s theory of a ‘Hollow Earth’ announced in his *Circular No. 1* (1818) – the main

inspiration for the US Exploring Expedition's mission to colonize the holes in the Polar Regions in 1838 – was a fundamental driver of this imaginary by portraying the poles as thresholds to a utopian society of the inner Earth, full of riches ready to be exploited (Griffin 2004). In the same manner, the North Pole is viewed by the engineers as a virgin territory that promises an unimaginable source of wealth.

Unlike Axel and Professor Lidenbrock, who in *Voyage au centre de la Terre* sails to Iceland and, with much difficulty, clammers down the dangerous volcano Snæfellsjökull towards the centre of the Earth, unlike most of Verne's *Voyages, Sans dessus dessous* is not about the geographical movement of Man exploring the marginal regions of the planet. In *Sans dessus dessous* the travel is planetary: it is Earth, the spaceship, that is being moved, the wealth of the North Pole coming to mankind by way of his telluric power, as the club's president argues. This 'American' form of colonialism is not about discovering and recreating a piece of land like the old French colonial project. Like a de Lesseps on steroids, Barbicane dreams of appropriating, demarcating, and designing Earth on a planetary level so that it suits the needs of a very specific set of terrestrial beings. Verne portrays the American way of terraforming as French industry *in extremis*.

For this reason, it is no coincidence that the club's mathematician J.-T. Maston uses the word *redressons* when fantasising about shifting the Earth's axis (98). The self-satisfied terraforming enterprise is premised upon the perverse idea that *straightening* or *correcting* the Earth means moving it in the image of humanity. So, while the title *Sans dessus dessous* seems to describe the club's confused attempt to form Earth, altering its axis and melt its pole, it should also be understood as a clever critique of the terraformers' logic: they conceptualise Earth without a clear sense of direction, viewing it from a virtual nowhere.

The Terraformer's Gaze

David Pike has recently argued that Verne's novels often examine the interrelation between the tourist's gaze and the engineer's gaze (2019). To illustrate this, he draws on a scene from *Le Tour du monde en quatre-vingts jours* (1872) where French domestique Passepartout's exoticising gaze clashes with the cold heat of English gentleman Phileas Fogg. Confronted with the pêle-mêle of "des merveilles de Bombay", Fogg sees "the world as a collection of objects interconnected in a transport grid rather than a collection of things to be encountered in a series of unique experiences" (5). Following Pike's point, it seems reasonable to inquire into the nature of the terraformer's gaze, portrayed in *Sans dessus dessous*. What constitutes the vision incarnated by the Baltimore Gun Club? Where does this gaze come from, and what does it do?

In short, the club's vision of a formable planet stems from their extraplanetary viewpoint achieved by the space exploration in *De la Terre à la Lune* and *Autour de la Lune*. The club sees Earth not as a multivalent sphere, but rather as a mechanical globe, viewing from deep space. Earth takes the shape of the humanity's supreme home, nothing more, nothing less, terraforming signifying the trivial implementation of a home makeover. According to the club, the renovation of humanity's mansion entails the creation of a world in which day and night succeeds each other in an eternal equinox:

[C]omme le mouvement de rotation sur le nouvel axe terrestre ne serait ni accru ni amoindri, comme vingt-quatre heures sépareraient toujours deux midis successifs, les nuits et les jours seraient exactement de douze heures en n'importe quel point de notre sphéroïde. [...] On vivrait au milieu d'un équinoxe perpétuel, tel qu'il se produit le 21 mars et le 21 septembre sur toutes les latitudes du globe, lorsque l'astre radieux décrit sa courbe apparente dans le plan de l'Équateur. (Verne 1889, 100)

The terraformers envision a homogenised Earth characterised by ecological rationalisation: the same day, the same night all over. Not only concerned with fabricating the perfect day, the club also believes that the climate consists of unstable processes in need of correction:

