

On the other hand, there is a forensic momentum that refers to a restless modern past that is currently being exhumed, unburied, and investigated, at a time when not just the nature of violence, but also the means of holding perpetrators accountable, are dramatically changing. The forensic here can serve the identitarian agenda of states or certain minorities, but it can also be essentially turned against state and symbolic power. The countless restitution claims concerning not only artifacts, but also human remains, which museums and other institutions are currently facing from victims of violence and formerly colonized people, further testify to the scope of forensic aesthetics as a mode not only of restoration of histories/continuities otherwise lost, but of their active construction. Forensic identification serves to establish “truth” as a means of the reconstruction of social bonds that have been destroyed, of different possible societies, a task which is most often related in this context to the identification of human remains. A map of exhumations of sites of political violence would show that we can truly speak of a global momentum, which points to a universal dimension of political violence in modernity and in the name of the state — a “negative” universality, to be sure, but one whose explication provides a possible “common ground,” a basis on which we can imagine what is missing from actual universality.

- 1 See Nabil Ahmed, “Entangled Earth,” *Third Text*, vol. 27, no. 1 (January 2013): 44–53; and *Radical Meteorology* (2013), three-channel video (3’46”, 4’12”, 5’53”) and two-channel audio.
- 2 Russell Schweickart, “Whose Earth?,” 1974. Transcription available at <http://settlement.arc.nasa.gov/CoEvolutionBook/SPACE.HTML>, accessed November 2013.
- 3 See Steven Shapin and Simon Schaffer, *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life* (Princeton, NJ: Princeton University Press, 1985).
- 4 Donna J. Haraway, *Modest_Witness@Second_Millennium. FemaleMan@_Meets_OncoMouse?: Feminism and Technoscience* (New York: Routledge, 1997), 24.

- 5 See Shelagh Ranger, “Animals in African Legend and Ethiopian Scriptures,” in *The Encyclopedia of Religion and Nature*, ed. Bron Taylor (London: Continuum, 2006).
- 6 See Anselm Franke, ed., *Animism*, vol. 1 (Berlin: Sternberg Press, 2010).
- 7 Giorgio Agamben, *The Open: Man and Animal* (Stanford, CA: Stanford University Press, 2004).
- 8 Bruno Latour, *We Have Never Been Modern*, trans. Catherine Porter (Cambridge, MA: Harvard University Press, 1993), 29.

Floating Bodies

Adrian Lahoud

Weaponizing Earth

Our peacetime economic relations, working slowly and continuously, produce the same results as would a short global conflict, as if war no longer belonged to soldiers alone now that it is prepared and waged with devices as scientific as those used by civilians in research and industry. Through a kind of threshold effect, the growth of our means makes all ends equal.
—Michel Serres¹

On July 14, 2008, an arrest warrant is issued from The Hague by the Chief Prosecutor of the International Criminal Court (ICC) Luis Moreno Ocampo alleging that Sudanese President Omar al-Bashir systematically attempted to eradicate the Fur, Zaghawa, and Masalit people of Darfur. The charges in the warrant include war crimes, crimes against humanity, and genocide.

Some eighteen months later in a convention center in Copenhagen, the Sudanese diplomat Lumumba Di-Aping, representing the G77 Group of Developing Nations, calls an impromptu press conference during the 2009 Climate Conference. Di-Aping will return the accusation of genocide back to the industrialized nations of the world: he will accuse them of systematically thwarting negotiation on climate change, failing to prevent a catastrophic temperature increase, and, therefore, condemning millions in Africa to certain death. Di-Aping is immediately described as a hysteric by sections of the press.

Between Ocampo and Di-Aping the contours of two different concepts of violence come into view. The first addresses the past in order to deliver justice in the present. The second addresses the present in order to avert a future harm. The alleged genocide in the first instance is familiar, involving militias and their sponsors, a sequence of brutal massacres. The alleged genocide in the second is little understood and involves a set of unlikely agents: atmospheric patterns, ocean temperatures, indigenous groups, and climate scientists.

Whether it is ritualized through acts meant to subsume the individual within a group, or industrialized within the apparatus of modern warfare, it is impossible to think violence without an act which sets into play the very tools of violence. When it occurs, violence takes a punctual form— a solitary projectile moving through space, a cloud of shrapnel blooming in a crowded room. In turn, this occurrence organizes a space according

to the trajectories of confrontation between the aggressor and their victim within a limit *circumscribed* by the possible extension through space of the combatants and their weapons.

Nor is violence endless; its occurrence occupies a moment within time, finding its origin in the pressure applied to a trigger only to be extinguished with the life this pressure means to end. In its continual potential for escalation—even in our wartime invocations of peace—violence abides by all of this. It involves a weapon whose possible action and consequence is limited within the space-time of a violent event. The various ethical and moral norms which regulate and distinguish between the acceptable and unacceptable forms of violence arise from human experiences of violence: experiences whose character offends moral norms and solicits collective response in the form of laws that must be enforced, procedures that must distinguish between claimants in order to produce verdicts from which either recompense or punishment can flow.

This is the violence and law we know. Is it possible, however, to imagine another kind of violence? Can we imagine a crime without a criminal? A violence without coordinates on which transgressions might be plotted? A violence with no “x” and with no “y”? A violence with no weapon and no witness, passing invisibly through the human sensorium—leaving no memory, no testimony, and no record? That is to say, can we imagine violence without a violent event?

By what right would this impossibility warrant the word “violence,” let alone the term “crime”? If this early proposition is still too unformed, can we instead conceive of a world become weaponized? A world in which the very facts of everyday life, the basic habits and simple routines, by the sheer cumulative weight of their repetition, begin to consume, overwhelm, and finally destroy their host. Our sum, which now totals seven billion, does not only grow, it changes phase, bringing forth a different problem and a new internal topology, presenting a violence without limit and end—a violence that we are yet to recognize.

The hypothesis here is that structural violence is criminal. If this is true, then the genesis of structure is a criminal event, the space of genesis its crime scene. This essay attempts to describe this violence to come, the signs of which have been with us since the start of our industrial society. It proposes that the conflict over global carbon capacity is in very real terms a war, but a war whose agents, weapons, and theater of operations bear

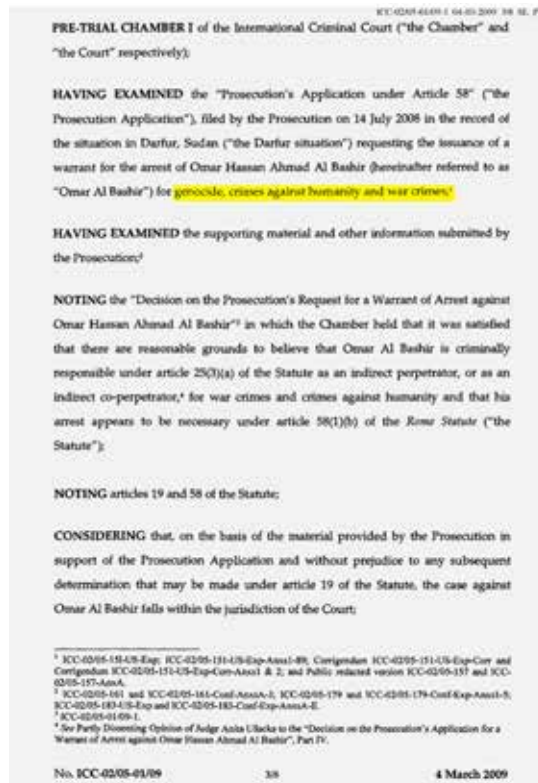


Fig. 1. International Criminal Court, Warrant for the Arrest of Omar al-Bashir issued March 4, 2009. Source: <http://www.icc-cpi.int/iccdocs/doc/doc639078.pdf>.

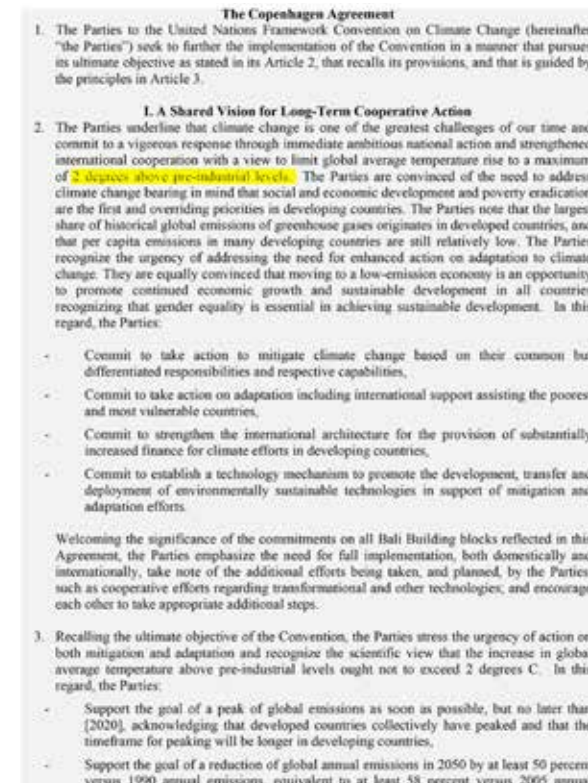


Fig. 2. Draft of the so-called “Danish Text” from the 2009 United Nations Climate Change Conference in Copenhagen. Source: <http://www.theguardian.com/environment/2009/dec/08/copenhagen-climate-change>.

little resemblance to the conflicts of the past.

