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## **Extra-terrestrial Geography: Cosmography before and after Von Humboldt**

**Denis Cosgrove**

Alexander von Humboldt's best-known work is the five-volume Cosmos: a sketch of a physical description of the earth, published at the end of his life (part posthumously) between 1845 and 1862. Its first two volumes were rapidly translated into English, and have been reprinted in the past three years, a testament to renewed interest in von Humboldt's work. The universal scope of this enterprise is almost inconceivable for a scholar today, but it represents a significant moment in a long intellectual tradition in which geography is embedded. It is that tradition – of grasping the material world as a cosmos - that I shall reflect upon today.

I make no claim to be a Humboldt scholar (the fraternity is large, and specialised enough not, I imagine, readily to forgive what the geographer John Kirtland Wright once called 'foolrusher' on my part across their well-tilled field). But the singular honor awarded me by this University of inviting me to become the first occupant of a chair named after Alexander von Humboldt, together with the opportunity to re-read *Cosmos*, permit me to use

his work to reflect upon the idea and practice of cosmography. In a gesture towards my removal to Steven Spielberg's city, I have chosen to title my remarks 'extra-terrestrial geography.' My aim is to explore the interest that my own sub-field of cultural study within the discipline of Geography might have today in the spaces beyond Earth's immediate surface and atmosphere. I want to suggest that the historically deep connections between Geography and Cosmography - the description and representation of the universe as a whole, or cosmos - historically broken by the processes of Modernity (von Humboldt's own text clearly registers the tensions that such a break entailed), are worthy of reconsideration. Philosophical and epistemological shifts have weakened the claims that underpinned the Modernist intellectual project, while there is a growing human presence (virtual and actual) in spaces beyond the earth. Both these trends nudge us towards a re-thinking of the cosmographic connection. They allow us, perhaps, to re-imagine a Human Geography of celestial space, a cosmography for the twenty-first century. I don't propose to sketch such a cosmography this afternoon. At the simplest, I want no more than to gesture towards the fact that the actualities of a virtual world: of informatics, GIS and the Net, and also of space exploration, are evidence that an extra-terrestrial human geography already exists. Framing and answering the questions it raises await the interest of cultural geographers.

But reference to cosmography signals my intention to press a little further and to remark various responses within the contemporary humanities and creative arts to the newly opened extra-terrestrial spaces of human presence. Such responses address imaginative, aesthetic and poetic aspects which were always integral to the cosmographic project. In his cosmographic writings, Alexander von Humboldt recorded and reflected such responses.

My presentation is in three parts: I shall examine first the meanings of cosmography and its relations to geographical and astronomical knowledge. For this I shall draw upon the account offered by von Humboldt himself. The second volume of *Cosmos* is a history of cosmography in which he calls particular attention to its metaphysical and artistic connections, while emphasising their subordination to empirical observation during the era of European encounter with global geography. The second and third parts of my own talk echo in some measure von Humboldt's interest in the meeting of empiricism and imagination during the age of 'oceanic discoveries' and 'discoveries in the celestial spaces'. While a historical sketch of cosmography is beyond both the time available and my own capacity, I want to recall in the second part of my lecture the crisis of cosmographic knowledge in the Renaissance, the consequent separation of earth from the

heavens, and the responses within humanism and the creative arts. In the final part of the presentation, I signal some indications of renewed interest in these poetics of cosmography and suggest that they might warrant the attention of cultural geographers today, as extra-terrestrial space itself takes on a more complex human geography.

### **Cosmography**

Closing his introduction to *Cosmos*, von Humboldt discusses the meanings of the word cosmos itself, pointing out the root meaning of ‘ornament’ that it shares with the Latin mundus, (still echoed in our modern word *cosmetic*). The Pythagorean application of ‘cosmos’ to a harmonious and beautiful creation, conceived as unitary whole, draws upon an aesthetics of order and proportion most perfectly expressed in mathematics: number and geometry. Ordered unity in physical creation is von Humboldt’s special concern:

I use the word Cosmos in conformity with the Hellenic usage of the term subsequent to the time of Pythagoras. ... It is the assemblage of all things in heaven and earth, the universality of created things constituting the perceptible world. If scientific terms had not long been diverted from their true verbal signification, the present work ought rather to have

borne the title *Cosmography*, divided into Uranography and Geography.

