

Contents

1 Spatial Entropy, Geo-Information and Spatial Surprise	1
1.1 From Boltzmann's Thermodynamics to Shannon' Formula	1
1.2 Geo-Information and Spatial Entropy	5
References	11
2 Computing the Spatial Entropy of Square Binary Maps	15
2.1 The Spatial Entropy of Square Binary Maps	16
2.2 The Spatial Entropies of two Landscapes of France and Brazil	27
References	30
3 Spatial Entropy of Directional Geographical Data and Landscape Networks	31
3.1 Networks, Landscapes and Spatial Entropy	32
3.2 Entropies of Random and "Small World" Networks	37
3.3 Spatial Entropy of Directional Distributions	44
3.4 The Directional Spatial Entropy of a Landscape of Mexico	49
References	52
4 Spatial Entropy of Landscapes Simulated with Artificial Life and Swarm Intelligence	57
4.1 Spatial Entropy of Simulated Landscapes: Artificial Life	58
4.2 Spatial Entropy of Simulated Landscapes: Swarm Intelligence	62
4.3 Directional Spatial Entropy of Simulated Landscapes	66
References	70
5 Spatial Negentropy and Social Self-Organization in Simulated Landscapes	75
5.1 Schelling's Model of Segregation and Spatial Negentropy	75
5.2 Spatial Self-Organization and Kolmogorov-Sinai Entropy	80
References	83

6	Visual Perception of Spatial Entropy and Landscape Analysis	87
6.1	Landscape Diversity and Landscape Entropy	88
6.2	Spatial Entropy, Order and Disorder	94
	References.	99
7	Spatial Entropy, Non-Extensive Thermodynamics and Landscape Change	103
7.1	Non-BGS Thermodynamics in Landscape Analysis	104
7.2	Non-Extensive Thermodynamics.	108
7.3	The Tsallis Spatial Entropy of a Landscape of Greece	112
	References.	119
8	Emergence, Sustainability and Cyber-Physical Landscapes	123
8.1	Thermodynamic Entropy, Spatial Entropy and Emergence.	124
8.2	Sustainability, Culture and Cyber-Physical Landscapes	128
	References.	135
	Index.	141