

Space Race Archaeologies
Photographs, Biographies, and Design

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CHAPTER 1

Another Space: Global Science and the Cosmic Detritus of the Cold War

Asif Siddiqi

Most narratives of the history of space exploration traffic in a set of fixed archetypes redolent of machines, men, and militaristic ethos associated with bipolar superpower competition.¹ For Americans, the iconic images of NASA astronauts on the Moon conveyed the optimism of the 1960s – both real and imagined – while also reinforcing the notion that space activity, when it happened, was circumscribed within discrete geographies associated with high technology and national exceptionalism – of either the American or Soviet brand.² Yet, such narratives by design obscure smaller movements of people, knowledge, and artefacts that neither fit into national narratives nor are visible at the level of typical histories of Cold War “Big Science” and knowledge production directed by massive centralised resources. A close reading of the material detritus of the space race renders visible a skeleton of another parallel narrative of space exploration where, for example, locals at Hammaguir, a village in Algeria’s Béchar province on the border with Morocco, could help visiting engineers launch the first French satellite into orbit in 1965. Or, where Italian and American scientists used the San Marco sea platform off the coast of Kenya to launch satellites

1 Roger D. Launius, *American Spaceflight History’s Master Narrative and the Meaning of Memory*, in: Steven J. Dick (ed.), *Remembering the Space Age* (Washington D.C.: NASA History Division, 2009), pp. 353-385.

2 Asif Siddiqi, *National Aspirations on a Global Stage: Fifty Years of Spaceflight*, in: Steven J. Dick (ed.), *Remembering the Space Age* (Washington D.C.: NASA History Division, 2009), pp. 17-35.



The area around the French launch site, which the French called Hamada du Guir, or Hammaguir for short, was notable for its flat stony sandstone plateaus above the desert plains.

Source: Michel Taillade

into space operated by the University of Rome. Or, in Thumba in South India, where Soviet, American, and French scientists could meet in a remote fishing village to conduct a physics experiment high on the edges of space above the Indian Ocean. Beyond bringing to light what has largely been forgotten, the histories of these sites also offer empirical evidence germane to historians of science and technology about questions of locality, circulation, and the authority of knowledge in the Global South. Ultimately, these episodes, given their resistance to clean national narratives, help us to fundamentally reimagine the normative bipolar history of space exploration in the late twentieth century.

Historians of science and technology have engaged for quite some time now with questions of the “global” in their work, parsing out the possible differences and limitations of such terms as the global, the local, the comparative, and the national.³ We have debated particularly the problematic of circulation, undergirded by an interest in multiple mobilities – of the human, the material, and the epistemic – through space and through time. We have also been reminded that

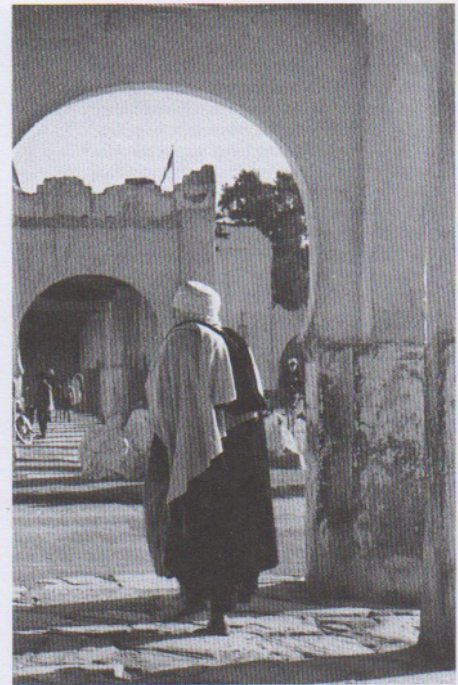
³ For a useful summary, see Francesca Bray, *Only Connect: Comparative, National, and Global History as Frameworks for the History of Science and Technology in Asia*, in: *East Asian Science, Technology and Society: An International Journal*, Vol. 6 (2012), pp. 233-41.

"mobility should not be stressed to the extent that immobility, disjuncture, and the workings of the local are forgotten."⁴ There is an abundance of work worthy of consideration here, some of it generated by scholars of colonial science who, in the 1990s, sought to avoid the kind of unidirectional centre-periphery diffusionary models evocative of much of the early work in the field. As a result, historians of science – subsequently influenced by postcolonial studies ... have rejected arbitrary signifiers such as "indigenous" and "Western" in describing the objects of their study in favour of "more interactive, culturally nuanced, multi-sited debate" over the history of science and technology.⁵ The substantive theoretical meditations on the circulation of knowledge in the history of modern science have, however, not been matched by a concomitant commitment to empirical case studies.

Here, in this brief essay, I use the history and archaeology of the French launch site in Algeria to offer some preliminary thoughts on the use of "site" and "scale" as heuristic frames of reference. My goal is twofold. First, I hope to contribute to discussions on the use of ground infrastructure scattered across the globe as a possible entry point into rethinking the normative history of space exploration. Second, I hope to develop some analytical approaches useful for empirical studies germane to questions on global histories of modern science. I will hint at common patterns, visible at Hammaguir, but repeated elsewhere globally in the technoscientific infrastructure of the space age, manifested in material formations on the ground and in the skies, with a goal to outlining how the use of site and scale can subvert normative narratives and rethink old stories in entirely new ways.