Cosmography then, takes as its object the ‘order of the world.’ As his words indicate, by von Humboldt's time it had largely disappeared as a respectable scientific term, and in the century and a half that has followed, the ‘order of the world’ has become a deeply distrusted concept in the social sciences and humanities too. From von Humboldt’s perspective, Newtonian science and Enlightenment secularism had relegated the humanist concerns of cosmography to quasi-theological and popular devotional works, based on the remnants of an outmoded science, still seeking to justify a global providential plan in creation and Christian salvation. Von Humboldt is concerned to reassure his readers that he is limiting himself to 'the domain of empirical data', and avoiding 'conceptions of the universe based solely on reason, and the principles of speculative philosophy.’ These, he claims, had dominated cosmographic thought until the conquest of medieval scholasticism by modern exploration and experimentation. But if von Humboldt thus embraced a characteristic mid-nineteenth century belief in positive scientific progress, from myth to enlightenment, through empirical observation of a dis-enchanted physical universe, he was Goetheian enough

to acknowledge the enduring power of human imagination and speculation in making and framing science. The final paragraph of his introduction states:

the abuse of thought, and the false track it too often pursues, ought not to sanction an opinion derogatory to intellect ... It would be a denial of the dignity of human nature and the relative importance of the faculties with which we are endowed, were we to condemn at one time austere reason engaged in investigating causes and their mutual connections, and at another that exercise of the imagination which prompts and excites discoveries by its creative process.

Thus, von Humboldt separates physical science from cultural and historical studies to the extent of devoting distinct volumes of his work to each. Volume One of *Cosmos* is a delineation of physical nature: a survey of then current knowledge of material phenomena in the terrestrial and celestial portions of the cosmos. Volume Two is a history of the poetic, artistic and physical contemplation of the universe and of its scientific exploration, in which von Humboldt studiously avoids any critical consideration of what had long been cosmography's central question: the place of human order within the order of nature. Indeed, the structure of the work prevents this, reflecting von Humboldt's adherence to that strict division of objective and subjective knowledge (*Naturwissenschaft* and *Geisteswissenschaft*) that dominated

nineteenth-century German scholarship. I shall return to this in a moment. A more immediately obvious absence in *Cosmos* is illustration. Von Humboldt's text lacks maps or diagrams, key features of the cosmographic tradition. This is particularly surprising given von Humboldt's justly famous demonstration in a paper of 1817 of the isoline (an theoretical geographic surface, produced by connecting empirically observed points of equal value) and its application in a map of temperature variation across the northern hemisphere [L]. The map demonstrated dramatically the inadequacy for describing global climatic patterns of the 90 latitudinal klimata and zones of habitability dating back to Classical cosmography [R]. The klimata had been evidence of cosmography's root assumption: that the perfection of the divine heavens was inscribed in some measure on the elemental earth. There was a specific reason for the absence of maps in von Humboldt's text: he had intended a separate volume of maps and illustrations to be prepared by Heinrich Berghaus as illustrations to his argument, but the two projects were separately published.

But the graphic void in *Cosmos*, like von Humboldt's isotherm map itself, the structure of his text, and his comment on changing scientific terminology, all point to the shrivelling of the cosmographic project in the

face of the modern structure of knowledge and the disenchantment of the cosmos. As a mapping project, cosmography's conventional embrace incorporated and extended that of geography and chorography, the scales of the globe its and particular regions respectively, to create a harmonious picture of the whole of creation. According to Claudius Ptolemy, mathematics was the technical foundation of geographic mapping, while chorography relied on drawing and painting in order to capture the character of place. Cosmographic mapping (although Ptolemy does not discuss it) called more fully upon the resources of imagination and speculation. To be sure, identifying at the earthly scale those principles of order and harmony that render the Pythagorean universe a cosmos depends upon transferring observed temporal regularities (solar, planetary and stellar) to geographic patterns, and representing these graphically by means of points, lines and symbols: mapping as recording. But cosmography also calls upon another, more projective, sense of mapping in its quest to calculate and predict consequential regularities that make the earth an ordered place of human dwelling: for example, Aristotle's fifty-five homocentric celestial spheres, the symmetry of geographical patterns, . [L] or formal homologies in the human microcosm [R].