Every new weapon goes on to produce a new geopolitical relation. Nuclear weapons gave us bipolar cold war politics, “deterrence,” “balance of power,” and “mutually assured destruction”; similarly, “the war against terror” leaves us with “security,” “targeted assassination,” “nonstate actors,” and a burgeoning theoretical literature on urban warfare and its asymmetries. In turn, the conflict over carbon now calls for its own sets of terms and concepts, ones able to capture the diffuse, unfamiliar causality of violence that this conflict marks.

Beginning with the production of energy from fossil fuels, in what follows a series of episodes that connect human industrialization to tropical weather systems, food production, and human movement will be set out in order to begin the project of depicting this violence to come. In turn, each episode is brought into existence through a specific event with a specific scale. The concept of “scale” must

be given a new sense here if we are to think our way beyond the monotheistic reductionism of the common, the complex, or the universal.² Scale is defined in terms of an ontological, epistemic, and discursive genesis in which a *problématique* produces a bounded set of relations.³ With regard to the problem of climate, we will see that the concept of scale forces a Faustian reinscription of the political within the very heart of reason itself.

Floating Bodies

The clinamen manifests neither contingency nor indetermination [...]. It manifests something entirely different, that is the irreducible plurality of causes...

— Gilles Deleuze⁴

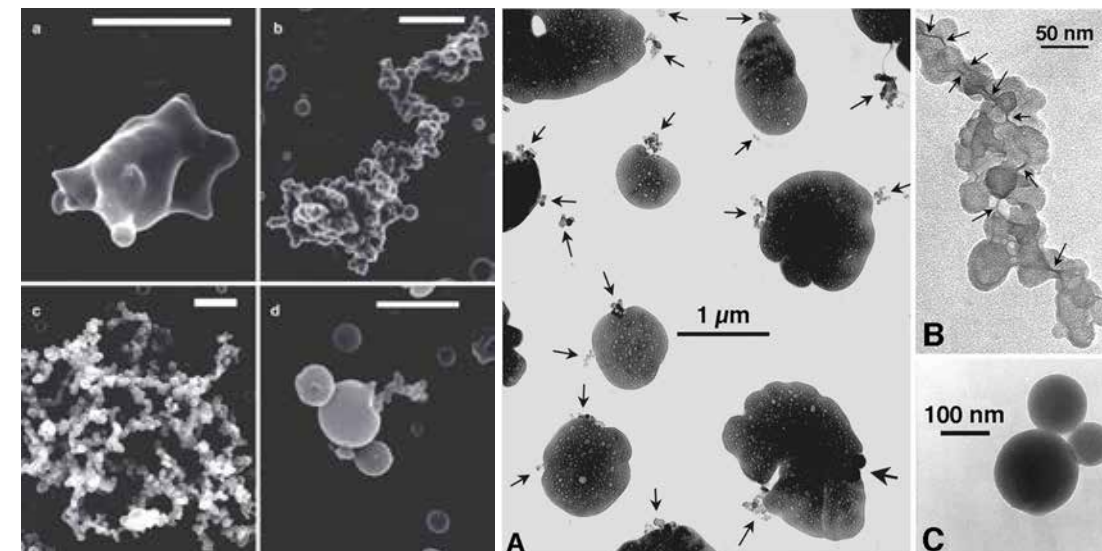
In order to liberate the potential energy fossilized in aromatic hydrocarbons such as oil, coal and gas, the compressed remains of organic compounds must undergo combustion, transforming dead photosynthetic material into heat. The advent of machines able to reliably convert these resources into energy has driven a radical intensification of human activity.

It has also given rise to two byproducts, the best known of which is a molecule called carbon dioxide. A less familiar side effect in this conversion process is the production of a diverse range of particles called aerosols.⁵



Fig. 3. GEOS-5 aerosol transport simulation by William Putnam and Horace Mitchell. Aerosols are small atmospheric particles that can be produced by various means, such as dust or sand being blown into the sky above a desert, by volcanic eruptions, or by burning fossil fuels. Aerosols have become an important heuristic device for understanding atmospheric air patterns since they carry a signature of their origin, allowing climate models projecting aerosol dispersion to be calibrated against observations and therefore improving their accuracy. The image on the left is a close-up taken from a global simulation of aerosol dispersion run between April 2006 and April 2007 showing dust marked red, sea salt marked blue, sulphate marked white and black, and organic carbon green. It clearly demonstrates the intensity of aerosol production from the industrialized northern hemisphere as well as the winds that carry these particles southeast. Image source: NASA/Goddard Space Flight Center.

Not all aerosols are human in provenance: besides particles with an anthropogenic origin like sulfates and black carbon, the total aerosol budget for the planet includes dust and salt particles lifted off the surface of the earth and oceans by wind. The unique character of aerosol dispersion has been noted for some time, as in observations of the measurable temperature decrease that can occur downwind of industrial areas when the amount of solar energy reaching the surface is “dimmed.”⁶ A dramatic natural equivalent occurred in 1816, known as the “year without a summer,” when a veil of sulfates caused by volcanic eruptions shrouded the earth, tinting sunsets a dark reddish hue, inspiring J. M. W. Turner’s iconic images of the skies above London painted that same year, and leading to devastating crop failure in much of Europe and North America.⁷ The scientific recognition of this cataclysmic event, along with the Cold War fear that nuclear war would make for endless winters, prompted further attention to aerosol particles and their effects. Despite the renewed scrutiny, these floating bodies are only now beginning to reveal their impact on the world’s climate. Researching aerosol patterns is like a fractal form of ballistics, a difficult science of trade winds, turbulence, and jet streams that only climatologists have learned to read. Their baroque scripts are kaleidoscopic, describing maps of oceanic and atmospheric transport, and an astonishing interlinking of human fortune that is as glorious as it is terrifying.



Unlike CO₂, the properties of aerosol particles depend on their size, shape, and atmospheric location.

Fig. 4. (left) Field-emission scanning electron microscope images of four different categories of soot particles. This image reveals the morphological variation of aerosol particles. Scale bars measure, 500 nm. Source: Swarup China et al., “Morphology and mixing state of individual freshly emitted wildfire carbonaceous particles,” *Nature Communications*, vol. 4 (2013), article no. 2122.

Fig. 5. (right) Image showing scalar variation in soot and sulphate aerosols. Source: Mihály Pósfai, Arizona State University.

Meteora

Scientists can predict the time of an eclipse, but they cannot predict whether they will be able to see it [...]. Meteorology is the repressed content of history.
— Michel Serres⁸

In many ways, its spherical shape lends the Earth a sense of symmetry that is as complete as it is ideal. Even as our cartographic imaginary carves the globe into sovereign parts and their jurisdictions, dividing hemisphere from hemisphere, land from sea, and sea from air, the clinamen threads its complex path across all these parts, obeying no sovereignty or law, save those of physical and chemical interaction. The globe has no symmetry *as such*, only gradients of moisture, temperature, and pressure fighting to reach equilibrium, bandwidths of relative stability whose fate will be broken by infinitesimal fluctuations. The despotic blue sphere collapses this differentiation into a benign picture of balance and finitude when it is anything but.

For example, as the industrialized North pours aerosols into the atmosphere, important equatorial asymmetries are differentially loaded, forcing shifts in precipitation patterns around the tropics.⁹ The behavior of the climatic system around the tropics is rich and complex due to powerful heat differentials and the intensity of moisture supply. The relatively high amount of solar exposure on the equator poses a problem in energy transportation that is resolved by a continual genesis of pattern and structure whose morphological paradigm is the convection cell.

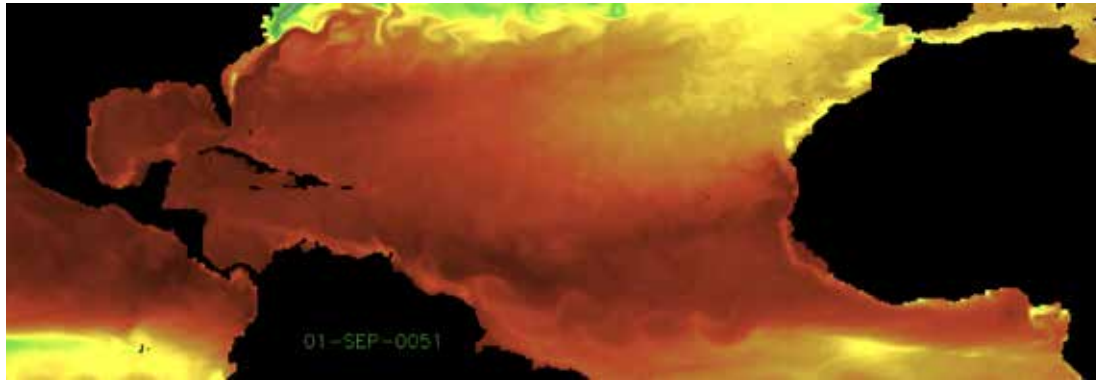


Fig. 6. Biases in the Atlantic Inter-tropical Convergence Zone (ITCZ) in seasonal interannual variations for a coarse and a high resolution, coupled climate model. This visualization effectively shows the movement of the ITCZ, especially the instability of different Sea Surface Temperatures (SST) as they meet and intermix along a shifting equatorial line. The temperature differences are a critical factor in the strength of the African Monsoon, which depends on differentials in SST for its intensity. Source: Tom Delworth and Keith Dixon, National Oceanic Administration (NOAA)/Geophysical Fluids Dynamics Laboratory (GFDL), 2008.