4 Sujit Sivasundaram, *Sciences and the Global: On Methods, Questions, and Theory*, in: *Isis*, Vol. 101 (2010), pp. 146-158.

5 Warwick Anderson, Introduction: *Postcolonial Technoscience*, in: *Social Studies of Science*, Vol. 32, Nos. 5/6 (2002), pp. 643-58; David Arnold, *Europe, Technology, and Colonialism in the 20th Century*, in: *History and Technology*, Vol. 21 (2005), pp. 85-106. See also the special issue on *Science and Global History, 1750-1850: Local Encounters and Global Circulation*, in: *Itinerario*, Vol. 33, No. 1 (2009), especially the piece by Lissa Roberts (*Situating Science in Global History*); Fa-ti Fan, *The Global Turn in the History of Science*, in: *East Asian Science, Technology and Society: An International Journal*, Vol. 6 (2012), pp. 249-58; Kapil Raj, *Beyond Postcolonialism... and Postpositivism: Circulation and the Global History of Science*, in: *Isis*, Vol. 104 (2013), pp. 337-37; and the special issue on *Transnational History of Science*, in: *The British Journal for the History of Science*, Vol. 45 (2012), especially the introduction (pp. 319-336) by Simone Turchetti, Nestor Herran, and Soraya Boudia (*Introduction: have we ever been 'transnational'? Towards a history of science across and beyond borders*).



This photo from the early 1960s was one of several published in the French media showing life in the city of Colomb-Béchar, home to a vibrant coal-mining economy. Algerians, if they were visible at all in images of Hammaguir, were often used to emphasise the contrast between traditional life and the modern French programme.

Source: *McGraw-Hill Encyclopedia of Space* (New York: McGraw-Hill, 1968), p. 80

Hammaguir and the other similar sites scattered across the global landscape represent examples of the many installations created in the aftermath of Sputnik to sustain and support space activities directed by the United States, the Soviet Union, and former colonial powers such as Great Britain and France. NASA itself established a network of a dozen stations globally to support deep space communications.⁶ The locations of these sites, as well as the ones built by other nations, were determined not by any particular technical expediency but largely as a result of constraints dictated by geography and politics. Satellites that crisscrossed over the global landscape required listening posts in very particular locations, for example, but the superpowers often favoured places governed by states friendly to their ideological worldview. Launch sites, especially if created overseas, were subject to similar constraints, determined by closeness to the equator but also by political expediency. As the space age declined into monotony and maintenance, and the Cold War eventually concluded, many of these installations, such as Hammaguir, were abandoned. Some have been repurposed for non-technical ends, as farming structures or playgrounds. In some places, large population displacements due to the creation of the technical infrastructure had produced deep social antipathy. These kinds of temporal, material, and social frictions mark a forgotten web of cosmic but earthbound detritus strewn across the global landscape. The clash between the social, the material, and the technical embodied in the remains of these abandoned artefacts point to a history of irruptions as the space age arrived in the form of massive technological infrastructure in places far beyond the United States. Through an investigation of Hammaguir, this essay represents a kind of archaeology of the space age, one that reconstitutes the space race as a project at the intersection of global science, ephemeral infrastructure, and postcolonial geography.

Hammaguir: Site and Scale

The French presence at Hammaguir had roots in the immediate aftermath of the Second World War. As the French gained an appreciation for the power of new weaponry such as ballistic and cruise missiles, they sought an appropriately remote region to test such armaments.

6 Sunny Tsiao, "Read You Loud and Clear!" The Story of NASA's Spaceflight Tracking and Data Network (Washington D.C.: NASA, 2008).



French authorities found an ideal site in Algeria, which offered a constellation of favourable conditions: its colonial status, its large expanse of relatively uninhabited desert area, a railway line to the Mediterranean, favourable weather conditions, an airstrip, and the availability of "skilled foreign [sic] labour."⁷ In 1947, the French government established, by ministerial decree, an official test range near the eastern Algerian border, officially known from September 1948 as the Inter-Army Centre for Tests of Special Vehicles (Centre Interarmées d'Essais d'Engins Spéciaux, CIEES). The range was located in the vicinity of the coal-mining town of Colomb-Béchar, which also had a healthy local economy of leatherwork and jewellery. The flat stony sandstone plateaus of the local topography proved attractive to the French military, and by the late 1940s, the French army had begun dropping bombs on the desert south of Colomb-Béchar as part of a missile test programme to blow up simulated targets.

⁷ Philippe Varnoteaux, *Le centre interarmées d'essais d'engins spéciaux. Origine et enjeu d'un champ de tir opérationnel*, pp. 535-542 (quote from p. 537). For more detail, see Philippe Varnoteaux, *Les origines et les enjeux de la conquête de l'espace en France, 1944-1962*, Diss., Université de Reims Champagne-Ardennes, 2000.