“Du moment que le nouvel axe serait perpendiculaire à l'écliptique, il n'y aurait plus de zones glaciales ni de zones torrides, mais toute la Terre jouirait d'une zone tempérée” (100). The terraformers have no patience with the multiple agencies of the Earth, the more-than-human: climatic zones must be adjusted according to the life of mankind, as Barbicane prophesies triumphantly: “Chacun, suivant son temperament, pourra choisir le climat invariable [...] sur un globe où l'on ne connaîtra plus les variations de chaleur actuellement si regrettables !” (102). While the method is different – opting for blasting a cannon instead of deforesting – it is not difficult to recognise Buffon's Enlightenment Earth, where man seeks to “fixer [...] la temperature au point qui lui convient” (Buffon 1778, 244), repeated in the quote by Barbicane. The terraforming gaze wants to remedy the climatical disorders that it sees characterising the nineteenth century, it wants to straighten the fallible weather to, in the words of the Saint-Simonians, carry out ‘l'embellissement et l'exploitation du globe terrestre’ (cited in Meyer 2016, 54). The fact that the climate can be changed, as the ash cloud of Krakatoa empirically proved, comes to mean that it *must* be changed. For the terraformer, possibility fuels necessity.

The most telling element of the terraformer's gaze is that these passages stem from chapter VIII in the novel, called “Comme dans Jupiter?”. Gun club mathematician J.-T. Maston's desire to *redresser* planet Earth stems directly from his love of the biggest planet in the solar system: “si J.-T. Maston s'était fougusement écrié: ‘Redressons l'axe terrestre !’, c'est que l'audacieux et fantaisiste Français [...] venait d'entonner un hymne dithyrambique en l'honneur de la plus importante des planètes de notre monde solaire” (Verne 1889, 98). The balancing of the terrestrial day and night is inspired by Jupiter, where: “les jours sont constamment égaux aux nuits par n'importe quelle latitude –, soit 4 heures 77 minutes pour le jour, 4 heures 77 minutes pour la nuit” (100). Maston's dream is to abolish the changes caused by the succession of spring, summer, autumn, and winter so that Earth resembles the

Jovian state of climatological and chronological sameness: “les Joviens ne connaissent rien de ces saisons. Donc les Terrestriens ne les connaîtraient plus” (100), seeing Earth from Jupiter, the trace of it leaving its mark on the terrestrial globe. While the engineer’s gaze is intertwined in the gridwork of the ground, the terraformer’s gaze is from outer space, the result being that Earth loses its multiple nuances, characteristics, and agencies, Maston explicitly comparing the planet to a billiard ball (146).

The terraforming eye performs what Donna Haraway has called the ‘god trick’ of a so-called ‘objective’ science which claims to see the world from a timeless place (Haraway 1988, 581). As Haraway succinctly puts it, this kind of “eye fucks the world to make techno-monsters” (581), this perverse libido being put in to practice when the Columbiad cannon physical penetrates the mountain of Kilimanjaro.

While it could be argued that Verne stages the dynamic between the engineer’s gaze and the tourist’s gaze in *Le Tour du monde en quatre-vingts jours*, in *Sans dessus dessous* he stages a contrast between the terraformer and the engineer. Due to the criticisms of his alleged scientific amateurism, in writing the novel, Verne allied himself with the real engineer Albert Badoureaux, graduate from l’École Polytechnique and administrator of the railway network (Tarrieu 2019, 71). Thus, far from being a piece of wonderland fiction, the novel’s description of terraforming was based on Badoureaux’s comprehensive mathematical calculations.ⁱⁱⁱ In the first version of the novel, the scientific documentation was explicitly added on as a supplementary chapter, showcasing “la mesure exacte des divers phénomènes dans ce roman [...] malgré ses apparences ultra-fantastiques.” (Verne 1889, 303) In the supplementary chapter, Badoureaux highlights the very real dangers of changing the Earth’s axis such as rising sea levels: “Le niveau de la mer change donc en presque tous les points du globe.” (311) This meta-perspective is furthermore pursued in the work as Verne morphed the real Badoureaux into the fictional character Alcide Pierdeux, engineer at “corps national

des Mines de France” (109), endearingly known as ‘Alcide sulphurique’, due to his acidic manner of discussion (107).

In contrast to the club members that fail to see the potential catastrophes of their terraforming, Alcide is the first to recognize, by his sound scientific pursuit, that the “les conséquences de la secousse peuvent être plus compliquées qu’on ne l’imagine !”, listing all the possible cataclysms that it could entail:

Pourquoi les volcans ne profiteraient-ils pas de l’occasion pour se livrer à des éruptions échevelées, pour vomir, comme un passager qui a le mal de mer, les matières déplacées dans leurs entrailles ? Pourquoi une partie des océans surélevés ne se précipiterait-elle pas dans leur cratères ? (146)