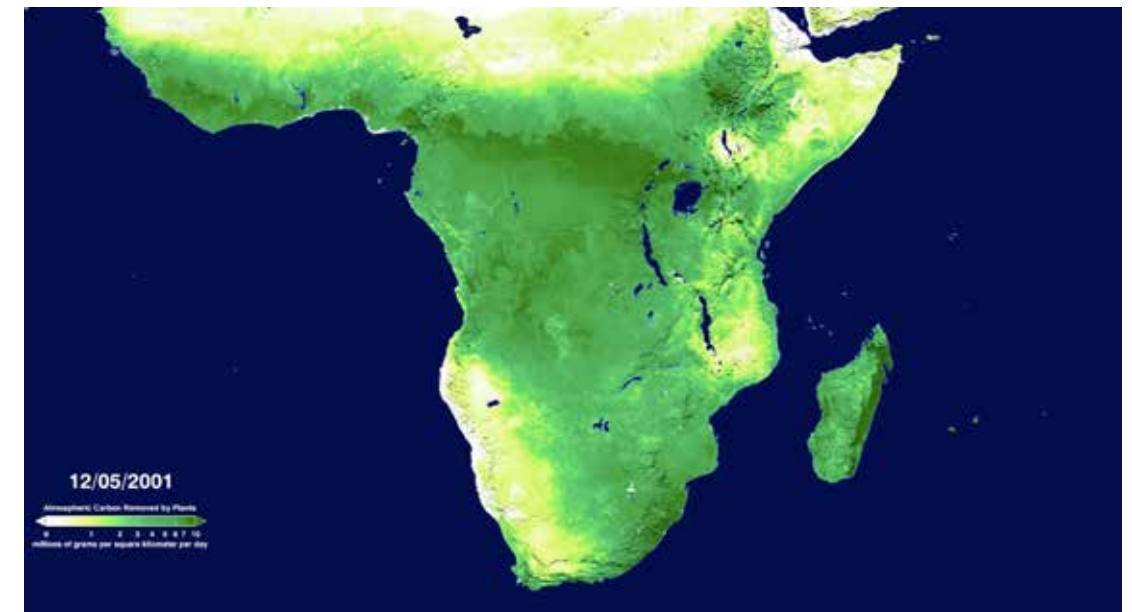
Towering some fifteen kilometers above the surface of the earth, the formation of these cells is held in check by the stability of the atmosphere in the area. Much like the crystallization processes where small irregularities in structure initiate the cascading process of molecular transformation, only if a certain threshold of instability is exceeded can the process of cell genesis begin.¹⁰ As tropical ocean temperatures rise, the threshold for this instability also rises because it depends on a temperature differential between warm and cold seawater.¹¹

Rain results from this instability. In the fertile equatorial region called the Intertropical Convergence Zone, this effect is organized around a conflict between mechanisms working at two different scales. In the first, the increase in the mean ocean temperature makes the threshold for convection difficult to reach. In the second, a local increase in terrestrial radiation increases evaporation and precipitation. The winner drives rainfall in West Africa.¹²

Let us put this another way. Every single event of fossil fuel combustion in Europe conspires to send a small stream of aerosol particles into the atmosphere. If these particles are emitted in the right kind of weather system, they will be carried high into the atmosphere and transported along air currents toward the Atlantic Ocean. Here, suspended thousands of meters above the seas, the particles will interact with incoming and outgoing solar energy, changing the temperature of the seas below. This affects evaporation levels in the sea and transforms moisture supply to the atmosphere. The shift in moisture supply in turn affects the location, timing, and intensity of the wet season that brings annual rain to the Sahel.

If it is the case that activity in one part of the globe triggers a climatic bifurcation in another then mapping, understanding, and reproducing this system of gradients and differentials constitutes more than a particularly intractable problem in thermodynamic calculus, particle transport, or physicochemical interaction. What it becomes instead is the medium through which a future political claim will be made and a present crime prosecuted.

Fig. 7. Atmospheric carbon absorption by plants. The fluidity of climate change is poorly understood through cartographic forms of representation. As this still from a visualization demonstrates, the amount of vegetation in the Sahel changes dramatically with the seasons, especially the monsoon rains which sweep up and down the continent. These oscillations repeat but they do so differentially as the patterns shift and adjust according to annual and decadal time scales due to variations in anthropogenic forcing. The variability of this redistribution poses a continual challenge to populations that must find ways to earn a livelihood from the land such as farmers and pastoralists. Image source: NASA/Goddard Space Flight Center, 2009.



The World Dies from the North

...the desert is one of the faces of the Mediterranean.
— Fernand Braudel¹³

The Sahel is one of the most heavily researched climatic zones in the world because it was the first to undergo significant and initially inexplicable climatic variation at timescales longer than a decade—longer therefore than the El Niño Southern Oscillation cycle of seven years.¹⁴ The droughts brought more than deprivation. An institutional apparatus of international aid agencies, donor organizations, financial institutions, medical missions, and other bodies united by concern, contractual obligation, and a legacy of colonial politics arrived soon after. Then, with the waning of the drought in the '90s and the recovery of the Sahel from its extended period of desiccation, a second wave of expertise converged upon the region: meteorologists, climate scientists, anthropologists, and ethnographers. Like an epistemic force field, every problem in the environment would soon attract new forms of knowledge around it. If a complex causal chain stretching over five thousand kilometers threads industrial activity in the Ruhr Valley to the number of water droplets hitting the ground in Senegal, Darfur or Burkina Faso, then another thread can be constructed in the opposite direction. If the first thread weaves through the atmosphere and the ocean, this second thread links distant territories across the surface of the earth. The two threads touch when the rain hits the earth. This moment of contact rests on a plurality of causes that must conspire in just the right way to produce an effect, be it drought or rain, or a delayed

monsoon. Climate science renders this complexity perceptible, threading a line of reasoning that allows us to follow the aerosol on its path and visualize the effects it leaves in its wake. Science is very good at posing these kinds of problems, but it will tell you almost nothing about how to organize kinship structures or manage social bonds in a condition of scarcity. For this one turns to other forms of knowledge.

Take the nuanced temporal descriptions of rain within West African communities, which—far from treating precipitation in numerical terms—describe rainfall timing with respect to planting, to its character in relation to runoff, to its effects in terms of crop yield.¹⁵ While

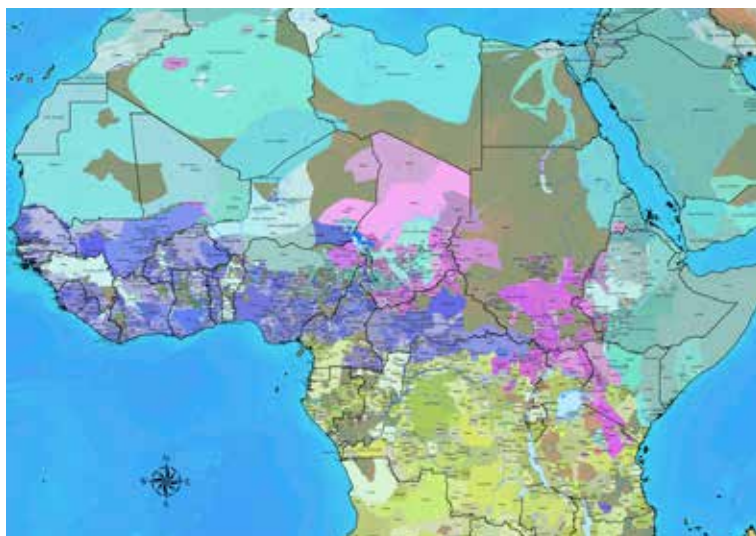


Fig. 8. Languages in Africa. This map of language groups is an indication of the diversity of the Sahel. The viability of rich cultural and spatial traditions is under threat as the quality of productive land transforms in response to anthropogenic climate change. Map © Steve Huffman, Global Mapping International, 2013.

scientific reason must isolate each element from its neighbor to uncover correlations and then causal structures, indigenous forms of knowledge conceive of rain as part of an assemblage that has always already held together a series of different elements such as soil, water, and crops. Or consider the names of famine in Darfur, which attract no generic appellation and are instead in each instance referred to through a singular name describing the moral and behavioral effects of the event on the community. Most notably, Fur definitions of famine refer to lived experiences; they distinguish between different effects such as a scarcity or the erosion of social bonds, but they do not refer to starvation or to mortality, nor do they appeal to metrics, statistics, or other quantifiable forms of description, "... rural people of Darfur do not think of the populace as an anonymous aggregate population, but as a moral community."¹⁶

These short examples of epistemological and cognitive differences are not presented in order to suggest a Babel of communities condemned to speak in indecipherable tongues, only to say that one cannot begin with the presumption of sameness, consistency, or unity among the various parties—be they scientific or indigenous—either in the kinds of claims they make or the meanings one can draw from them. Instead, one must begin with the idea of differences that are real and therefore not simply translatable.¹⁷ Beyond their instrumentality in the region's geopolitics, the multiperspectival character of these various forms of knowledge production do not resolve to form a unified picture.¹⁸ There is no single map upon which each point can finally be plotted, each blank space filled. Because each link in the

chain of causes and effects is forged within a unique field of inquiry, it carries with it the tones, manners of speaking, practices, instruments, historical tendencies, and rationalities that structure thought and decision making within

that field. Incommensurability between the scales of climatic interaction is as real as the incommensurability between different cognitive and epistemic practices. What is so often forgotten in the discussion of ecology is that difference pertains, and it pertains in such a way as to prevent making one thing the measure of all others. Points will always fail to coincide—and conflict can never cease to ensue.

