

ANTIARCTIC RESOLUTION

edited by GIULIA FOSCARI / UNLESS
Lars Müller Publishers

11 **Antarctic Resolution**
Ursula Fossari

01 Ant-Arctica In-Cognita

- 30 **The Discovery of Antarctica**
 Robert Headland
- 39 **Asymptotic Cartography**
 William L. Fox
- 48 **South Polar Regions**
 William Kentridge
- 49 **Drawing the Antarctic Resolution Atlas**
 Sol Camacho and Carolina Passos
- 53 **Climate Models. Antarctica and the Politics
 of Digital Representations**
 Juan Francisco Salazar
- 54 **One Map, One Ocean. The Athelstan Spilhaus
 Projection**
 Bojan Šavrič, John Nelson, David Burrows
- 57 **Constructing a Place through Literature.
 The Image of Antarctica**
 Elizabeth Leane
- 60 **Constructing a Place through Photography.
 In Wilderness**
 Jean de Pomereu
- 63 **Photography's Trace on Ice**
 El Glasberg
- 66 **Imagined, Recreated, and Rephotographed.
 Ice Blink**
 Anne Noble

**02 Antarctic Pie. The Menacing
 Geometry of Power**

- 72 **National Claims in Antarctica**
 Robert Headland
- 76 **Neuschwabenland**
 Cornelia Lüdecke
- 82 **Naming the Antarctic**
 Carlo Baroni, Adrian Fox, Ursula Harris,
 and Jean-Yves Pirlot
- 88 **Political Conflict in the Antarctica Peninsula**
 Adrian Howkins
- 92 **How to Claim a Continent. Operation Tabarin
 and the Post Office**
 Camilla Nichol
- 94 **A Concise Military History of Antarctica**
 Joseph Micallef
- 98 **Strategic Interests in Antarctica.
 The Example of China**
 Anne-Marie Brady
- 99 **Antarctica as a Hybrid Warfare Environment?**
 Anne-Marie Brady

03 The Governance System of a Citizenless Continent

- 102 Science, Politics, and Governance in the Antarctic
Treaty System. A Symbiotic Relationship
Karen N. Scott and Donald R. Rothwell
- 106 International Polar and Geophysical Years
Susan Barr
- 108 The Precursor of the International Geophysical
Year. The Norwegian-British-Swedish Antarctic
Expedition
Christel Misund Domaas
- 110 The Pivotal Role of the International Geophysical
Year (IGY) 1957–1958
James Fleming and Cara Seitchek
- 114 The Antarctic Treaty
Klaus Dodds
- 124 The Scientific Committee on Antarctic Research
Gary Wilson
- 126 Facilitating International Collaboration in Antarctic
Science. The Role of COMNAP
Gillian Wratt
- 130 Antarctica's Latest Governance Challenge.
Coronavirus
Alan D. Hemmings and Bob Frame
- 132 Antarctic Law Enforcement
Donald R. Rothwell and Karen N. Scott

04 Antarctic Resources. Temptations and Accountability

- 136 Antarctic Resources and the Protocol for
Environmental Protection
Doaa Abdel-Motaal
- 139 The Role and Impact of Antarctic Specially Protected
Areas and Antarctic Specially Managed Areas
Kevin A. Hughes
- 144 Antarctic Biodiversity
Peter Convey
- 149 Fishing in the Southern Ocean and the Role
of CCAMLR
Cassandra M. Brooks
- 152 Marine Protected Areas
Andrea Kavanagh
- 154 Spatial Exceptions at Sea
Juan Du
- 156 The Krill Market
Daniel Kiss and Swadheet Chaturvedi
- 159 The Emerging Issue of Plastic Pollution
in Antarctica
Elisa Bergami and Ilaria Corsi

- 160 Bioprospecting in Antarctica
Julia Jabour
- 162 Antarctic Tourism
Daniela Liggett
- 167 Ship-Based Antarctic Tourist Landing Procedures
Solan Jensen

05 “The Question of Antarctica”

- 172 Antarctica. Territory Beyond Possession?
Christy Collis
- 174 Antarctica as a Global-Commons. Promises
and Pitfalls
Sanjay Chaturvedi
- 175 Where the Ice Meets the Waves. Antarctica
and the Law of the Sea
Tim Stephens
- 179 Bounding Antarctica. The Greater Southern Ocean
Alan D. Hemmings
- 182 The “Question of Antarctica” at the United Nations
Doaa Abdel-Motaal
- 186 The Role of NGOs in the Antarctic Treaty System
James N. Barnes
- 187 Antarctica as World Park
James N. Barnes