Cosmography's primary mapping act is the inscription of the celestial part of the universe, classically described in Aristotle's *De Caelo*, onto the elemental sphere described in his *Physics*, *On generation and corruption* and *Meteorology*. The mapping is realised most fully in the three-dimensional armillary sphere [L]. Cosmographic terminology still structures our basic geographical vocabulary: horizon, axis and poles, equator, tropics and ecliptic [R]. Aristotelian physics dictated that the geometrical perfection of the incorruptible celestial spheres, while inscribed theoretically on the globe, for example in the bands of the klimata, would never be perfectly reproduced in the mutable, elemental spaces of earth, water, air and fire. The precise extent of the variation from perfect symmetry and harmony remained a matter for empirical description. Thus emerged the enduring scientific questions of cosmography: for example, was the observed pattern of continent, ocean and temperate-zone Oikoumene, watered by a Mediterranean (Middle) sea paralleled in the southern hemisphere, as theoretically it should be? How were the surface distribution of lands and waters, the atmospheric confusion of air and fire, or the imperfections to a perfect earthly sphere produced by mountain ranges to be explained? Cosmography always had both a theoretical and mathematical side, which described the motions of the heavens and mapped their patterns onto the elemental globe, and a

descriptive and graphic side which outlined and represented actual patterns across the surface of that globe.

The purpose of cosmography in a pre-secular age was ethical; it concerned the place of human life in an ordered creation. It is worth recalling that the Greek *ethos* referred to a ‘sojourn’, a familiar place haunted by a divinity (in Latin, *genius loci*). *Ethos* united earth and heavens, and implies the recognition that place and duration (habitation) inform and are reciprocally informed by conduct. Thus to know the time and space that govern the earth as a human habitation is to reflect upon how to conduct ourselves within it. Von Humboldt’s division of *Naturwissenschaft* and *Geisteswissenschaft* thus stands counter to a governing principle of cosmos and of cosmography as traditionally conceived. The final section of Plato’s *Timaeus*, that key cosmological text of the Classical tradition, describes the creation of humans from the materials of a cosmos, itself endowed with soul. The form and spirit of the cosmos are mapped into our material being [L]:

... God gave the sovereign part of the human soul to be the divinity of each one [of three souls], being that which, as we say, dwells at the top of the body, and, inasmuch as we are a plant not of an earthly kind but of a heavenly growth, raises us from earth to our kindred who are in heaven. And in this we say truly;

for the divine power suspended the head and root of us from that place where the generation of the soul first began, and thus made the whole body upright.

This principle, differently expressed in Aristotle's *Metaphysics Lambda* and *De anima*, that we humans, although sojourning on earth are have roots elsewhere in the cosmos, gives cosmography an inescapable ethical dimension, inescapably engaged with the moral and aesthetic questions of humanistic science.

The place of humanity as the connecting centre of the cosmographic map made cosmography doubly geocentric. Methodologically, cosmography's basic mapping procedure assumes a central earthly sphere around which the planets revolve. This remains true whether or not geocentricity is accepted as a scientific truth. Epistemologically, cosmography maps from the perspective of a human observer located on the earth's surface [**R**]- it is literally homocentric. Such a perspective lends support to the idea of a cosmos consciously designed as the stage for human existence. Thus, the embrace of Greek science in the Christian West, especially after the twelfth-century, saw the form and patterns of cosmos taken as evidence of the providence of a loving God to his principal creature

and primary occupant of earth. Divine providence found its fullest expression in the microcosmic perfection of the redeeming Christ, at once God and Man [R]. Christian cosmography therefore performs the central task of reading the book of nature alongside scripture as moral texts and witnesses to divine beauty [L]. Mathematical cosmographies such as Albert Magnus' *De Caelo et Mundo* or Sacrobosco's *Tractatus de Sphaera*, employed as instructional texts in European schools and universities well into the early modern age, and more descriptive works such as Pomponius Mela's *Cosmographiae* or Isidor of Spain's *Etymologiae*, mapped the order and variety of a universe centred on the earthly globe and its human occupants.