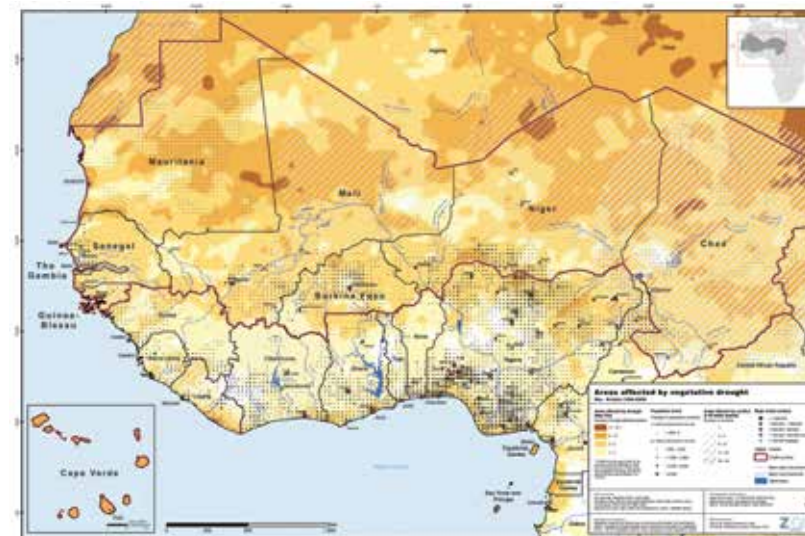


Fig. 9. Areas affected by vegetative drought correlated to areas affected by conflict. Source: UNEP & Centre for Geoinformatics (Z_GIS), University of Salzburg, Austria, October 2010.

The Anthropocenic Equator

Rather than celebrating or affirming a post-human world, where man no longer deludes himself with regard to his primacy or distinction, and rather than asserting the joyous truth of ecology where life is finally understood as one vast, self-furthering interconnected organic whole, we should perhaps take note of the violent distinction of the human.
— Clare Colebrook¹⁹

As of January 2013, all eight situations before the International Criminal Court (ICC) involve African nations between the twentieth northern and the tenth southern parallel. Investigations in Uganda, Democratic Republic of Congo, Central African Republic, Darfur-Sudan, Kenya, Libya, Côte d'Ivoire, and now Mali are confined to a narrow equatorial belt on a single continent, which US security experts now refer to as a "corridor of terror." Within the Western media, war crimes, crimes against humanity, and a legacy of camps, displaced persons, and famines repetitively reinforce the view of the Sahel as a space synonymous with violence and suffering. The perception of a landscape characterized by either warlords, jihadists, and child soldiers on one side, or drought-stricken adults and starving children on the other, leaves sub-Saharan Africa in a bind, caught in a cliché of either hyperaggressivity (genocide, terror, and massacre) or hyperpassivity

(malnutrition and underdevelopment). The very constitution of this crisis and the “concern” it enables form an integral component of the neocolonial machinery and its management of foreign territories.²⁰ The ICC’s international jurisdiction, as set out in the Rome Statute and as outlined at the outset of this essay, is more imagined than real; today it is a tribunal established to judge the sins of the “South.”

This South is always posed as a “not-yet” modern, “not-yet” complete project. It is framed in terms of its underdevelopment, described in terms of stagnations and pathologies which cannot but elicit sympathetic aid programs and rescue packages from the ever-vigilant North.²¹ There

is no more emblematic case of this gaze and its concrete material effects than Africa, whose supposed state of primordial chaos, poised forever on the threshold of arbitrary disorder and habitual violence exists—if indeed it does so—only to reflect back and secure an image of the norms and values of its paternalistic other. For decades, it was assumed that desertification in the Sahel was primarily caused by poor farming practices—that unsophisticated local farmers could not adapt to changing environmental conditions as quickly as they needed to, leading to overgrazing, deforestation, and erosion; similarly, military conflict was and still is too often seen as a simple byproduct of ethnic and religious differences, the manifestation of ancient hatreds and tribal rivalries. More recently, however, anthropogenic climate change has forced a reexamination of these alleged causes.²²

The Sahel is marked by a high variability of annual precipitation. It is certain that heightened competition over shrinking plots of productive land have worked in concert with ongoing governmental and institutional failure to exacerbate existing conflicts, a situation that has been exploited by local elites—not only to further existing claims over land and markets, but also to displace narrations of conflict from a political to an environmental register.²³ Nonetheless, it is also the case that tensions between pastoralists and farmers over dwindling resources has brought different territorial practices into closer proximity. As with the different conceptions of famine and drought noted above, in the case of Fur villagers and Arab pastoralists one finds radically different understandings of, and relationships to, the

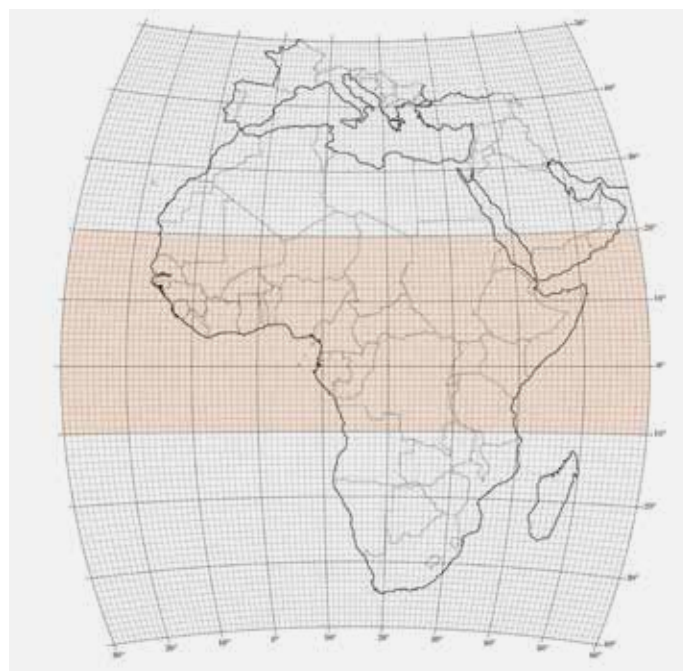


Fig. 10. The Anthropocene Equator. Today, the remit of the ICC exists between two parallels: 20 degrees north and 10 degrees south. Image: Adrian Lahoud and Alina McConnochie, 2012.

Fig. 11. The expansion of the Sahara. This image shows study areas over a 45-year time series of dune mobility indicating constant wind velocity over the central Sahara. Due to the paucity of local wind measurements, scientists Pieter Vermeesch and Sebastian Leprince turned to Landsat imagery and a sophisticated form of algorithmic analysis to construct a time series of dune mobility and therefore of wind velocity. This image shows the three study areas for the Bodélé Depression in northern Chad. Image: Pieter Vermeesch and Sebastian Leprince, 2008.

earth. The former conceive of territory according to a clear north-south striation forming a gradient of decreasing nomadism as one moves away from the desert; while in the latter, spatial practices follow a fluid distribution of opportunity that knows no clear territorial demarcation. These differences are not essentialist traits; in fact, cultural markers such as Arab or African are fixed to livelihoods more than ethnicity. What is happening in the Sahel, besides conflicts over resources, institutional failure, and the instrumentalization of disorder by competing political claimants, is a confrontation between different modes of existence, as multiple spatial and cognitive practices superimpose on the same territory.

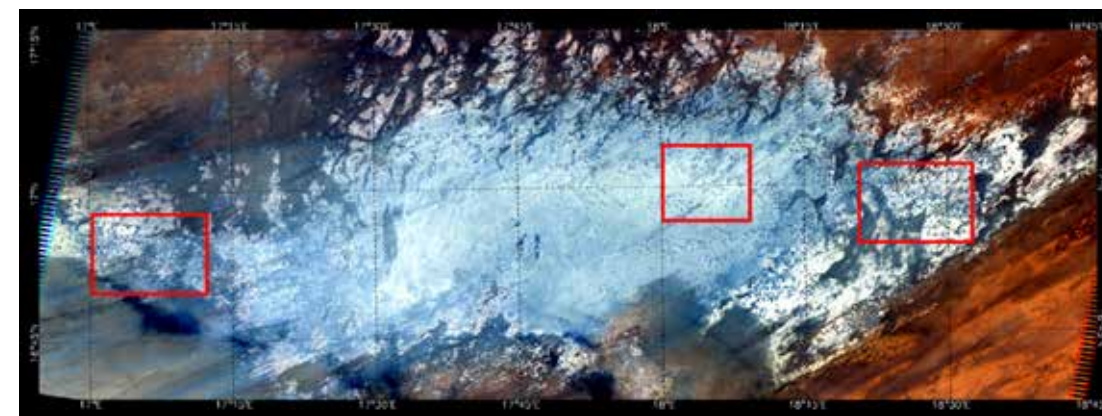
As the Sahara colonizes the Sahel, continuing its expansion down into once fertile landscapes, the deadly march is perfectly captured by the Zaghawa people of Chad and Sudan who say, “the world dies from the north.”²⁴ In a condition of scarcity and within an ever narrowing bandwidth of viability, the peoples of the Sahel are facing pressures to coexist: they make direct contact, they do not coincide, and yet they must still relate.

The Nation Ex-situ

At least until the process of the dissolution of the nation-state and its sovereignty has come to an end, the refugee is the sole category in which it is possible today to perceive the forms and limits of a political community to come.

—Giorgio Agamben²⁵

Climate simulations reveal more than kaleidoscopic gradients of color; they expose the dynamic and differentiated form of climate impact, the dramatic reorganization of resource availability, biological viability, and human fortune—in short they present a set of new geopolitical maps. The emergence of newly productive land on the one hand and the exhaustion of existing productive territories on the other does more than generate alternative





Figs. 12–14. Rescue of Migrants in the Mediterranean Sea. Helicopter footage published on October 24, 2013 by Maltese Coast Guard showing the rescue of migrants attempting to reach Italy. Source: Navy of Malta, 2013.