Launch pad for satellite launches at Hammaguir. A rocket can be seen installed on the launch platform while connected to the servicing tower. Source: Centre National d'Etudes Spatiales



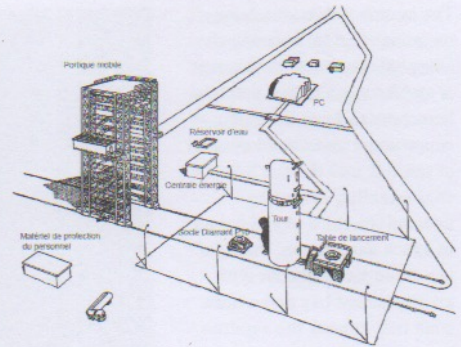
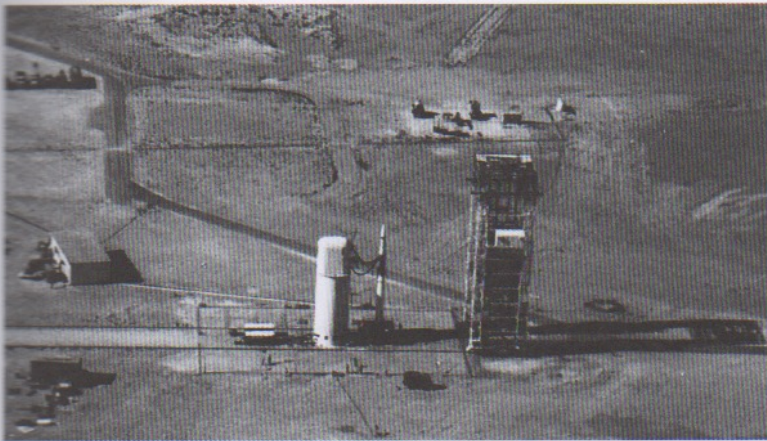
The local infrastructure of Hammaguir included a small settlement for about 600 people working directly on the launches. On the lower left, we see the hotel with a large swimming pool. On the far left, there is a large area for playing football. The road stretching backwards to the top and right leads to the launch pad area.

Source: Michel Taillade

In 1952, the CIEES range was extended about 110 km southwest to the plateau (*hamada* in Arabic) that overlooked a desert plain (*guir*). Here, in the newly christened Hammaguir (or base B2), the French began firing a modest series of Veronique rockets into the upper atmosphere.⁸ In the early 1960s, as French efforts to assert their independence in space gained momentum, the French scientific community spearheaded a project to launch a national satellite into space, a plan approved by President of the French Republic Charles de Gaulle. For this objective, the French government created the National Centre for Space Studies (Centre National d'Études Spatiales, CNES) in December 1961.⁹ Hammaguir was an obvious choice for the launch site but these expectations were nearly extinguished with Algerian independence in 1962. The expected French departure from Hammaguir was put on hold, at least temporarily, in a secret provision which was part of the Évian Accords of March 1962 that ended the bloody colonial war. Accordingly, the French were allowed to remain at Hammaguir for another five years, until 1 July 1967. Thousands of French scientists and engineers

8 Émile Arnaud (ed.), *Les Missiles Balistiques de 1955 à 1995* (Paris: Comité pour l'histoire de l'aéronautique, 2004), pp. 191-228; Jacques Villain, *Le C.I.E.E.S.: un champ de tir oublié*, *Bulletin d'information de l'Institut Français d'Histoire de l'Espace* (July 2007), pp. 7-8.

9 Hervé Moulin, *La France dans l'Espace 1959-1979: Contribution à l'effort spatial européen* (Noordwijk: ESA/ESTEC, 2006), pp. 28-29. The actual decision to build a satellite launch vehicle was taken on 9 May 1962. See Jean-Pierre Marec (ed.), *Un demi-siècle d'aéronautique en France: Centres et moyens d'essais*, Vol. 1 (Paris: Comité pour l'histoire de l'aéronautique, 2008), p. 186.



continued to work in the desert, often resulting in frictions, partly due to anxieties about wayward rockets falling near populated areas at Colomb-Béchar. Undoubtedly, there was residual animus directed at the French for activities still perceived as colonial in the wake of independence. Local Algerians were prohibited from entering the Hammaguir range although the Colomb-Béchar economy was crucial to sustaining French social life on the base. In 1965, the French successfully launched their first satellite, Asterix, from Hammaguir, making France the “third” space power after the Soviet Union and the United States. Hammaguir hosted several more launches before the French relocated all their space activities, in 1967, to another colonial holding, French Guiana in South America.