188 The Antarctic through the Lens of Herbert Ponting

FOUR ELEMENTS

06 The Revolutionary Ocean

- 206 The Global Carbon Budget
Andreas Hauck
- 209 The Southern Ocean Overturning Circulation
Jean-Baptiste Sallée
- 212 The Variable Southern Ocean Carbon Sink
Peter Landschützer
- 215 Southern Ocean Acidification and Its Impact on Microorganism
Katherine Petrou
- 219 The Fate of Pteropods in an Acidified Ocean
Gretchen Hofmann, Juliet M. Wong, and Kevin Marquez Johnson
- 221 Antarctica's Bio-indicators
Philip Trathan
- 225 Emperor Penguins and the Impact of Climate Change
Stéphanie Jenouvrier
- 226 The Impact of Climate Change on the Antarctic Krill
Andrea Piñones
- 228 Antarctic Sea Ice and Its Impact on the Global Climate System
Dirk Notz

07 Twenty-Six Quadrillion Tons of Ice. The Urgencies of Contemporaneity vs. the Truths of "Deep Time"

- 237 Antarctica. The World's Coldest Desert
David Brauner
- 242 Antarctica as Environmental Archive
Cécile Barbante and Jacopo Gabrieli
- 250 Ice Memory. An International Salvage Program
Cécile Barbante and Jacopo Gabrieli
- 252 The Technicalities of Ice Drilling
Alexey V. Bridgovich Talalay
- 256 Antarctic Subglacial Lakes. The Case of Vostok
Vladimir Lipenkov and Alexey A. Ekaykin
- 259 Ice Shelf Retreat in Antarctica
David Vaughan
- 262 The Larsen Ice Shelf
David Vaughan
- 266 West Antarctica Ice Shelf. The Thwaites Glacier
David Vaughan
- 269 Antarctica and Global Sea Level Rise
David Vaughan

08 A Continental Archipelago under Ice

- 282 Gondwana, Antarctica, and Continental Drift
Karsten Gohl and Georg Kleinschmidt
- 284 Scientific Drilling on the Antarctic Margin
Gary Wilson
- 286 Plant Migration
Arturo Lyon
- 288 Big Geo-Scientific Data in the Antarctic
Graeme Eagles and Mirko Scheinert
- 290 The Antarctic Digital Database
Peter T. Fretwell
- 292 The Land underneath the Ice Cap
David Vaughan
- 293 The Geodynamic Evolution of the Continent and Magnetic Anomalies
Graeme Eagles
- 295 Exploring Antarctic Subglacial Geology and Lithosphere
Fausto Ferraccioli

09 The White Desert. A Unique Viewing Platform into the Cosmos

- 300 The Magnetosphere
Louis J. Lanzerotti and Andrew J. Gerrard
- 303 Stellar Axis
William L. Fox
- 305 Atmospheric Chemistry. The Discovery of the Ozone Hole
Jonathan Shanklin
- 305 Advocating for Consistent Data Sets. The Dobson Spectrophotometer
Jonathan Shanklin
- 308 Long-Duration Ballooning
Andrew T. Hynous
- 314 SuperTIGER
Brian Rauch
- 315 The Balloon-Borne Large Aperture Submillimeter Telescope
Gabriele Coppi
- 319 IceCube Neutrino Observatory. Transforming Antarctic Ice into a Science Experiment
Francis Halzen, James Madsen, and Madeleine O'Keefe
- 319 Cosmic Rays and Neutrino Astronomy
Francis Halzen, Kael Hanson, and James Madsen

- 324 The Antarctic through the Lens of Eliot Porter

10 Extreme Habitation. Compressed Spaces and Dilated Times

- 344 Inhabitation in the Extreme. The Winter-Over Syndrome
Lawrence A. Palinkas
- 350 Interior Urbanism at the Pole. Framheim vs. Cape Evans
Giulia Foscari
- 356 The Medicinal Role of Reading in the Heroic Age
Elizabeth Leane
- 361 Communication Abstinence
Arturo Lyon
- 366 Extreme Habitation. Antarctica's "Architecture of Sleep"
Juan Du
- 372 Sensory Deprivation and the Role of Colour in Antarctica
Angela Wright
- 374 Antarctic Nourishment
Inti Ligabue
- 377 Confined Interiors and the Importance of Collective Spaces
Juan Du

11 Importing and Transporting the Possibility of Life

- 382 From Polar Gateways to Antarctic Cities
Juan Francisco Salazar
- 384 Construction Seasonality and Building Phasing
Thomas Schramm
- 389 Traverses and Intermodal Transportation
Paul Thur
- 392 White Noise
Anne Noble
- 393 A Day in the Life of an Antarctic Traverser
Paul Thur
- 394 Antarctic Mindset
Chiara Montanari
- 395 Freight to Vostok Station
Yuri A. Shibaev
- 400 Bitch in Slippers
Anne Noble