“patterns” of human settlement; it makes proximate foreign spatial practices, it makes different worlds touch—abundant evidence of which can already be found in our present condition of diasporic movements and displacements.

Because there is no movement without countermovement, and in response to this displacement, today the European border network is conceptualized through the idea of “prefrontiering,” a precognition of illegality materialized through treaties and cooperative security frameworks.²⁶ This infrastructure attempts to counteract refugee movement into the EU by shifting the burden of policing to non-EU states in order to limit the legal obligations conferred upon claimants within sovereign European territory.

Refugee movements intensify during periods of drought. In Africa, drought is thought to be partially responsible for the long-term pattern of urbanization that the continent is experiencing. From the northward migrations out of the Sahara toward the Nile and Levant during the Holocene, to annual routes of herders that follow the rains and pasture, the movement of people through the Sahel and across the Sahara has a long and rich history that, since the great drying of the Sahara thousands of years ago, has been increasingly organized by the coastal area to its distant north, and the cities to its south.²⁷ The tragedy of today’s Mediterranean is that this history of human passage is subject to a calculus in which bodies are marked as weapons on one side, demons on the other. Our own legacy in this story of passage will now resemble a loop, where bodies floating south through the atmosphere eventually receive a ghostly human complement floating north in the sea far below.

The figure of the refugee—the deterritorialized subject par excellence—has a history that has been organized around the



Fig. 15. Frontex Risk Analysis Unit. Source: Frontex, *Beyond the Frontiers. Frontex: The First Five Years* (Warsaw, 2010).



twin poles of individuals without a state such as Palestinian refugees, or individuals that must be resettled due to the redrawing of sovereign territorial borders as took place in the former Yugoslavia. International law emerges in response to violence between nation states as a way of redressing conflict, including these issues of refugee status. Legal scholarship has internalized the concept of the refugee only in so far as the two possibilities

described above continue to operate.

New kinds of challenges emerge once the very viability of the nation state is threatened with dissolution. In response to this, legal scholar Maxine Burkett radicalizes the very idea of the deterritorialized subject by proposing the concept of “the Nation *Ex-Situ*”; that is to say, a nation for citizens without a territory. When a catastrophic loss of territorial productivity is incurred due to distant causes rather than indigenous acts, a challenge is posed to normative legal principles of harm, redress, and responsibility. Climate migration is thus doubly complex, because its cause is not always attributable while its consequences in terms of *human life considered in terms of numbers* are also unclear, and for these reasons it occupies no distinct legal category.²⁸ The idea of a “nation ex-situ” then is an attempt to maintain a semblance of continuity through a legal construction that supports projects of cultural protection through the loss of land, resources, and an economy.

The veracity of testimony is one basis on which both genocide and refugee claims will be assessed. Within international law, evidence in the form of human testimony assumed a singular importance after World War II, building on definitions of genocide and crimes against humanity used in trials such as that of Adolf Eichmann.²⁹ More recently, however, in the case of dangers posed to larger populations by environmental destruction, mathematical and scientific modes of knowing have come to complement human ones.³⁰ The mobilization of science and especially advanced forms of spatial and statistical analysis occupy an increasingly prominent position within the biopolitical problem of environmental violence.³¹ Though they do not touch the body directly, environmental violations affect the milieu that bodies depend upon for their survival.

But what happens to the “era of the witness” when a crime is no longer visible to unmediated human perception? In the case of climate change, climate justice and its deterritorialized claimants, will the era of the scientific model come to replace human testimony in adjudicating humanitarian claims? These new questions in law emerge in recognition of the challenges that climate change brings, the most important of which will be the nexus formed between climatology and criminology.

Climate Forensics

We are in a different world of proof than that of the archetypical smoking gun.

— Jack Weinstein, Major General in the US Air Force³²

Because the mechanics of climate form a complicated transport system, redistributing the effects of pollution according to a process that is nonlinear and transboundary, the space of violation is separated from the space of its repercussion. Those least responsible for carbon emission will be most susceptible to drought and rising sea levels.³³

Edmund Locard's principle that "every contact leaves a trace"—the very cornerstone of modern forensics—still applies, but with one impossible catch: the contact and the trace drift apart, carried away on ocean currents and diffused into the atmosphere. The earth's climate loosens the bond between cause and effect; it breaks the link between attribution, responsibility, and, potentially, justice. In the elongated space-time between the crime and its consequence, myriad forces intervene—clarifying them becomes not only a scientific priority, but also a political and ethical one.

Furthermore, because the cause is in some way coextensive with everyday life, and because its consequence often occurs beyond our everyday experience of that life, the consequence is no longer recognizable or even proximate to its cause. We are summoned, then, to address a problem whose consequences we may never experience. Testimony, institutions of justice, their jurisdictions and modes of political, legal, or financial redress emerge from events that are more historically/experientially familiar. Unlike many indigenous cosmologies, Judeo-Christian ethics is finally circumscribed by the horizon of *human* experience; Western ethical systems drawn from the Enlightenment and forming the basis for Western law have little purchase on events beyond this horizon—events that are imperceptible without sophisticated technical mediation. In order for an alternative ethico-legal reasoning to secure itself, a new kind of aesthetic and epistemic space must be established. This fragile tethering of different ways of knowing calls for a style of thought that is more *attentive* to shifting sites of veridiction, matters of sense and intelligibility. Much is at stake in holding this diverse series together (as we will see when we turn to the 2009 Copenhagen Climate Conference in the conclusion of the essay); displacing violence from the battlefield to the forum already required no less. Before this, however, it is worth considering climatological reasoning and the question of scale a little more closely since it is here in the calculus—in fact, in the very mathematics—of the model that the political insists on re-inscribing itself.

All Things Being Equal

...when a concurrence of causes produces an effect, these causes have to be studied one at a time, and their laws separately investigated [...] since the law of the effect is compounded of the laws of all the causes which determine it.

—John Stuart Mill³⁴

Because any event, climatic or otherwise, is irreducible to a single explanation, one way to imagine each event is as an outcome of causes conspiring, or more simply as other events intersecting. In turn, because each cause is also an event in itself with its own private network of precursors, it is impossible to fully explicate any single event since this would mean following an infinite network. This is not really a problem, however, since some causes will contribute to the event's character more than others.

By disturbing this network of relations we can test which connections are relevant: an easy way to imagine this is to think about cutting threads on a web—if the web stays the same shape the thread was not structurally important. To "explain" an event is to set out causes with regard to a context; implicit in this idea is that any reliable explanation will attend to the most relevant of causes—effectively pruning back unimportant threads in order to limit the potentially infinite space of explanation.³⁵ In turn, this means that any explanation is always indeterminate since it rests on a network of amputated relations which are implicit or presupposed without being stated, either because they are thought not to bear upon the event significantly, or because they are commonly understood and do not need repeating. The Latin phrase *ceteris paribus*, meaning "all other things being equal"—or, less literally, "in the absence of disturbing factors"—refers to this method first described by Mill and found within different forms of reasoning, of *isolating* causal factors from a complex network.³⁶

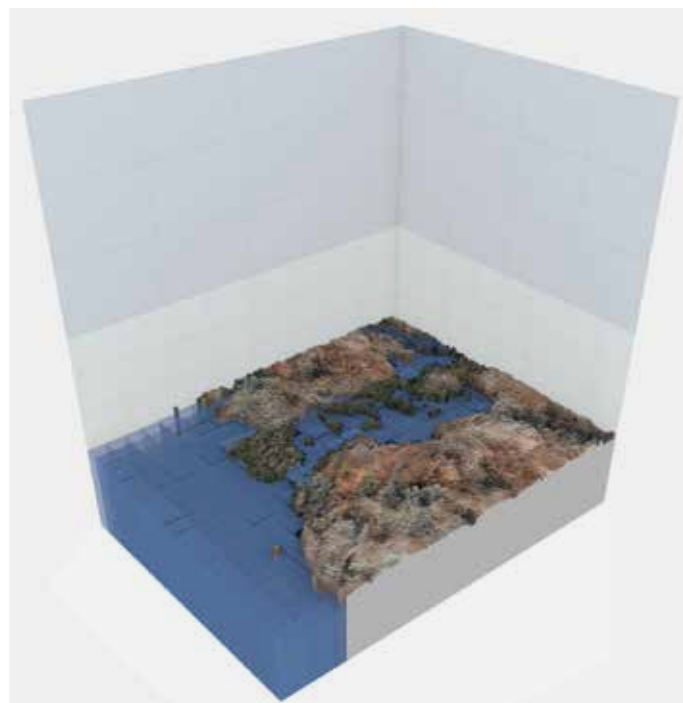
Let's now consider the way some climatic zones produce a morphologically distinct type of weather pattern. The pattern exists in series, repeating annually over each wet season or, as with the El Niño cycle, every seven years; none of these forms are identical and yet they share a recognizable structure. Then let's suppose that at some point in time, a mutation—that is to say a signal—emerges from the noise of "normal" morphological variability (the norm is in itself entirely contingent, the invocation of nature's end—if it means anything it points only to the difficulty of establishing a baseline or reference in the sea of temporal variation). In attempting to identify this mutation, different causal factors will be isolated step-by-step in a simulation to see if a *correlation* can be found between a specific cause and this specific mutation or, as in the words of the previous analogy, a thread whose loss changes the shape of the web. However, correlation in itself does not give causation—it doesn't say anything about the process that makes these variables relate. In order for *causation* to be determined, first there must be proof

that this deviation is not explainable by other causes.³⁷ Furthermore, some mechanism or relation must be proposed for connecting the elements together.