Alcide, Verne’s version of the ideal engineer, thin-haired due to “l’abus des signes algébriques sous la lumière des ‘verres de rosto’” the abuse of algebraic signs under the light of the gas-lamps in the study” (107), is, in contrast to the capitalist, pragmatist terraformers, able to envision the potential catastrophes, his clear sight capturing the mechanics of engineering Earth: “pour produire un déplacement d’axe de $23^{\circ} 28^{\circ}$ [...] il faudrait un trillions de canons qui a été creusé dans le massif du Kilimanjaro. Or, notre sphéroïde – toute sa surface fût-elle solide – est trop petit pour les contenir,” contendedly manifesting the physical impossibility of the club’s hubristic attempt to form Earth in the image of mankind (201). Verne’s description of the engineer’s gaze and the tourist’s gaze in *Le Tour du monde en quatre-vingts jours* is turned up a notch in *Sans dessus dessous*, showing us what happens to our sense of planet when we view it as a distant object. Within the universe of Vernian ecology, it is only logical that the attempt to move Earth fails, the club’s terraforming gaze being trumped by the partial perspective, Alcide’s grounded vision.

Earth in Time

The terraformer's gaze sees Earth in its supposed totality but forgets its 'unconstructable part', to use the expression from Frédéric Neyrat's recent work (2016). In *La Part inconstructible de la Terre: Critique du géo-constructivisme*, he associates terraforming with the worldview of what he calls 'les géo-constructivistes' – the ideologues of planet management – who regard Earth as "la proie consentante d'une conquête intégrale" (10). Neyrat argues that the germination of geoengineering projects and terraforming philosophy is a result of – as we have argued – their distinct viewpoint: "[T]out se passe comme si les géo-constructivistes se considéraient comme en dehors de la Terre, sans relation vitale avec l'écosphère, détachés aussi loin que possible de l'objet Terre à reformater" (17). For Neyrat, "la représentation de la Terre qui prévaut chez les géo-constructivistes est celle d'une boîte creuse que l'on peut reformater à volonté" (22), even though the supposed totality of the extraplanetary sight is false: "il y a aussi la Terre retirée, inobjective et irréductible à un corps" (259). While canonical snapshots such as Earthrise and The Blue Marble seem to represent a unitary outlook on Earth, encasing the globe in its entirety, there is always a shadowy, unconstructable part of the planet which is not captured – its dark side (259). Neyrat uses this epistemological insight to launch what he calls "le transcendantal de la Terre": neither an object to be captured through an extraplanetary lens nor a Gaia-like subject, Earth should be regarded as a *trajet*, "un entre-deux traversant l'espace-temps" (262). Seeing Earth as a historical trajectory is a way of escaping utilitarian objective-spatial conceptions of the planet (as a marble, billiard ball, box etc.).

I would argue that Verne illustrates a similar point in *Sans dessus dessous*. Quite clearly inspired by the Parisian mathematician and climatologist Joseph Adhémar – in the novel's first chapter he quotes Adhémar's idea that movement of the terrestrial axis would modification of the terrestrial climate (Verne 1889, 11) –, Verne subscribed to the fundamental notions of his *Révolutions de la mer* (1842). In it, Adhméhar argued that, over

time, irregularities in the Earth's orbit would alter hemispheric temperatures, triggering glaciation and thus drastic changes in sea level. By demonstrating that Earth was not a fixed, stable sphere on the firmament without ecological outburst, but rather a quite historical world suspended between periods of glaciation and rising sea levels, Adhémar's Cuvierian work initiated the 'Holocene awakening' that "civilisation is tethered to a transitory climate", as Wood have argued (2019, 11-2).

So, while the club expounds upon the utopian potential of changing the Earth's axis, making Earth right again, Verne's narrator is quick to describe the other side of the coin: the temporal dimension of the planet, the delicate balance of its ecosystems, its Holocene fragility. The club's idea of fashioning Earth as humanity's airconditioned home is succinctly punctuated by Verne's lengthy descriptions of the catastrophes that would follow in the wake of the proposal:

[I]l faut observer que par suite de l'abaissement des eaux, la couche d'air s'abaissera d'autant. Donc, le littoral de l'Europe et celui de l'Amérique seront surélevés d'une hauteur telle que les villes situées même à vingt et trente degrés des points maximum, n'auront plus à leur disposition que la quantité d'air qui se trouve actuellement à une hauteur d'une lieue dans l'atmosphère. [...] Quant aux Bermudes, l'air y manquera comme il manque aux aéronautes qui ont pu s'élever à 8,000 mètres d'altitude, comme il manque aux sommets de la chaîne du Tibet. Donc, impossibilité absolue d'y vivre. Même effet dans le segment opposé, qui comprend l'océan Indien, l'Australie et un quart de l'océan Pacifique, lequel se déversera en partie sur les parages méridionaux de l'Australie. (Verne 1889, 159)