### **Modernity and the crisis of cosmography**

It was both forms of geocentricity that modern thought came to reject, and the consequences are apparent in the structure of Von Humboldt's Volume Two of *Cosmos*. His 'subjective' account of cosmography - 'from the sphere of objects to that of sensations' - is itself divided into two parts, distinguished historiographically as well as textually. Volume Two opens with an account of stimuli to the aesthetic contemplation of nature, tracing 'its image, reflected in the mind of man, at one time filling the dreamy land of

physical myths with forms of grace and beauty, and at another developing the noble germ of artistic creations'. This account summarises a global heritage of poetic and artistic descriptions of the natural world, and implies a transhistorical and transcultural connection between the human spirit and the material order of nature: an aesthetic, but not necessarily ethical, imperative within cosmography. It bears the strong influence of German Romanticism's attempt to re-enchant a secular nature [L/R]. Von Humboldt's second part gives an historical account of cosmographic science which, as I have indicated already, is a progressive narrative of empirical observation overcoming myth and speculation. Von Humboldt resolves any tension between these accounts with the suggestion that 'at periods characterised by general mental cultivation, the severer forms of science and the more delicate emanations of fancy have reciprocally striven to infuse their spirit into one another'. These 'delicate emanations of fancy' carry no moral charge. The most significant of such periods, occupying more than one third of the volume, comprises the quarter-millennium between the Latin translation of Ptolemy's *Geography* (initially titled *Cosmographia*) about 1410, and Newton's *Principia* of 1670.

The tension apparent in Volume Two of *Cosmos*, between scientific and poetic cosmography, is characteristically modern. Von Humboldt's rejection of a humanistic cosmos is apparent in his treatment of Johannes Kepler:

The figurative and poetical myths of the Pythagorean and Platonic pictures of the universe, changeable as the fancy from which they emanated, may still be traced partially reflected in Kepler; but while they warmed and cheered his often saddened spirit, they never turned him aside from his earnest course, the goal of which he reached in the memorable night of the fifteenth of May 1618.

This moment was, of course, Kepler's discovery of elliptical movement of the planets, which, together with Galileo's observations of the Jovian moons [L], and more particularly of blemishes on the surface of the sun, radically challenged the Aristotelian assumption of celestial perfection in form and movement. Von Humboldt's reference to myths which warmed but did not charm Kepler's scientific spirit, is to the astronomer's direct embrace of Renaissance platonism – for example in his connection of the platonic solids to the distances of the planetary orbs [R]. But von Humboldt's response to Kepler's central spiritual dilemma is inadequate. Kepler's whole project was ethical. As Kepler's 'Lunar Dream' (*Somnium seu de astronomia lunarii*)

of 1634 amply demonstrates, his cosmographic images explored the earthly ‘sojourn’ of a body rooted in the heavens.

In fact, von Humboldt’s entire historical account ignores the profound significance of platonism within Renaissance cosmography. Yet Marsilio Ficino’s translation of the key platonic texts, including *Timaeus*, took place in the same city and in the same years (1460s), and indeed among the same group of scholars, that Ptolemy’s newly-translated *Geography* [L] was being re-connected with empirical knowledge of an expanding oceanic globe. A direct example is the rendering of Ptolemy’s text into poetic Italian by a member of Ficino’s Florentine Academy: Francesco Berlinghieri, for which Ficino wrote the dedication [R]. Thus, while few would challenge the significance of the empiricism that von Humboldt’s celebrates in generating a crisis within Western cosmography, historians of science today are far less confident than von Humboldt in distinguishing between poetic and scientific ‘spirits’ inspiring scientific ‘revolution.’ The argument over Copernicanism for example, remained finely balanced well into the seventeenth century.

I have stated that the cosmographic theorem of celestial perfection inscribed mathematically onto elemental earth left open the question of how

far the balance and harmony of the heavens were physically present across the elemental sphere. Mathematical cosmography long remained unaffected by heliocentrism, so that cosmographic handbooks such as Apian's [L] and even Sacrobosco's [R] were still being reprinted and widely used a century after the publication of *De Revolutionibus orbium celestium*. Apian's diagrams for example, are reproduced on Antonio Campi's 1576 map of Cremona province [L] to connect its chorography to geographic and cosmographic scales of observation, while illustrations of planetary eclipse from Sacrobosco [L] provide the structure for the Portuguese, Francisco de Holanda's dramatic images of creation [R]. By contrast, descriptive cosmography faced the much earlier challenge of oceanic discovery, and the rapid and widespread diffusion of its revelations by means of much more dramatic and accessible texts and images. From the early years of the sixteenth century the cosmographer would be faced with myriad and inevitably disconnected fragments of personal observation, reportage, mappings and speculation arriving in his study from navigators whose journeys circled the globe. The consequences were perhaps inevitable. The French cosmographer André Thevet's *Cosmographie Universelle* (1584) collapses into incoherence, unable to sustain within a single controlling

structure a descriptive unity for the earthly sphere to parallel that of the heavens. In Frank Lestringant's words:

The crisis of cosmography at the end of the Renaissance was manifested ... on three planes. From the religious point of view, the cosmographer who raised himself to the level of the Creator in order to attain the latter's eternal and ubiquitous knowledge was guilty of pride, even blasphemy: he pretended to correct Scripture in the name of his sovereign, unlimited experience. At the level of method, he sinned by incoherence, confusing scales of representation and imagining that autopsy (or seeing for oneself) could guarantee the truth of a synthetic, and necessarily secondary, vision. Finally, from the epistemological point of view cosmography, which supposes a monumental compilation under the controlled authority of a single individual, was soon transcended by more supple and open forms of geographical knowledge.