Climatologists have learned to exploit the unique, nonlinear nature of climatological patterns. The fact that no two climate patterns are the same (despite sharing morphological similarities), far from being a problem, is precisely what allows for a forensic climatology: spatiotemporal pattern is the key. The difference is much like a fingerprint. Though left and right fingerprints are expressions of the same gene, the difference between them results from the reciprocal interaction between genes and an information-rich environment of enzyme gradients, the relation between which guides morphological development during embryogenesis. The path dependency of this process gives a unique signature on left and right prints since each print actualizes in response to a unique context of developmental noise. Climate forensics takes this principle of identification through path dependency a step much further. Instead of simply noting the shape of left and right prints in order to register formal difference, it will attempt to explain *differentiations*; that is, to uncover why the process of morphogenesis unfolded in exactly this as opposed to any other way.

It is here that a durable claim about causal relations begins to be threaded *through* the different elements of the climate system. To accomplish this feat, the question of scale is paramount. Take aerosol dispersion: even if it were computationally possible, little would be gained by tracking every single one of the 10^{40} particles in the atmosphere. Similarly, conceiving aerosol content as a global mean, in the way that CO₂ is measured, would reveal almost nothing. In the first instance, the explanatory mesh is overdetermined, carrying too high a resolution and too much redundant information (taking into account every single particle); in the second case, the explanatory mesh is underdetermined and has too coarse a resolution (a global mean).³⁸ What is missed in both these examples is the spatiotemporal pattern. The epistemic frame that tries to capture the salient ontological characteristics is poorly calibrated, there is something in between that must be understood—namely, scale; that is to say, an objective correlation between the ontological causal structure and its reproduction in some epistemic frame. In this sense, we can understand the pro-

Fig. 16. Scalar subdivision of earth within a climate model. There have been significant advances in the resolution of climate models in the last twenty years as computational speed has increased, and yet many important phenomena such as aerosols and clouds exist at a sub-calculable scale—being too small to be caught by existing methods of spatial subdivision. There is no agreement on the optimal grid type, with some scientists and mathematicians arguing for the dynamic transformation of resolution in response to the scale of phenomena that must be captured. Others argue for an even grid coverage, suggesting that areas with seemingly little activity may nonetheless play an important, if as yet unknown, role. Image: Adrian Lahoud and Jose Sanchez, 2012.



cess of scalar individuation by which a climate model is progressively specified in scale until it is able to reliably capture the relevant parts of the problem in question much like a sieve that must be calibrated so that its openings catch the correctly sized elements.

These five points—correlation, causation, path dependency, determination, and scale—form the basis for forensic climatology. The importance of this form of reasoning for constructing durable claims about climate change and climate attribution is not in doubt. What is as yet unclear, however, is the way this form of reasoning enters into and shapes nonscientific disputes over climate and climate justice: for hidden within the amputated web of relations that structure such reasoning is an indeterminate payload, one with the capacity to radically repoliticize the apparent objectivity of any scientific claim.

The Third Degree

We have been asked to sign a suicide pact.
— Lumumba Di-Aping³⁹

Computational models seek to explain and predict the world's climate. They can be understood in purely scientific terms, but only at the expense of unmeshing the models from the political and economic forces in which they are installed and for which they are called upon to work. By locating these models against the milieu of conflicts and negotiations that characterize the struggle over global carbon capacity, the objectivity of science can be reframed in terms of its relevance within a political force field which scientific attention both enters into and shapes. A problem can be objective in a scientific sense yet nonetheless partial in a political sense, as we shall see with the argument about global average temperature increase.

According to the Working Group I Contribution to the IPCC Fifth Assessment Report Climate Change 2013, the Earth's temperature is likely to rise by 1.5 degrees according to most long-term scenarios (projection for 2081–2100) and 2.0 degrees for many others.⁴⁰ As a nonscientist, there is no reason to question the accuracy of this figure or the *objectivity* of the reasoning that lies behind it, but there are very good reasons to scrutinize its *relevance* within discourse on climate change. First, the figure is a global average and conceals the uneven transformation of the planet's climate; second, it obscures the fact that climate negotiations are first and foremost economic negotiations, arguments over growth rather than negotiations over temperature; third, it invites public misperception as to the consequences of even small temperature changes since humans experience far larger changes over the course of a normal day.⁴¹

Economic activity is highly carbon dependent: industrial and agricultural production as well as consumption link GDP to emission. For these reasons, over the next century, forums charged with allocating global carbon

capacity will become paradigmatic spaces of conflict both between states and nonstate actors such as corporations. The 2009 Climate Change Conference in Copenhagen, as well as Kyoto before it, were unique historical events. Despite Copenhagen's failure, it is worth reflecting on the unprecedented strangeness of a forum in which world leaders ostensibly gather to discuss the acceptable level of the earth's temperature.

During the 2009 Copenhagen Climate Conference the public debate was framed by two simple questions: Would an accord be signed or not? And what would be an acceptable temperature increase? The latter question revolved around a series of figures: would it be 1.5 degrees, 2 degrees, 3 degrees, 3.5 degrees? But in the midst of the negotiations, and with the fate of Africa's Sahel at stake, a transformative moment occurred which welded the scientific and the economic to the political again. On December 8, 2009, during a hastily convened private press conference, the Sudanese diplomat representing the G77 group of 132 developing nations, Lumumba Di-Aping, broke down and uttered a distinctly undiplomatic phrase, "We have been asked to sign a suicide pact," in reference to the so called "Danish text" that had been tabled, and its proposed 2 degree global average increase. This brief eruption carries into speech within a public forum the reality of a private calculus and its implicit presupposition, linking responsibility for climate change, economic activity and, most importantly, foregrounding the *unequal* distribution of anthropogenic impact. The proposed global average of 2 degrees meant 3.5 degrees in many of the nations that Di-Aping represented—a catastrophic result for sub-Saharan Africa.⁴² Committing the G77 to the Danish proposal would not only condone this catastrophe, it would legitimize it: the organization was being invited to become party to the devastation of its members.

Why should temperature increase be posed at a global scale rather than a local one, which would allow for an assessment of impact according to specific populations? The answer is both technical and political. It is technical in so far as smaller scale predictions are more difficult, which is why predicting the climate is easier than predicting the weather. It is political—not because the average figure is subjective, but because its very objectivity operates at a scale that mystifies the real and uneven extent of change; what is at stake here is the *relevance* of the truth—its truer truth—and not its objectivity or disputability. The conceptualization of climate change as a global average does little to clarify its impact on people.⁴³ If the scale of argument is shifted from a planetary one to a local one, different pictures emerge. In the Sahel, the impact of water stress, reduced crop yields, and new disease vectors could lead to an additional 300,000 deaths on the continent per year in the immediate term, with double that number in the coming decades.⁴⁴ This does not include any possible deaths caused by the exacerbation of existing conflicts and refugee movements due to war and famine.



Fig. 17. (above) Lumumba Di-Aping. Press conference December 11, 2009. United Nations Climate Change Conference, Copenhagen, Denmark. Still image capture from "Lumumba Di-Aping of the G77—The Most Important COP Briefing the World Never Heard I Part 5," <http://youtu.be/Vtjbuq4fsRY>.

Fig. 18. (below) Luis Gabriel Moreno Ocampo, first Prosecutor for the International Criminal Court, Tallinn, February 7, 2012. Photo: Estonian Foreign Ministry, Creative Commons License.

As the climate conference disbanded, with news of Di-Aping's claim of "climate genocide" spreading, hundreds of thousands of protestors gathered outside the Bella Centre in Copenhagen. Di-Aping's response to the colonial mentality of the G20 ("we have been asked to sign a suicide pact") and his invocation of the death camps of the Second World War ("climate genocide") were unexpected. His dissident utterance succeeded in breaking all protocol. He was immediately criticized by conservative sections of the media who, indignant that he had so intentionally failed to follow the norms of diplomacy, called for his resignation. The idea that a Sudanese person would speak out in such a way in the context of a major international conference elicited derisory comments that suggested a lack of responsibility, disingenuousness, and unproductive hyperbole.

Di-Aping's status as a speaking subject and chairman of 132 nations was called into further question because of the continuing criminal proceedings against President Omar al-Bashir regarding war crimes in Darfur. What many commentators failed to realize is that it was precisely Di-Aping's proximity to events in Darfur that provided him with a visceral sense of what a change in temperature could mean.

Di-Aping's statement disrupted the existing order of what can and cannot be said, what can and cannot be seen, and what can and cannot be constituted as a problem. After this disruption a new terrain of relevance was produced, no longer posed in terms of global averages and degrees but rather in terms of mortality, livelihoods, and the differential impact of heat. Beyond even this however, a far more radical reading might be possible: Di-Aping's comments constitute more than an articulate plea for participation in dialogue; they might be much more still than a dissident speech act or disruption of the diplomatic order. Is it not possible that what this statement amounted to is a political demand for a new type of mathematics—a differently-scaled calculus? His call, then, is an attempt to reestablish the *proper* political scale within a debate about temperature increases in order to make specific populations visible and calculable within the model and therefore the argument.

Di-Aping's deliberate violation of diplomatic protocol should finally be read in these terms, since what the event in Copenhagen conclusively revealed is that within each degree of temperature increase, billions of "first world" dollars are congealed. Fossilized deep within every scientific model and dispute over average temperature increase is a nonscientific, ethico-political paradigm. Inside every simulation, inside every single degree, a new calculus of life and death is disguised.⁴⁵



The Chain of Immanence

UN climate change negotiations are not “environmental”: they are about the economic future of nations.

— Radoslav S. Dimitrov⁴⁶

Fig. 19. (left) Kuwait Oil Fires, 1991. Photo: Robert Bumpas/National Science Foundation. Creative Commons License.