Too eager to envision the impact the blast would have on the local terrain of the North Pole, the terraformers' extraplanetary gaze is, quite paradoxically, not equipped to see the global catastrophes that would subsequently unfold, the events taking place on the planet's dark side. On these grounds, Verne's point is that the club does not understand the multicausal

dimensions of the planet's ecosystems. As the science of ecology dictates: changes in one variable do not lead to simple proportional changes in related variables (Hamilton 2013, 13). The club's rudimentary sense of planet leads to the simple thought that a huge blast inside Kilimanjaro – a local intervention – will lead to proportional changes in the Earth's axis. They do not envision the possibility of other factors coming into play, such as the tilting of the planet leading to half of the planet's population being asphyxiated, the other half drowned. The terraformers have no sense of the Earth as a trajectory, they see it as a one-dimensional, timeless object.

The overarching purpose of *Sans dessus dessous* is, then, a critique of scale. Verne's novel is an exercise in scalar awareness because it points to the way in which a situation alters according to the scale on which it is perceived (Clark 2019). Since the club adopts a vantage point from a virtual nowhere, instead of opting for a situated, partial perspective, it paradoxically fails to grasp the wholeness, the totality of the Earth System as a temporal field.

Verne exhibits a profound awareness of how influential scale, viewpoint, and perspective are in terms of exercising an ecological sensibility. In this sense, his satire is not purely negative. His appraisal of the club's mechanistic worldview positively advocates for incorporating a greater sense of scale and temporality when imagining planet-altering changes. Consequently, *Sans dessus dessous* is a work that renders the complex dynamics of intervention in the global climate – an aggregate of weather conditions over time – intelligible. By insisting on the non-linearity of ecological change, the author humorously induces a modern sense of planet, or what Ursula Heise calls an *eco-cosmopolitanism*, aware of the co-constitutive relation between the local and the global (2008).

Terraforming or Anthropoforming?

The standard dictionary definition of the term *terraforming* calls it the “process of transforming a planet into one sufficiently similar to the earth to support terrestrial life.” (‘Terraforming n.’ 2022). The term was first coined by Jack Williamson, who applied it in his short story “Collision Orbit” in 1942 (Pak 2018). However, while concepts such as *geoengineering* seems to signify terraforming applied to Earth, the climate crisis muddles the difference between the two concepts:

The application of large-scale engineering methods to modify rock formations or other features of the natural environment; (in later use *esp.*) the modification of the global environment or the climate in order to counter or ameliorate climate change.

(‘Geoengineering n.’ 2022)

Confronted by climate change, engineering Earth is not only about exerting difference to the landscape, drilling and modifying the rock. Now geoengineering is, somewhat absurdly, about making Earth more like Earth, correcting it. More specifically, geoengineering is about modifying the atmosphere so that it artificially mimics its condition before 1870 – the year in which elevated CO₂ levels started to have a discernible impact on biogeochemical cycles (McNeill 2019) – either through carbon dioxide removal (*clean-up*) or by solar radiation management (*shading*) (Hamilton 2013, 1, 20). In this sense, geoengineering and terraforming have come to describe virtually the same thing: the process of modifying Earth so that it can house terrestrial life, that is, humanity.

Even though *terraforming* carries with it an ambiguous range of meanings such as the fantasy of redeeming a lost earthlikeness, a plan B for terrestrial life on an uninhabitable planet, or the unintended consequences of fossil fuel combustion (Pinkus and Woods 2019, 4), I take *terraforming* to describe a technological process concerned with forming planets (Earth or others) in the image of terrestrial life. I prefer the term *terraforming* to *geoengineering* since it encases the continuum between space travel and planetary management. Space travel and terraforming are close-knit. As we see in *Sans dessus dessous*,

they constitute a dialectic of colonisation and appropriation: “Terraforming depends on the trace of one planet in the thought of another. Terraforming is always terraforming Earth”, as Derek Woods has contended (2019, 17), while Jeremy Baskin argues that the idea of manipulating Earth’s weather systems is cultivated by the control of extraplanetary space (2019, 244). To illustrate the causal relationship between space imperialism and terraforming, you could argue that by colonising space – planting the American flag on the moon in 1969 – the American Space Age developed a culture in which Earth suddenly appeared as an extraplanetary ‘spaceship’, illustrated by Richard Buckminster Fuller’s famous operating manual (1969). If we shift our focus to our literary case again, the Vernian cycle serves as a testament. The Baltimore Gun Club’s successful trip to and around the Moon in *De la Terre à la Lune* and *Autour de la Lune* ostensibly leads to the idea of terraforming the now alien Earth in *Sans dessus dessous*.