The crisis of cosmography in the sixteenth and seventeenth centuries was primarily a crisis of vision and representation, but it had profound ethical implications. Autopsy, eye-witness vision, and its guarantee by either registering human presence (eg by illustrating the mapmaker within the frame of the map [L]) or by mechanisation - for example the camera obscura or optical lens, Galileo actually burned the sunspots onto paper by

means of his telescope [R]) - was unavailable to the cosmographer. He lacked a position from which to witness the truths he proclaimed. In fact, those who came closest to achieving such a cosmographic autopsy were not the scholars but the painters. A dramatic, if minor innovation in sixteenth-century Western art is the cosmographic, or world landscape [R]. The names of Joachim Patinir, Lucas Cranach, Albrecht Altdorfer and Peter Bruegel are curiously absent from von Humboldt's account of artistic achievements in the representation of nature. Yet the genre of painting which they pioneered came closer than any other to realising Erasmus' cosmographic question: 'what spectacle can be more splendid than the sight of this world? Not only did these artists work in the same cities that new techniques of mapping were being developed - Nuremberg, Augsburg, Antwerp – a number of them had close personal connections with cosmographers: Altdorfer with Behaim, Regiomontanus and Pirckheimer, Peter Bruegel with Abraham Ortelius. Their often tiny, jewel-like panel paintings were regarded by such scholars as a more adequate format than language or text for describing the universe, and such images were actually referred to as 'cosmographies'. Albrecht Dürer wrote for example that 'the measurement of the earth, the waters and the stars has come to be understood through painting'. In the years of Magellan's circumnavigation

the panel painting was being held up by humanists as a paragon format for the description of the universe, and much more adequate than written accounts. A work such as Altdorfer's *Battle of Issus* thus maps the whole Eastern Mediterranean as setting for the global drama of Alexander's defeat of Darius [L/R], raising the eye to a position where both planets and curving earth are brought within its scope. Bruegel achieves a similar feat, mapping Crete and Cyprus into the cosmic scope of his *Fall of Icarus* [R]. By relocating the eye in that liminal space between elemental and celestial spheres (where Plato's *Timaeus* placed the human creature), these 'cosmographies' anticipate the challenge to geocentrism while offer the eye-witness autopsy that evaded the textual cosmographers. And, while their themes may be imperial and heroic, they are 'ethical' in the cosmographic sense in which I have used the term. And their genre quality offers to everyman the dignity and authority over space once reserved for gods and monarchs.

### **Extra-terrestrial Geography**

That the artists of the sixteenth century should have succeeded where the more scholastic cosmographers failed has a certain contemporary resonance. In all but the most banal respects, understanding today's

cosmological theory seems restricted to a small number of highly sophisticated mathematical physicists, certainly it lies well outside my own scientific reach (although the success of Stephen Hawkins' book indicates an enduring popular fascination with the subject). Like most non-specialists, I can grasp only superficially such ideas as space-time relativity or multi-dimensional geometry, and such phenomena as 'black holes' or 'quarks,' more as images and metaphors than as coherent concepts. I am told that fractal geometry offers new possibilities for establishing morphological correspondence between the unimaginably large and distant phenomena of the macrocosm and the most infinitesimally small particles of matter, but I do not clearly understand how fractals are derived and manipulated. Lacking such understanding, it is difficult to know in what sense, if any, the universe so described remains indeed a cosmos. I hear promises of a single equation as the ultimate, and apparently none too distant, solution to the questions of cosmic origins and form, but doubt if such an equation would be meaningful to me. However, when cosmological theories are rendered in ordinary language rather than equations, the reappearance of very ancient metaphors is often striking:

The Aristotelian 'perfect cosmological principle', for example, of a universe maintained indefinitely by natural laws

foreshadows the ‘steady state’ concept, whereas the opposed view of a ‘big bang’ theory of the universe starting from a single point and erupting out from there had its adherents then as now.