Fig. 20. (right) Ruhr valley Industrial Centre, 2009. Photo: AP Photo/Frank Augstein.

In the 1991 Gulf War, for every day the fires caused by the detonation of almost six hundred Kuwaiti wellheads burned, they released ten times more oil-related pollutants than the daily industrial output of the United States. In this comparative fact lies an interesting equation, a certain kind of equivalence between war and peace, captured well by Michel Serres in the epigraph to this essay when he writes: “Our peacetime economic relations, working slowly and continuously, produce the same results as would a short global conflict, as if war no longer belonged to soldiers alone now that it is prepared and waged with devices as scientific as those used by civilians in research and industry. Through a kind of threshold effect, the growth of our means makes all ends equal.”⁴⁷ In some sense then, what for Serres separates the state of war from the state of peace is a speed, a difference in pattern or intensity, a distribution in time and space.⁴⁸

It is now possible to precisely reframe the question posed at the beginning of this essay: can we imagine a form of violence without a violent event? The question we face now is: can we clarify the genesis of structures that authorize indirect violence? Or in other terms, can we bring the contact and the trace back together again?

Do we risk making familiar forms of violence more ambiguous and therefore less operative through the concept of structural violence? It is an important question: if everything is violent, then nothing is violent. This hesitation rests on a flawed premise however: “structure” is not everything. Nor is it simply a punctually violent event, and here lies the philosophical and political challenge: to discern with enough precision and attention the action of this network and its agents, to follow the threads of relation where they lead, to rigorously unfold the complex causal links in this thing called “structure.” The purpose of this new cartography is not

to absolve agents or individuals from responsibility, as if the structure itself should be indicted. On the contrary, it is to make individuals aware of and responsible for the consequences of their actions, whether they represent themselves or larger entities such as nations and corporations.

In the indigenous understanding of famine and territory, the medical calculus of mortality, the statistical patterning of genocide, the scale of mathematical models, the visualizations of sea-surface temperatures, the plurality of legal structures and their conflicting jurisdictions, in satellite photos registering changes in vegetation and tracking boats packed with migrants attempting to cross the Mediterranean without succumbing to the seas, one finds epistemic frames and virtues that do not coincide to form a single world but rather superimpose like the split perspectives in a fractured mirror. So too with the various forums and spaces of discourse that this visual evidence enters into, and where it attempts to make itself heard: the hotel conference halls used for an ICC investigation or to host a climate summit, the press conferences, the rural councils, the courts and parliaments, and academic institutions. Each ontological, epistemic, and discursive individuation—each phenomenon, frame, and forum—creates its own distribution of relevant and irrelevant points, a unique order of what can be counted, what can be said, what can be made visible.

And what is now becoming visible, what is being represented, made available for experience and also for judgment, is more than a set of bonds that tie together distant fates. What appears today is the extension of a colonial project into the atmosphere itself. Like the industrial age that produced it, the Anthropocene is playing host to its own scramble for sovereignty, a colonial drive that now extends into the air and its capacity for life. As with the Berlin Conference of 1884 before it, Copenhagen assumed all the protocols and formalities of international law and diplomacy, and though the conflict is now over atmospheric resources like carbon, rather than terrestrial resources like ivory, Copenhagen, like Berlin, attempted to exclude African representation from the forum of negotiation. Lumumba Di-Aping was one of the only delegates present to recognize Copenhagen for what it was—a crime scene.⁴⁹ His speech act reminds us that when it came to the decolonization of land, the law followed force. As the earth closes in on us, what makes us think that decolonizing the sky will be any different?