In rethinking the patterns of ground infrastructure of the space age dotting the Global South, Hammaguir offers us provocative ways to consider two heuristics: site and scale. Consider the constituents of what made these locales space sites instead of simply scientific or technical sites, particularly the infrastructural archetypes of the space age as they were identified in official documents: these sites included the launch pad (at Hammaguir there were four of these with common French names, Blandine, Bacchus, Béatrice, and Brigitte); the railway line that connected the launch site with a nearby settlement (here, the French depended on a colonial-era railway); optical tracking cameras known as cinetheodolites (the French built four each for each site, with names such as Askania and Contravés); radar systems to track rockets flying into the atmosphere (the French had COTAL radars); a ground interferometer system

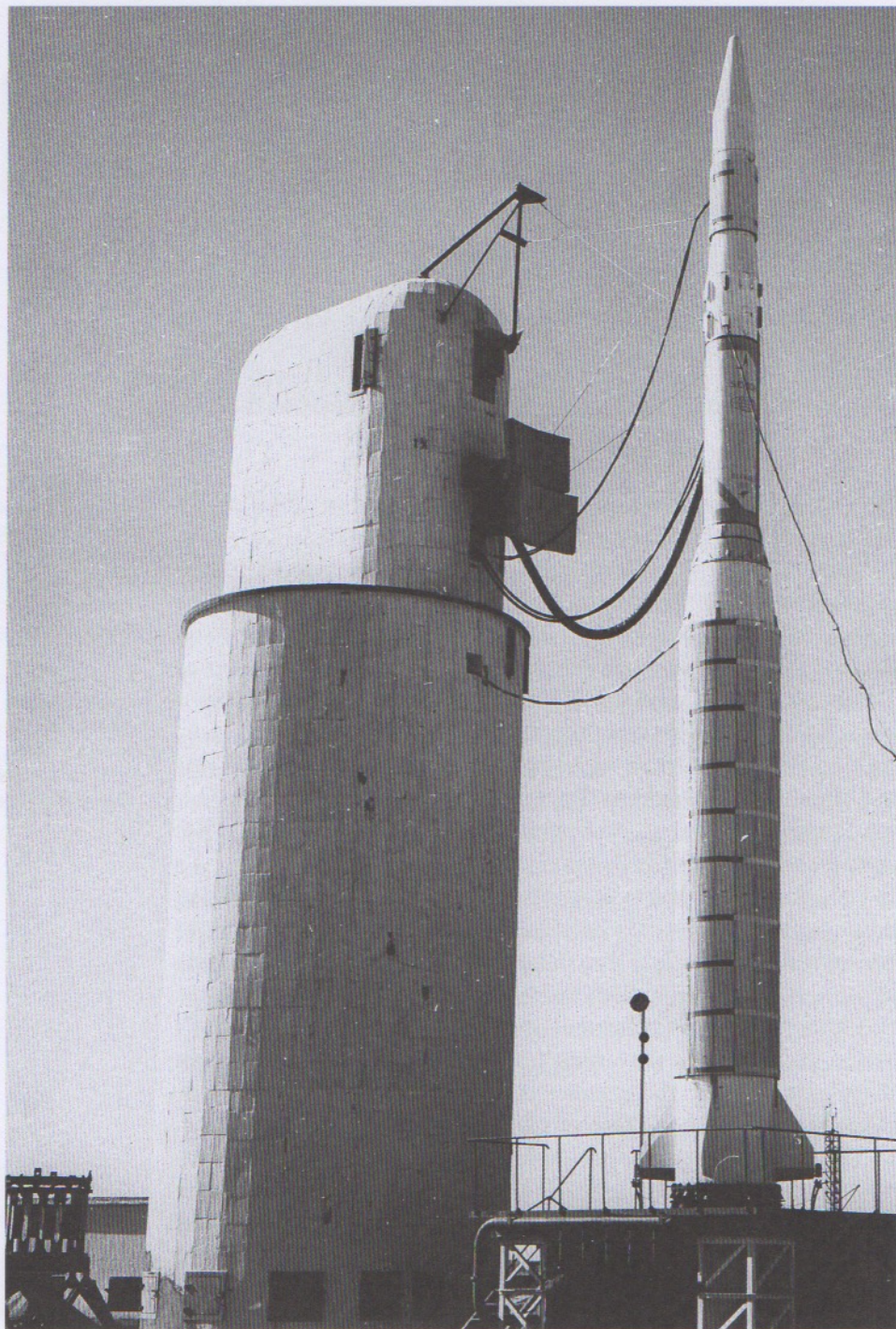
Left: the launch pad for satellite launches, known as Brigitte, was one of four located at Hammaguir. A rocket can be seen installed on the launch platform while connected to the servicing tower.

Source: Michel Taillade

Right: a diagram of Brigitte shows the various elements of the ground infrastructure, including a mobile platform, a water reservoir, a power station, a tower, a launch table, and a control building structure (“PC”).