12 Towards a Temperate "Existenzminimum". From Seaweed to Polystyrene

- 404 The Three Typologies of the Heroic Age Huts
Michael Pearson

- 408 Borchgrevink's Cape Adare Hut. The First Antarctic Architecture
Michael Morrison
- 409 Antarctic Prefabrication. From Timber-Frame Structures to Panelised Construction
Geoff Cooper
- 412 Containerisation in Polar Architecture
Hartwig Gernandt and Hans-Jürgen Meyer
- 415 Recombining Architecture. The Role of the Container at Mario Zucchelli Station
Francesco Pellegrino
- 416 Comandante Ferraz Station
Emerson Vidigal
- 418 Bharati Station
Bert Bücking
- 422 The Role of the Window in Antarctic Architecture
Hugh Broughton
- 423 The Evolution of the Architectural Envelope
Federica Sofia Zambelletti
- 430 Jang Bogo Station
Sang Leem Lee

13 Geography of Science, "Domed Cities", and Mobile Architectures

- 435 Abstract Master Plan
Giulia Foscari
- 442 The Amundsen-Scott South Pole Station
Joe Ferraro
- 444 A Supra-regional Dispersed City. The Fildes Peninsula
Arturo Lyon
- 448 Domesticity in the Extreme
Giulia Foscari
- 449 An Unbuilt City in Antarctica
Claudio Williams
- 450 The "Informal Settlements" of Antarctica
Juan Du
- 453 Lessons in Temporal Permanence. McMurdo Station
Rick Petersen
- 456 Scott Base. Rethinking the Dispersed Master Plan Model
Hugh Broughton
- 458 Calving Architecture. Archaeology of the Debris
Giulia Foscari
- 466 The Halleys
Hugh Broughton
- 469 The Architectural Impact of Halley VI
Hugh Broughton

14 From Anthropic Footprints to Disembodied Technologies

- 474 **Antarctic Building Design Standards**
Neil Gilbert and Ceisha Poirot
- 477 **Antarctic Environmental Impact Assessment**
Neil Gilbert and Ceisha Poirot
- 478 **Water Management in the Extreme**
Tony McGlory
- 482 **Rodriguez Wells and Water Management**
Steve Franco
- 484 **The Challenges of Fire Safety in Antarctica**
Tony McGlory
- 487 **The Footprint of Antarctic Stations**
Shaun T. Brooks
- 490 **Built-in Redundancies or Infrastructure Resilience**
Tony McGlory
- 491 **Vostok Station**
Yuri A. Shibnev
- 494 **Building Performance and Carbon Emissions**
Tony McGlory
- 498 **Princess Elisabeth Station**
Prestatux
- 499 **Striving for Zero Carbon Emission in Princess Elisabeth Antarctica Station and the Ellipsoid**
Philippe Samyn
- 502 **Design for Removal. The Life Cycle of Antarctic Stations**
Thomas Schramm
- 504 **Antarctic Foundations. Towards Elevated Platforms**
Keremig Gernandt and Hans-Jürgen Meyer
- 507 **Ephemeralization. "We left no footprint, even"**
Greta Pasceri
- 510 **The Googies**
Neil Egan
- 511 **Union Glacier Field Camp**
Alejandro Bernal, Paul Taylor, and Francisco Galadí
- 512 **Halley and the Importance of Automation**
Thomas Barningham

15 The Ideological Use of Relics

- 516 **Questioning Antarctica's Museumification**
María Ximena Senatore
- 518 **The Antarctic Heritage List**
Francesco Bandarin
- 524 **Antarctic Archaeology, Heroic Age Huts, and Scientific Stations**
Francesco Bandarin
- 528 **Antarctic Heritage Management**
Camilla Nichol

- 529 **Restoration in Antarctica**
Geoff Cooper
- 530 **Preservation Contradictions on an Active Volcanic Crater. Deception Island**
Arturo Lyon
- 532 **The Fate of Whaling Stations in Antarctica**
Michael Morrison
- 534 **The Neglected Sealing Heritage of Antarctica**
Michael Pearson
- 536 **Māori Culture in Antarctica. Preserving Knowledge and Papatūānuku**
Priscilla Wehi, Te Warihi Hetaraka, Fayne Robinson, Poutama Hetaraka, and James York
- 537 **Antarctic Memorials, Monuments, and Scientific Equipment**
Francesco Bandarin
- 539 **Vladimir Lenin at the Pole of Inaccessibility**
Alexander Klepikov
- 540 **Roald Amundsen's Tent at the South Pole**
Susan Barr
- 544 **The Wreck of Shackleton's *Endurance* in the Weddell Sea**
Julian A. Dowdeswell
- 546 **The Role of Photography in Antarctic Preservation**
Shaun O'Boyle