- 1 Michel Serres, *The Natural Contract* (Ann Arbor: University of Michigan Press, 1995), 32.
- 2 The term “monotheism” is used here to refer to any system of thought with a consistent ontological and epistemological structure.
- 3 The French *problématique* is used to indicate the way this concept emerges from a history of French epistemological thought, primarily in the writings of Gaston Bachelard and Michel Foucault, and then especially later in Gilles Deleuze’s *Difference and Repetition* (London: Continuum, 2004).
- 4 Gilles Deleuze, *The Logic of Sense* (London: Continuum, 2004), 306–07.
- 5 Unlike CO₂, which is temporally long-lived and spatially diffuse, aerosol particles remain suspended in the atmosphere for less than a week and are therefore localized within parts of the earth’s atmosphere. Nonetheless they have a significant, if more spatio-temporally patterned, effect on climate. See also J.M. Prospero, R.J. Charlson, V. Mohen, R. Jaenicke, A.C. Delany, J. Moyers, W. Zoller, and K. Rahn, “The Atmospheric Aerosol System: An Overview,” *Review of Geophysics and Space Physics*, vol. 21, no. 7 (1983): 1607–29; and S.K. Satheesh and K. Kirshna Moorthy, “Radiative effects of natural aerosols: A Review,” *Atmospheric Environment*, vol. 39 (2005): 2089–110.
- 6 H. Moosmüller, R.K. Chakrabarty, and W.P. Arnott, “Aerosol light absorption and its measurement: A review,” *Journal of Quantitative Spectroscopy & Radiative Transfer*, vol. 110 (2009): 844–78.
- 7 C.S. Zerefos, V.T. Gerogiannis, D. Balis, and A. Kazantzidis, “Atmospheric effects of volcanic eruptions as seen by famous artists and depicted in their paintings,” *Atmospheric Chemistry and Physics*, vol. 7 (2007): 4027–42.
- 8 Michel Serres, *The Birth of Physics* (Manchester: Clinamen Press, 2000), 67.
- 9 Leon D. Rotstain and Ulrike Lohmann, “Tropical Rainfall Trends and the Indirect Aerosol Effect,” *Journal of Climate*, vol. 15 (2002): 2103–16.
- 10 Gilbert Simondon uses this example to introduce the concept of transduction, finally extending it beyond the action of crystallization to describe the structuring of any metastable field. See Gilbert Simondon, “The Genesis of the Individual,” in Jonathan Crary and Stanford Kwinter, eds., *Incorporations* (New York: Zone Books, 1992).
- 11 Alessandra Giannini, “Mechanisms of Climate Change in the Semi-arid African Sahel: The Local View,” *Journal of Climate*, vol. 23 (2010): 743–56.
- 12 The key role played by Sea Surface Temperatures (SST) has been the subject of a series of landmark papers published by Alessandra Giannini at The Earth Institute at Columbia University in collaboration with colleagues in other climate research centers in the United States. Building on important work by Leon Rotstain and colleagues at the CSIRO on the sensitivity of SST to aerosol emission, this research reverses decades of orthodoxy that argued that local anthropogenic transformation (i.e., African agricultural practice) were responsible for desertification. The work concludes by proposing that persistent drought in the Sahel is not local in origin but rather the result of an increase in SST in which aerosol emission plays an important role. See Michela Biasutti and Alessandra Giannini, “Robust Sahel drying in response to late 20th century forcings,” *Geophysical Research Letters*, vol. 33 (2006), L11706. See also Leon D. Rotstain and Ulrike Lohmann, “Tropical rainfall trends and the indirect aerosol effect,” *Journal of Climate*, vol. 15 (2002): 2103–16. For an overview see Alessandra Giannini, Michela Biasutti, Isaac M. Held, and Adam H. Sobel, “A global perspective on African climate,” *Climatic Change*, vol. 90 (2008): 359–83. See also Alessandra Giannini et al., “A unifying view of climate change in the Sahel linking intra-seasonal, interannual and longer time scales,” *Environmental Research Letters*, vol. 8 (2013), 024010.
- 13 Fernand Braudel, *The Mediterranean and the Mediterranean World in the Age of Phillip II* (Berkeley and Los Angeles: University of California Press, 1995), 24.
- 14 The word Sahel is thought to mean “shore,” as in the Arabic *Sabil*, which refers to the edge where land meets sea—the Sahara desert forming an analogous edge with the savannah. In fact the word Sahel becomes—among West African Arabs, initially—the word for the sea to their north, that is to say the Mediterranean.
- 15 C.T. West, C. Roncoli, and F. Ouattara, “Local perceptions and regional climate trends on the central plateau of Burkina Faso,” *Land Degradation & Development*, vol. 19, no. 3 (May/June 2008): 289–304.
- 16 In Darfur the names of famine refer to conditions of social breakdown—the suspension of community and the promise of its reformulation at some point in the future. Alex De Waal notes an important distinction in naming deadly famines that do not merit a separate name but are simply appended with the term “famine that kills” (*maja’a al gata’ala*). He concludes that this state marks a crossing “where naming breaks down” and, more critically perhaps, that “the destitution and social breakdown it causes are more significant for the sufferers than the fact of mortality.” Alex de Waal, *Famine That Kills: Darfur, Sudan* (New York: Oxford University Press, 2005), 75. For a comprehensive treatment of the calculus and the politics of humanitarian aid, see the chapter “Arendt in Ethiopia” in Eyal Weizman, *The Least of All Possible Evils: Humanitarian Violence from Arendt to Gaza* (London: Verso, 2011), 27–62.
- 17 See Bruno Latour, *An Inquiry into Modes of Existence* (Cambridge MA: Harvard University Press, 2013).
- 18 See Eduardo Batalha Viveiros de Castro, “Exchanging Perspectives: The Transformation of Objects into Subjects in Amerindian Ontologies,” *Common Knowledge*, vol. 10, no. 3 (Fall 2004), 463–84.
- 19 Claire Colebrook, “Extinction: Framing the End of the Species,” in Colebrook, ed., *Extinction* (Living Books About Life/Open Humanities Press, 2012), unpaginated. See also Arturo Escobar, *Encountering Development: The Making and Unmaking of the Third World* (Princeton: Princeton University Press, 1994).
- 20 See also Franco Cassano, “For a Thought from the South,” in *Southern Thought and Other Essays on the Mediterranean* (New York: Fordham University Press, 2012), 1–6.
- 21 In a 2007 *Washington Post* article, UN Secretary-General Ban Ki-moon proposed anthropogenic climate change as a contributor. Ban Ki-moon, “A Climate Culprit in Darfur,” *Washington Post*, June 16, 2007. See also note 12 above.
- 22 H. Verhoeven, “Climate Change, Conflict and Development in Sudan: Global Neo-Malthusian Narratives and Local Power Struggles,” *Development and Change*, vol. 42, no. 3 (2011): 679–707; and Mathieu Couttenier, and Raphael Soubeyran, “Drought and Civil War in Sub-Saharan Africa,” *The Economic Journal* (2013), doi: 10.1111/2424-6290.12111.
- 23 Alex De Waal, “Is Climate Change the Culprit for Darfur?” *African Arguments*, June 25, 2007, <http://africanarguments.org/2007/06/25/is-climate-change-the-culprit-for-darfur/>.
- 24 Giorgio Agamben, “Beyond Human Rights,” in *Means without End: Notes on Politics*, trans. Vincenzo Binetti and Cesare Casarino (Minneapolis: University of Minnesota Press, 2000), 15–26, at 16.
- 25 See Anthony Lodge, *Beyond the Frontiers. Frontex: The First Five Years* (Warsaw: Frontex, 2010).
- 26 Terms like “displacement,” “migration,” and “refugee” are tactically adopted and refused, in that they form the frame through which political claims can be made. Because the political management of movement depends on these terms, the legal thresholds that distinguish between the practices and therefore the actors involved become heavily contested. More recently, paleoclimatologists suggest that the great drying of the Sahara can only be explained by simulating non-anthropogenic aerosols in the atmosphere, i.e. the influence of Saharan dust. For a long-term history see Rudolph Kuper and Stefan Kröpelin, “Climate-Controlled Holocene Occupation in the Sahara: Motor of Africa’s Evolution,” *Science*, vol. 313 (2006): 803–07.
- 27 See Maxine Burkett, “The Nation *Ex-Situ*: On climate change, deterritorialized nationhood and the post-climate era,” *Climate Law*, vol. 2 (2011): 345–74.
- 28 For a discussion of shifting ideas of testimony, see Thomas Keenan and Eyal Weizman, *Mengle’s Skull: The Advent of a Forensic Aesthetics* (Berlin and Frankfurt am Main: Sternberg Press and Portikus, 2012).
- 29 See Solomon M. Hsiang, Marshall Burke, Edward Miguel, “Quantifying the Influence of Climate on Human Conflict,” *Science*, vol. 341, no. 6151 (September 2013), doi: 10.1126/science.1235367.
- 30 Tal Golan, “A preliminary history of epidemiological evidence in the twentieth-century American Courtroom.” Unpublished manuscript, 2011. See also Sheila Jasanoff, “Science and the Statistical Victim: Modernizing Knowledge in Breast Implant Litigation,” *Social Studies of Science*, vol. 32, no. 1 (Feb. 2002): 37–69.
- 31 Weinstein speaking in reference to the 1984 Agent Orange claim lodged by US veterans of the Vietnam War against the government. Quoted in Golan, “A preliminary history,” 7.
- 32 African nations, in both absolute and per capita terms, are insignificant sources of emissions on a global scale. On average, each resident of sub-Saharan Africa produces less than a ton of CO₂ per year, compared with an average European’s annual output of 8.2 tons of CO₂ and the average North American’s of 19.9 tons. Whether or not most sub-Saharan countries sign up to a post-Kyoto deal will have little impact on global emissions. However, cases such as Darfur are being held up as cautionary tales for the potential impact of climate change everywhere. In other words, African nations are not the intended audience of the post-Kyoto debate, but they are part of the evidence being used to make it. See Oli Brown, Anne Hammill, and Robert McLeman, “Climate change as the ‘new’ security threat: implications for Africa,” *International Affairs*, vol. 83, no. 6 (2007): 1141–54.
- 33 John Stuart Mill, *Principles of Political Economy with some of their Applications to Social Philosophy* (London: Longmans, Green and Co., 1843), VI.9.3.
- 34 See also Alan Garfinkel, *Forms of Explanation: Rethinking the Questions in Social Theory* (New Haven: Yale University Press, 1981).
- 35 As a conditional statement, it makes any cause dependent on a supposition, and therefore non-universal, and only generalizable if said conditions are met. See also Marc Lange, “Who’s afraid of *Ceteris-Paribus* Laws? Or: How I Learned to Stop Worrying and Love Them,” *Erkenntnis*, vol. 57, no. 3 (2002): 407–23.
- 36 Nonlinear systems like the climate produce signature bifurcations in response to different forcings. Exploiting this path dependency by exploring a set of counter-factuals allows for different forcings to be compared to observations.
- 37 Biological mathematicians Giuseppe Longo and Francis Bailly argue that the impossibility of computing non-linear behavior in open systems can be attributed to the non-trivial difference between the continuous nature of the phenomena and the repeatable addressability of discrete points in the systems used to describe them. For Longo and Bailly, it is possible to say that language and matter are incommensurable, or perhaps that while computers can repeat, only God can miscalculate. Giuseppe Longo and Francis Bailly, “Objective and Epistemic Complexity in Biology (Towards a ‘conceptual organization’),” invited lecture, International Conference on Theoretical Neurobiology, New Delhi, National Brain Research Centre, February 2003. See also Giuseppe Longo, “From exact sciences to life phenomena: following Schrödinger and Turing on Programs, Life and Causality,” *Information and Computation*, no. 207 (2009): 545–58, at 553.
- 38 “Di-Aping first attacked the 2 degrees C warming maximum that most rich countries currently consider acceptable. Referring continuously to science, in particular to parts of the latest IPCC (Intergovernmental Panel on Climate Change) report, which he referenced by page and section, he said that 2 degrees C globally meant 3.5 degrees C for much of Africa. He called global warming of 2 degrees C ‘certain death for Africa,’ a type of ‘climate fascism’ imposed on Africa by high carbon emitters. He said Africa was being asked to sign on to an agreement that would allow this warming in exchange for \$10 billion, and that Africa was also being asked to ‘celebrate’ this deal.” Adam Welz, “Emotional scenes at Copenhagen: Lumumba Di-Aping @ Africa civil society meeting—8 Dec 2009,” <http://adamwelz.wordpress.com/2009/12/08/emotional-scenes-at-copenhagen-lumumba-di-aping-africa-civil-society-meeting-8-dec-2009/>, last accessed November 2013.

- 40 For more detailed analysis of the scenarios, see Thomas Stocker, Qin Dahe, Gian-Kasper Plattner, et al., “Working Group I contribution to the IPCC Fifth Assessment Report Climate Change 2013: the Physical Science Basis,” Intergovernmental Panel on Climate Change, 2013, 53.
- 41 In his otherwise excellent book, *A Vast Machine*, Paul Edwards states: “On an idealized view, high-quality scientific knowledge should and will automatically command policy choices, limiting disputes by partisans to no.s of implementation. Yet the implication of this profound authority is that credible science can be translated directly into political power.” This is indicative of a certain technocratic concept of information and its relation to decision making. What is in question here is exactly the opposite: less the credibility of science vis-à-vis science and more the relevance of science vis-à-vis politics. Paul N. Edwards, *A Vast Machine: Computer Models, Climate Data and the Politics of Global Warming* (Massachusetts: MIT Press, 2010), 406.
- 42 See Brodie Ramin, “Slums, climate change and human health in sub-Saharan Africa,” *Bulletin of the World Health Organization*, vol. 87 (2009), 886–86. Increasingly there are calls to link climate change analysis to health and mortality projections. See Simon Lewis, “It’s time for a body count,” *Guardian*, February 26, 2008. Mortality rates are difficult to estimate due to the mixed causal factors involved. Nonetheless some attempts have been made. For a review see Andrew C. Revkin, “Forum Says Climate Shift Brings Deaths,” *New York Times*, May 29, 2009.
- 43 Part of the reason for this is that scientific research has been directed toward global models, in part due to the need to understand the climate system in comprehensive terms, but also because this is where funding has been directed. Further, there are real technical limits on existing capacities to model impact at smaller resolutions.
- 44 Andrew C. Revkin “Forum says Climate Shift Brings Death,” *New York Times*, May 29, 2009.
- 45 For further elaboration on Copenhagen see also Adrian Lahoud, “The Third Degree: Interrogating the Scale of Climate Conflict,” in Ines Weizman, ed., *Architecture and the Paradox of Dissidence* (London: Routledge, 2013).
- 46 Radoslav S. Dimitrov, “Inside UN Climate Change Negotiations: The Copenhagen Conference,” *Review of Policy Research*, vol. 27, no. 6 (2010): 795–821.
- 47 Serres, *The Natural Contract*, 32.
- 48 See also Paulo Tavares and Adrian Lahoud, “Fifth Geneva Convention: Nature, conflict, and international law in the Anthropocene,” <http://www.forensic-architecture.org/wp-content/uploads/2012/10/5th-Geneva-Convention-Tavares-Lahoud.pdf>.
- 49 The crime scene was even marked with blood: Claudia Salerno, G77 member and Lead Climate Negotiator for Venezuela was forced to slam the table in order to be heard during a session in which the chair continually ignored her requests to speak; eventually, she continued her speech with her bloodied palm raised in front of her.