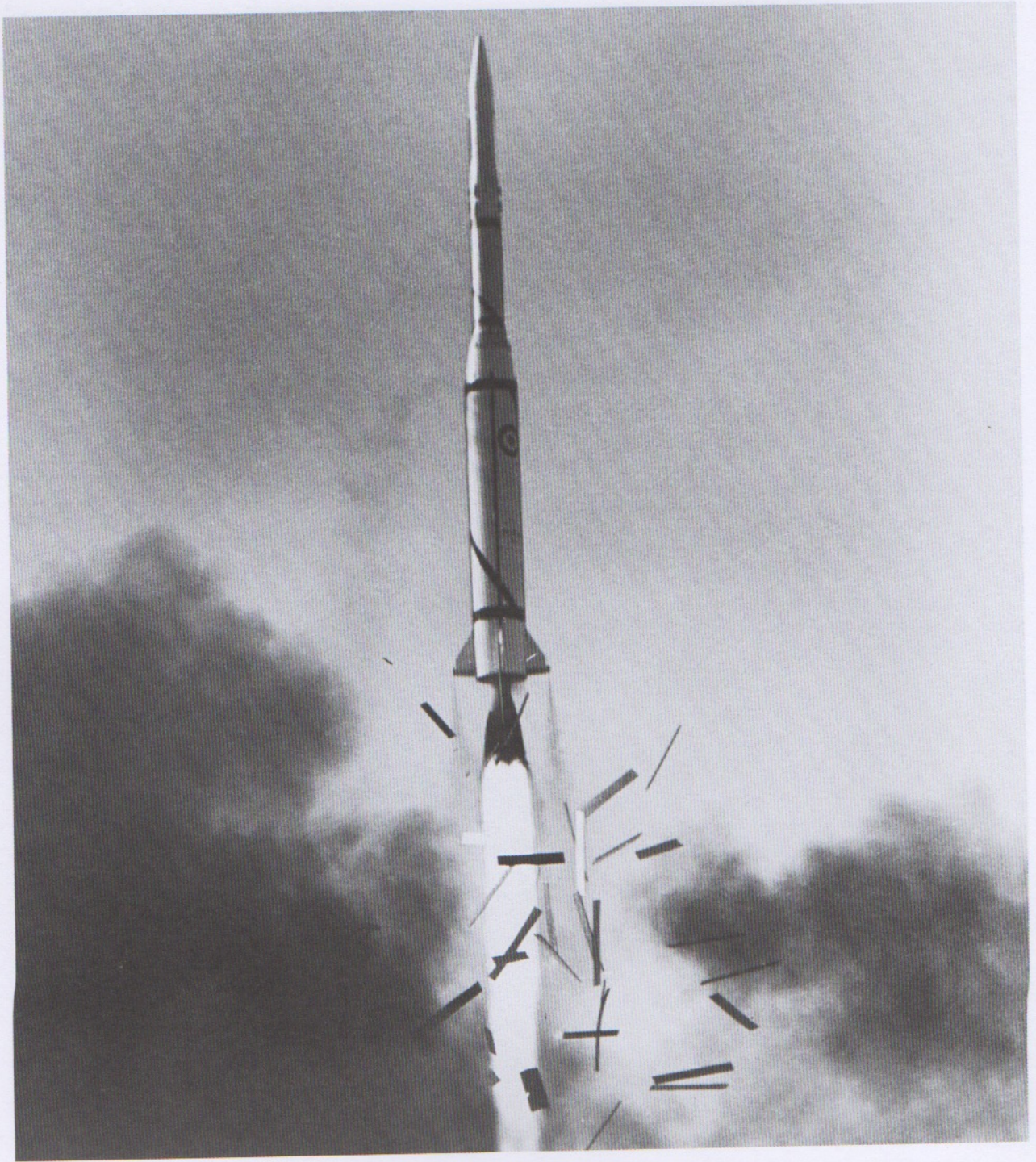
Source: Michel Taillade

The launcher Diamant A on its launch pad in Hammaguir (Algeria). The rockets Diamant A and B were the first satellite launchers to be researched, constructed and tested outside of the U.S. and the U.S.S.R., thus enabling France to become the third global power in space exploration. Diamant is a three-tier launcher with an equipment bay and a nose cone that shields the satellite. Its various upgraded versions have led to the designation of systems, anticipating the current launcher Ariane. The rocket Diamant A has been qualified by the launch of the satellite Astérix-A1 on 26 November 1965 from the Hammaguir base. The last launch took place in 1975 from the Guyana Space Centre.
© SEREB, 1965





First launch of Diamant A,
26 November 1965, Hammaguir.
France becomes the third global
power in space exploration.
The first French satellite
launcher: Diamant A.
© ECPA, 1965



(named COTAR), consisting of two arrays each having a panelled antenna 150 m in length laid flat on the ground; a high-precision radar (named Aquitaine); a large dish antenna for receiving telemetry from rockets (the French one was called Cyclope, with a dish 18 m in diameter); and an office building for "mission control."¹⁰ "Site" here also included the objects left invisible in the technoscientific frames of the space programme, meaning the infrastructure of the social, the architecture of life transposed onto the technological frame. These included a nearby "settlement" (in this case, Colomb-Béchar) where "local" populations lived, along with families of support personnel, and a local base around the actual launch site that included facilities for work and recreation, apartment housing, and hotels for visitors. Together, the technical and the social operated in these space sites without any contradiction, and in fact, usually in deliberate consonance. Historians of science and technology have a familiar term for this: sociotechnical systems, objects that are neither solely social nor only technological but can be understood as the outcome and expression of modern science as a force which draws in the social, the technological, the architectural, and ultimately, the political.¹¹