[Epicurus and Lucretius]

So, perhaps my conceptual inadequacies are not so disabling, and I begin to wonder whether it may not be that there is actually a strictly limited stock of representational metaphors and images upon which we are ever able to bring cosmos – the ornament of order - into meaningful being.

Acknowledgement of the limits that representation places on all scientific knowledge has of course been a major philosophical advance of recent decades, one which has finally demolished von Humboldt's neat distinction of objectivity and subjectivity, and which revitalises issues he regarded as superseded in a Modern world. In the words of one recent writer on cosmology:

Is the human race fundamental or incidental to the whole? A question that was once shunted to theology becomes increasingly relevant as we are made more aware that cosmology itself is a construct of human intelligence, subject to social and linguistic conditioning and dubious means of communication.

As Plato long ago recognised, cosmos actually *requires* myth, symbol, graphic image – in a word, cosmography – to realise its ethical

imperative. Introducing his spindle image of the universe in *The Republic* Plato comments: 'to attempt to tell all of this without a visible representation of the celestial system would be labour in vain'. The past decade's 'golden age of cosmology' is itself in some measure a product of technical developments in visual imagery, and it has generated in its turn a renewed interest among creative artists in cosmographic themes. The stunningly beautiful coloured photographs of the cosmos with which we are now familiar are produced by processes of colour filtering and enhancement which are at once highly technical and deeply artistic [L/R]. The photographer David Malin, who developed many of them, points out that 'these images are not visible in the eyepiece of the telescope. At best, even the most colourful gaseous nebulae seem little more than faint, luminous smudges of light, almost indistinguishable from galaxies of stars'. Malin's artistry yields results which are not too dissimilar to those created by the contemporary London painter, Adam Gray, [L/R] whose oil paintings re-imagine the opposing scalar infinities of macrocosm and microcosm as the context in which organic life holds a special if disturbing place.

While we may have decentred the human creature from the contemporary cosmos, Gray's images reflect a continuing apprehension

that organic life more generally holds a special place in existence; its discovery elsewhere in the universe - 'extra-terrestrial' - remains the most powerful stimulus to searching the heavens [L/R]. And, increased consciousness of both the constraints of representation and the temporality of humanity's sojourn on a planet whose own time within the cosmos is limited, intensifies rather than abolishes the ethical questions of how human existence should be conducted. As humans, we remain quartered, as Heidegger put it, between earth and heavens, gods and mortals.

But the ethical significance of the connection between earth and heaven is not confined to metaphysics. While theoretical cosmology remains at the margins of intellectual grasp for most of us, a human presence in the celestial spaces beyond the elemental sphere is becoming part and parcel of daily life. And, rather as the early-modern extension of Europeans' presence into terrestrial spaces about which they had formerly only speculated, generated new and pressing problems of 'human' geography, so the humanising of space today provokes more than simply questions of natural science. The impact of the first eye-witness views of earth from space, recorded in the Apollo lunar project photographs [L], resonated through late twentieth-century debates about the ethics of human

life on earth [R]. At the turn of the millennium, an American artist, Michael Light, returned to JPL's image archive of those extraordinary lunar visits between 1968 and 1972 when a mere dozen moonwalkers realised Plato's image of humans rooted in the heavens, and made actual Kepler's lunar dream. Treating as artworks, and with a photographic eye formed in the desiccated landscapes of the American Southwest, images taken under the most self-consciously rigorous 'scientific' conditions, *Full Moon* maps an uncannily familiar extraterrestrial landscape [L/R]. The lunar surface takes on a human geography: a landscape, made so by human signifiers, familiar through the graphic conventions and associations of landscape and cartography (suggested by the hairline grid that divides the photographic space), uncanny and disturbing because so many conventions and associations of terrestrial geography are here either stripped away or unaccountably absent [R].