To add to these distinctions, terraforming seems to resonate with the concept of the Anthropocene. To provide an example, Bill McKibben’s book *Eaarth: Making Life on a Tough New Planet* explicitly uses the trope of humanity now residing on an alien planet, arguing that entering the Anthropocene means living on planet *Eaarth* (2013). Indeed, the concept of the Anthropocene invites us to look at Earth as an already terraformed alien planet where the climate, the underground, and the landscape have been engineered according to human will. Could terraforming mean making planets more human, rather than making planets more terrestrial? Or could a concept such as *anthropoforming* be of use when describing the exploitative version of engineering Earth?

In an age characterized by the increasing power of private entrepreneurs such as Elon Musk promoting themselves as the terraforming saviour of humanity, his hand on the climatic thermostat, wanting to “Nuke Mars!”, it seems necessary to investigate the fallacies

of terraforming. Can we envision another sort of terraforming other than the appropriating, dominating, objectifying practice of the Baltimore Gun Club, now Elon Musk?

Recent work by Frédérique Aït-Touati, Alexandra Arènes and Axelle Grégoire seeks to answer this question. Their work *Terra Forma* (2019) consists of a series of ‘cartes vivantes’ that goes from “la ligne d’horizon à l’épaisseur du sol, du global au local” (3), wanting to highlight that “la Terre n’est plus une matière inerte” (9). Their speculative planetary cartography is born out of the wish to “habiter un espace peuplé d’autres vivants, d’autres entités qui partagent et façonnent avec nous la Terre, la *terraformation*”, creating a new kind of space by creating new kinds of maps (16). *Terra Forma* is a cartographic experiment that underlines that all living entities co-form Earth, not just humanity, contrasting the general notion of terraforming as an ultra-technical and human affair with a definition of terraforming as “une pratique éminemment terrestre, partagée avec les autres vivants” (16).

The mapmakers of *Terra Forma* understand terraforming as a co-constitutive practice between all living terrestrials. In the universe of the Baltimore Gun Club there exists only one set of terrestrials (the humans), so forming the planet in terms of terrestrial life means forming it in the image of humanity. Consequently, the Baltimore Gun Club seems to perform *anthropoforming* rather than *terraforming* – if we understand *terraforming* as the co-productive, positive forming of the planet. Anthropoforming could come to mean the technopolitics of the Anthropocene, with proponents such as the Ecomodernists and Elon Musk, while the terraforming imagined by Aït-Touati, Arènes and Grégoire adheres more precisely to what Donna Haraway calls the Chthulucene: A utopian world that resist the anthropocentrism of the Anthropocene, emphasizing myriad entanglements and assemblages of “the more-than-human, other-than-human, inhuman, and human-as-humus” (Haraway, 160). In *Staying with the Trouble* (2016) she contrasts the notion of an Olympic

Anthropos autopoetically forming the planet with the chthulucenic Earthmother, the Baltimore Gun Club incarnating the Anthropos intent on firing its gun into Earth, while the *Terra Forma* project sees “the chthonic powers of Terra infuse its tissues everywhere” (31), creating situated ‘cartes vivantes’ to account for the interrelation.

Reading *Sans dessus dessous* today nuances our perceived notions of the nineteenth century, shed lights on the pitfalls of our contemporary age of climate change while pointing towards a post-Anthropocenic future.

Conclusion

While terraforming is seen as an increasingly reasonable solution to the planet’s dire ecological problems, Verne’s *Sans dessus dessous* deals ambivalently with the idea of an Olympic Anthropos violently re-creating Earth according to his caprices. We can clearly recognise contemporary figures such as the Ecomodernist collective (arguing for a good Anthropocene) and space explorer Elon Musk (wanting to anthropomorphise Earth as well as Mars) in the Verne’s critical portraits of president Barbicane and chief mathematician J.-T. Maston.