Each of these artefacts of the archetypal space site embodies a particular visual trope – consider the launch pads with their towering structures, the large dishes of antennae in their parabolic shapes, the ground radars often as panels on the ground, the control centre building with its functional architecture ("block house" in NASA parlance), and the fuelling stations with their pipes and fittings leaking gas. We see all of these visual markers reproduced in space sites globally, as the infrastructure of the cosmos spread during the Cold War. And with them were the adjacent towns, the local housing, the makeshift roads, and the open-air cinemas in the middle of the desert (as there was at Hammaguir). We might also include the dynamic tropes of the site: the upward-moving trajectory of the rocket careening into the clouds, with wisps of jet trails in their wake, for example. Consider also the packages of sodium

The launcher Diamant A on its launch pad in Hammaguir (Algeria). The rockets Diamant A and B were the first satellite launchers to be researched, constructed and tested outside of the U.S. and the U.S.S.R., thus enabling France to become the third global power in space exploration. Diamant is a three-tier launcher with an equipment bay and a nose cone that shields the satellite. Its various upgraded versions have led to the designation of systems, anticipating the current launcher Ariane. The rocket Diamant A has been qualified by the launch of the satellite Astérix-A1 on 26 November 1965 from the Hammaguir base. The last launch took place in 1975 from the Guyana Space Centre.
© DMA, 1965

10 Details of many of these installations can be found in *Un demi-siècle d'aéronautique en France*, pp. 169-200.

11 Sociotechnical systems are typically associated with the work of Thomas Hughes. See his *Networks of Power: Electrification in Western Society, 1880-1930* (Baltimore: Johns Hopkins University Press, 1983). For Cold War "technopolitics," see Gabrielle Hecht (ed.), *Entangled Geographies: Empire and Technopolitics in the Global Cold War* (Cambridge, Mass.: MIT Press, 2011).



fired into the upper atmosphere above Hammaguir by the French on their Veronique rockets. By tracking the trails of coloured sodium vapour at the lower edges of space, scientists were able to investigate the properties of the upper atmosphere near the equator. These sodium clouds left peculiar spiralling orange trails visible in the sky for hours, formations that revealed scientific information on the direction of atmospheric winds while also leaving behind an aestheticised imprint of modern science in the heavens. A familiar site to the population of Colomb-Béchar in the late 1950s, these sketches in the sky represented an aerial icon of modernity to the scientists, while for many they were simply a reminder of the last vestiges of the colonial state. In a peculiarly global echo of space activity, the scientist in charge of the sodium experiment in Algeria, Jacques Blamont, soon provided the same experiment to American and Indian scientists launching rockets off the southern coast of India in the early 1960s.¹² Thus, in Thumba in India, scientists, local politicians, and the fisherman displaced by this rocket activity were also all witness to the same visual image of these strange sodium clouds, transposed from another postcolonial site in Algeria.¹³

Rethinking the heuristic of "site" in the history of space exploration leads us to a second interconnected register, that of "scale." The story of Hammaguir (or Thumba) was not limited to the physical span of the local scenery but also to the extended imaginary of its operations. To support the operations at Hammaguir, the French built and operated satellite tracking and communications facilities that connected Hammaguir with a large portion of the globe, thus extending Hammaguir's scale far beyond the immediate desert. These stations, such as Paardefontein (South Africa), Beirut (Lebanon), Ougadougou (Burkina Faso), Brazzaville (Congo), and Stephanion (Greece), were in addition to the French space agency's principal centre at Brétigny-sur-Orge near Paris. Besides the communications network, we can also consider the scale of the detritus of the rocket: as it reached for the skies, the used elements of its structure were discarded and then fell, unguided and uncontrolled into landscapes far beyond Hammaguir. Initially, French rockets flew in a northeastward direction, dropping discarded rocket equipment into the Mediterranean and then flying over the Middle East



Cyclope

Source: Musée de la Poste

12 Jacques Blamont, *L'Action Sœur du Rêve: souvenirs de voyage* (Paris: Éditions Édite, 2012).

13 For Thumba, see: Asif Siddiqi, Science, geography, and nation: the global creation of Thumba, in: *History and Technology*, Vol. 31, No. 4 (2015), pp. 420-451.

Left page: a close up of Cyclope

Source: *McGraw-Hill Encyclopedia of Space* (New York: McGraw-Hill, 1968), p. 283

and then into orbit around the Earth. Complaints about falling garbage from space into the sea forced the French to consider an entirely different track: instead, for the final satellite launches from Hammaguir, the French fired their rockets in a southeastward direction, toward sub-Saharan Africa, with their spent rocket garbage now falling in northern Niger, a former French colony, and one more amenable to accepting the detritus of the space age. The material manifestation of the rocket garbage, from the Mediterranean to Niger, represented one discarded reminder of the "global" scale of activity largely unacknowledged by locals at Hammaguir.