In these lunar landscapes, the presence and absence of light generates a metaphysical intensity. In the artist's own words, the images 'share a kind of delineation through distilled light that is at once highly abstract and yet brutally representational'. Lunar light offers a sense of 'divine perception', and the astronauts themselves recorded their own

apprehension of a god-like sublimity in its glow. In the absence of atmosphere, light and shadow etch across the Moon's monochrome surface landscapes of such crystal clarity and incised intensity that colour itself becomes the symbol of a softer, gentler other. Items that in the context of earthly landscape might appear coldly metallic or artifactual: the struts or wheels of the lunar rover for example, or a power cable, gain in these colour photos an unexpected warmth [L]. And in one of the most moving images of the collection, the blue aura of water vapour surrounding Alan Bean's tiny figure [R] as he stands against the lunar horizon, reminds us of Homer's threatened heroes – Achilles or Ulysses - concealed by their protecting divinity who 'pours out' air (*pneuma*) from his body. The image serves too as an intimate reprise of the most haunting distinction created by the Apollo photographs: between the Moon as the embodiment of the cold severity of celestial space and Earth as the watery, blue home of organic life. A tiny figure, trembling on the edge of deep space, the breathing human body becomes truly a microcosm and measure of life in the cosmos.

But physical human presence is not a prerequisite for an extra-terrestrial human geography. Ironically, much of the focus within terrestrial

human geography no longer connects necessarily to the material, mappable spaces of the physical environment, but works with the virtual spaces of social interaction and connectivity and with networks that do not depend upon the presence of material human bodies. In this respect, we might note in passing how many of these networks themselves extend into extra-terrestrial space, encompassing the landscape of satellites that occupies the innermost celestial sphere [L]. Places and landscapes are no longer thought of by geographers simply as bounded containers, but as constellations of connections that form, reform and disperse in space and over time.

Dwelling or inhabiting space is as much imaginative and conceptual as it is visceral and sensual. Such a perspective suggests that extra-terrestrial space does not have to be physically occupied in order to fall within the domain of cultural geography. And as planetary and celestial space beyond the earth's surface emerges as a realm of increasingly detailed knowledge and human care so a more complex and significant human geography is configured within it. From NASA's unmanned exploration projects of the 1970s and 1980s there is a presence of human artefacts in the atmospheres or on the surface of the inner planets [L/R Mars]. More significantly, their differentiated surfaces are increasingly present in the consciousness of men and women on Earth [L/R Venus]. We might suggest that such spaces are

as present to us as were the sea-lanes and coasts of this American continent to Europeans in 1530 [L/R Uranus/Neptune]. And we should remember that the dramatic colours which render as aesthetically powerful creations those images of deep space, returned as digital data from instrumented witnesses such as the Hubble space telescope, are as much the product of human imagination and the artistic skill of such individuals as David Malin of cold science [L/R].

Much of the responsibility for introducing a human presence into extra-terrestrial space during the past three decades has been undertaken here in the universities, observatories and laboratories of Southern California. It is appropriate, therefore, that Pasadena, home also in the Huntington Library to one of the greatest collections of European cosmographic literature, will next year be the location for a five-month millennial festival celebrating the continuum over twelve centuries of humanity's scientific and artistic description of the universe, in a series of exhibitions and performances, involving eight scientific, musical, artistic and botanical institutions. Such a truly Humboldtian project signals the continued involvement of the humanities as well as the physical and mathematical sciences in the deepest questions of the universe as *comos*.

## **Conclusion**

Cultural geography during the past two decades – here at UCLA as much as elsewhere - has been engaged in an intensive rethinking of the meanings of place and human experience, exploring critically the Heideggerian themes of dwelling, attachment and rootedness. The tensions between these themes and those of cosmopolitanism - the consciousness of belonging to a more diverse, complex and global space, created and sustained by social connections - are central to the theoretical concerns of cultural geographers in a globalising world. In this critical context, even the physical body of the human microcosm has been drawn within the scope of geographical consideration, reworked as a site of social and psychic construction and contestation, rather than merely a locus of material, organic life, shared with the rest of nature. Yet for all its critical sophistication, the attention of cultural geography has tended to remain fixed at the surface of the earthly sphere. Its concern with socially constructed ‘spatialities’ risks detachment from those ‘ethical’ materialities that bind our embodied selves to the whole of organic life, and our spirits

to spaces beyond the earthly surface, and which long formed the principal concern of cosmography. But, as both Jean-François Mattéi and the work of the contemporary artists remind us, and which their Renaissance predecessors knew well, to lose the sense of the heavens is to lose also that of earth. Both spheres are inseparably connected to human existence. As twenty-first century experience actualises and materialises this enduring truth in ways that are historically new, and as we create and live an increasingly extra-terrestrial human geography, so cosmography as a cultural mapping, that aspect which von Humboldt found so awkward, may find a revived significance.