What is predominant for the ideologues of ‘géo-constructivisme’ (to echo Neyrat) is that climate change gives rise to projects of geoengineering and ideas of terraforming. Evidently, research on ways that humanity can form its interplanetary spaceship through either carbon dioxide removal (CDR) or solar radiation management (SRM) has blossomed in harmony with the increasing awareness of current and future climate calamities, crisis being used as an excuse to anthropomorphise Earth even more. It is no coincidence that Crutzen – besides being a proponent of geoengineering – also co-authored the concept of the Anthropocene, the nearby argument to the Anthropocene thesis being: since humans are irreversibly changing the environment, why not start to do this deliberately? In *Sans dessus*

dessous, Verne highlights this kind of paradox, in which an environmental crisis (coal shortage) caused by the violent metabolism of the industrial beast is counteracted by the pursuit of more extracting and more terraforming. Instead of considering another way of feeding the industrial stomach, the Baltimore Gun Club wishes simply to engineer Earth to accommodate it. Ironically, terraforming is a result of the same Cartesian idea of mastery over nature that has created the problems it seeks to solve. In a way, *Sans dessus dessous* shows us the slippery rhetorical slope that recent geoengineering projects and terraforming philosophy are premised upon; when *crisis* becomes the opportune moment, *kairos*, for corporations to profit from climate change by privatising the terraforming of Earth. In contrast to his characters, Verne argues that we must view the planet as a historical trajectory and escape objectifying conceptions that lead to ideas of anthropogenic mastery. In this context, *Sans dessus dessous* could be understood as a precursor of the speculative theory-building and mapmaking of recent works such as *Terra Forma*.

Acknowledging precursors – and critical variants – of what we understand as the shock of the Anthropocene may be a controversial project since it diminishes the grandeur of the event. The point of reading Comte de Buffon, Charles Fourier, the Saint-Simonians, and Jules Verne as authors of terraforming is not to forward the claim that humans have always engineered Earth. The point is to locate spatial and temporal specificity: nineteenth-century France constitutes an amalgam of speculations about planet management, climate change and anthropogenic power that makes it a very pertinent period in the imaginary and political history of terraforming. Reading these authors today shows us that solar radiation management or carbon dioxide removal are not innovative and utopian initiatives awaiting practical implementation: these kinds of phantasms were the object of concern 200 years ago. Terraforming should not be understood as the desperate technofix launched by the sudden twenty-first-century awareness of climate change. Instead, it arises in line with large-scale

industry, modern climatology, the fossil fuel economy, and the technological evolution. The fact that visions of terraforming arose in the fin de siècle – the same period in which CO₂ levels started having a discernible impact on biogeochemical cycles – furthermore indicates that the Anthropocene’s techno-politics are ingrained at the origin of the climate crisis. This link constitutes a subject to be explored in future work.

In this sense, Verne’s *Sans dessus dessous* seems more contemporary than ever. It nuances our understanding of history, highlights the dangers of the present, and points toward a future in which terraforming means forming with other terrestrials, when the sky god Anthropos is toppled by the holobiomic Earthmother.

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Notes

- i Crutzen's basic message was that "research on the feasibility and environmental consequences of climate engineering of the kind presented in this paper [...] should not be tabooed" (214). It is commonly understood that his essay in *Climatic Change* 'broke the taboo on geoengineering': Three years after the text was published, more than half of the leading scientists agreed in the *Independent* newspaper that the climate situation had become so untenable that a backup plan was in order (Hamilton 15-16).
- ii Reflecting on the technological evolutions of the nineteenth century in his two major works *La Fin du monde par la science* (1855) and *L'Arbre de la science* (1857), Eugène Huzar imagined the possible catastrophes that scientific progress could entail. However, quite surprisingly, his technological catastrophism was not premised on an extensive critique of scientific progress as such, rather he criticised "une science ignorante, *impresciente*" and "un progrès qui marche à l'aveugle sans critérium ni boussole." (Huzar 2008, 138) Instead, he envisioned a new kind of science concerned with the equilibrium of the planet, supported by a world government overseeing the large-scale industrial and scientific projects that could disturb the harmony of the planet (Fressoz 2010, 98).
- iii A facsimile print of Badoureaux's extensive calculations as well as the correspondence between Verne and Badoureaux was published 2005, under the heading *Le Titan moderne*.