16 Antarctica and Outer Space. Laboratories for a Future as Global Commons

- 550 **Exploring Antarctic and Extraterrestrial Connections in Fiction**
Elizabeth Leane
- 551 **The Antarctic as Analogue Site**
William L. Fox
- 553 **Dry Valleys, Permafrost, and Mars**
Gary Wilson
- 555 **Antarctica and the Exploration of the Solar System**
Teasel Muir-Harmony
- 556 **Relational Trajectories of Antarctica and Outer Space**
Juan Francisco Salazar
- 558 **Antarctica and Apollo. Heritage in the Extreme**
Bryan Lintott
- 560 **Space and Suit**
Nicholas de Monchaux
- 562 **Antarctic Attire**
Conrad Anker
- 565 **Rethinking the Antarctic Suit**
Lino Dainese
- 570 **Do(o)med Interiors**
Miranda Nieboer and Craig McCormack

571	Antarctica, Human Adaptation, and Space Ron Roberts	602	Archive of Antarctic Architecture Index
574	Humankind in the Extreme. The Weakest Link Didier Schmitt	614	Cape Adare hut, 1899
575	Behavioural Patterns in the Extreme. Concordia as Space Simulator Beth Healey	618	Hut Point hut, 1902
577	Hydroponics. Greenhouses in the Extreme Daniel Schubert	622	Aktieselskabet Hektor Whaling Station, 1906
580	Inhabiting Space Scott Parazynski	624	Cape Royds hut, 1908
582	International Antarctic Stations Alan D. Hemmings	628	Framheim hut, 1911
584	The Antarctic and Outer Space. From <i>Res Nullius</i> to <i>Res Communis</i> Christy Collis	632	Cape Evans hut, 1911
588	The Antarctic through the Lens of Joan Myers	636	Cape Denison huts, 1912
		640	The <i>Endurance</i> , 1914
		644	Base A, 1944
		648	Maudheim, 1949
		652	Mawson, 1954
		654	Little America V, 1929/1956
		658	Halley I, 1957
		666	Naval Air Facility McMurdo, 1956
		668	Mirny, 1956
		670	Amundsen-Scott South Pole, 1957
		674	Charcot, 1957
		678	Scott Base, 1957
		682	Pole of Inaccessibility, 1958
		684	Base E, 1946/1961
		690	New Byrd, 1957/1962
		694	Eights, 1963
		698	Plateau, 1965
		702	Base B, 1944/1966
		706	Halley II, 1957/1967
		712	Casey Repstat, 1969
		716	Halley III, 1956/1973
		722	Amundsen-Scott South Pole, 1957/1975
		726	Base R, 1975
		730	Georg Forster, 1976
		734	Esperanza, 1953/1978
		736	Georg von Neumayer, 1981
		740	Halley IV, 1956/1983
		746	Base Presidente Eduardo Frei Montalva, 1969/1984
		752	Mario Zucchelli, 1986
		756	Casey, 1969/1988
		760	Zhongshan, 1989
		762	Halley V, 1956/1992
		768	Neumayer II, 1981/1992
		770	Syowa, 1957/1993
		776	SANAE IV, 1960/1997
		780	Concordia, 2005
		786	Princess Elisabeth, 2007
		790	Amundsen-Scott South Pole, 1957/2008
		796	Neumayer III, 1981/2009
		804	Bharati, 2012
		810	Halley VI, 1956/2013
		820	Jang Bogo, 2014
		824	Taishan, 2014
		828	Union Glacier, 1998/2014

832	Juan Carlos I, 1988/2018
838	Comandante Ferraz, 1984/2020
844	St. Kliment Ohridski, 1988/2020+
848	Henryk Arctowski, 1977/2020+
852	Scott Base, 1957/2020+
856	Rothera, 1975/2020+
860	Ross Sea Station, 2020+
862	Vostok, 2020+
866	McMurdo, 1956/2020+
872	Dome Fuji, 2020+

876	The Antarctic through the Lens of Fernando Pomareu
-----	---

892	Acknowledgments
903	About the Authors
910	Bibliography
932	Notes
949	Visualisations and Drawings Sources
967	Image Credits

978	The Antarctic through the Lens of Paolo Pellegrin
-----	--