In considering the "site" of Hammaguir then, we are thus left with several frames of "scale": there is the infrastructure local to the launch site, the broader site that included Colomb-Béchar, and then another larger frame that expands to include the vast number of tracking stations stretching across the African continent, Europe, and the Middle East. Another frame reminds us of the garbage from Hammaguir, linking the Mediterranean to sub-Saharan Africa. Finally, the mobility of the sodium experiment from Algeria to India created an epistemic link between postcolonial geographies. All of these frames invite further interrogations of the relationship between "site" and "scale" as registers of space activity in the late twentieth century.

Using "site" and "scale" as possible heuristic frames in recovering the history of the space age allows us, with the benefit of empirical case studies, a peek into the real world of the "global," moving from abstraction to the material. Collectively, they contribute to creating "an anthropology of intersecting imaginaries" where the boundaries of the imagination are as mutable as the substance of what is imagined.¹⁴ Through these imaginaries, we unmoor ourselves from reflexive and fixed assumptions about what it means to be "local" or "global."¹⁵ We must, however, avoid ascribing the notion of the "local" to indigent populations and the "global" to the authority of

14 I appropriate the term "an anthropology of intersecting imaginaries" from Anna Lowenhaupt Tsing's "anthropology of intersecting global imaginaries." See her *In the Realm of the Diamond Queen: Marginality in an Out-of-the-Way Place* (Princeton: Princeton University Press, 1993), p. 289 which is cited in Anderson, Introduction, p. 658 (ref. 65).

15 For a useful meditation on the problem of the "local" in the history of colonial science, see: David Wade Chambers and Richard Gillespie, *Locality in the History of Science: Colonial Science, Technoscience, and Indigenous Knowledge*, in: *Osriris*, 2nd Series, Vol. 15 (Nature and Empire: Science and the Colonial Enterprise), Roy MacLeod (ed.), (Chicago: University of Chicago Press, 2000), pp. 221-240.

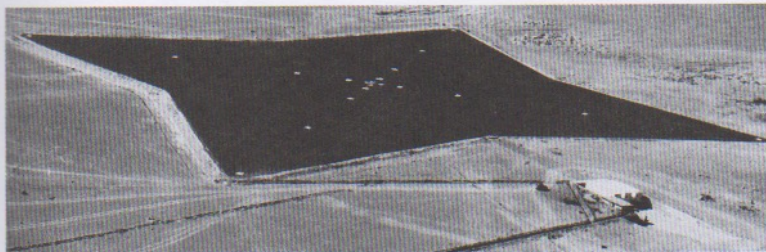


The main control station or block house supporting launch operations at Hammaguir was in a location separate from the main living area.

Source: *McGraw-Hill Encyclopedia of Space* (New York: McGraw-Hill, 1968), p. 80

Western science. I am more interested in highlighting sites that help us focus our investigations on the epistemic (and otherwise) violence that results from the friction between what is imagined as “global” and the “local” at any given moment by the principal actors in the story. In these frictions, to extend the analogy, I am interested in the sparks generated, as ideas, objects, and people burst forth and travelled into a contested epistemological terrain shaped by an incredibly heterogeneous social milieu.

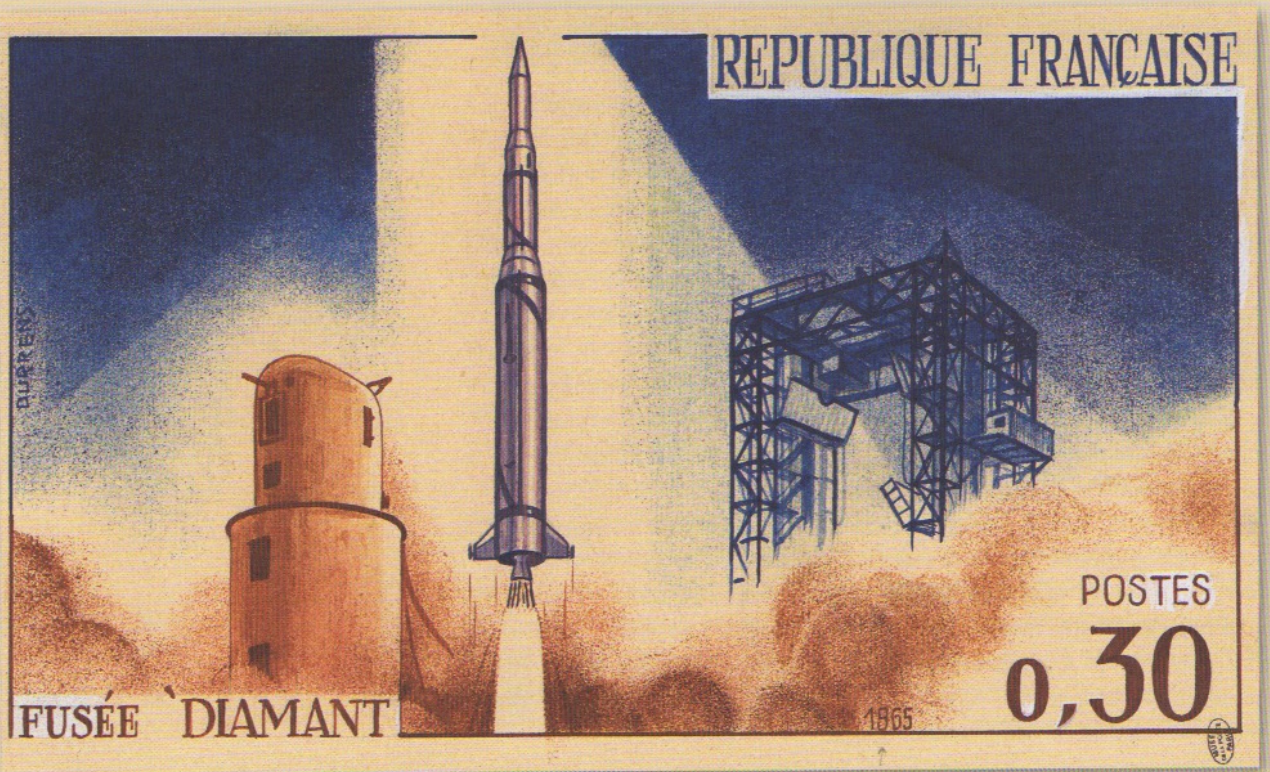
In one way or another, all these space sites such as Hammaguir embody patterns of “local” transactions that were understood as – or in some cases, gave rise to – “global” meanings and/or universalist claims, whether grounded in geography, time, or communities. But ultimately, there is a resistance here, to clean narratives of the local or the global. The story of Hammaguir – understood through the registers of “site” and “scale” – represents a possible empirical example of an alternative history of the space age. One imagines multiple stories such as these, found in several different sites, and encompassing a global mapping of imaginaries, all linked by the common goal of the exploration of space.

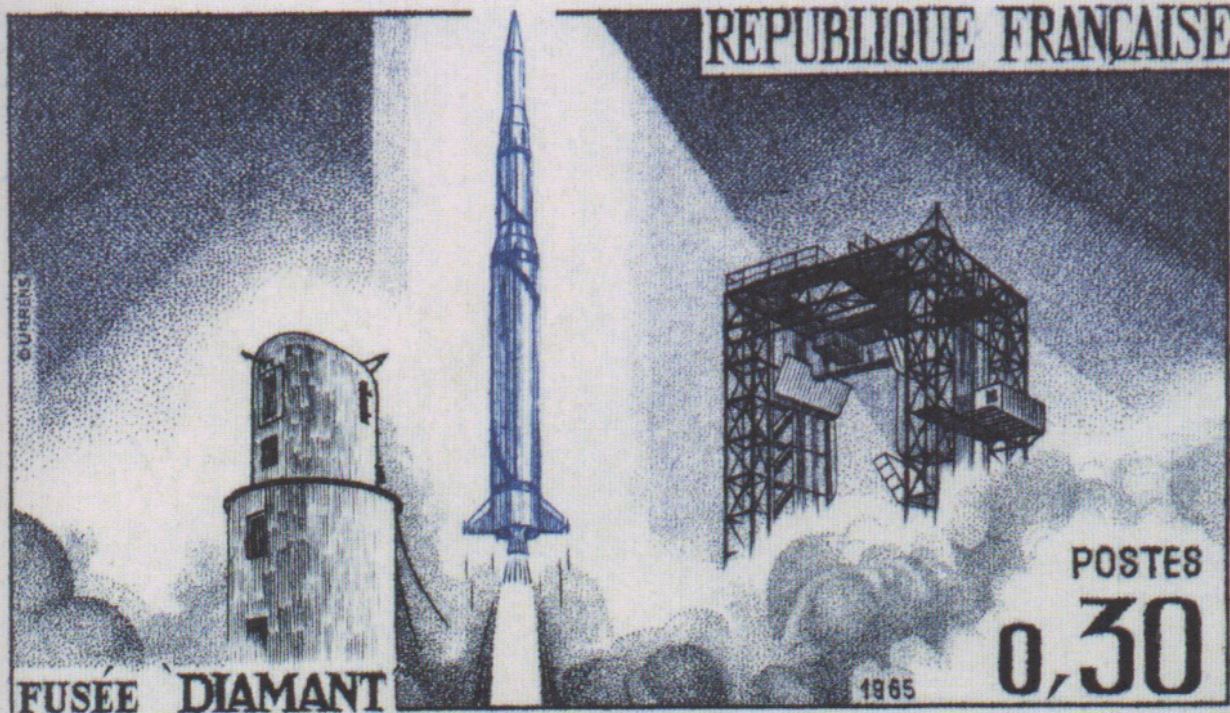


One of the interferometers at Hammaguir presents a striking image against the flat landscape of the desert. The installation was used to determine the position of rockets and satellites. When the French space agency, National Centre for Space Studies, left Hammaguir in 1967, it dismantled and packed up the interferometers and took them back to France.

Source: *McGraw-Hill Encyclopedia of Space* (New York: McGraw-Hill, 1968), p. 79

Diamant rocket on a stamp of French post,
design proposal (left) and final print (right).
Design: Claude Durrens, 1965.
Source: Musée de la Poste





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FUSÉE DIAMANT

1965

POSTES
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