

Symbiosis of Scientific Rationality and Humanistic Care Literary Transformation and Values of Climate Science Narration in The Long Summer

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Abstract

In the context of the Anthropocene, the global outbreak of the climate crisis has made the integration of climate science and literary expression an inevitable trend of the times. Scientific rationality provides cognitive support for ecological governance, while humanistic care infuses spiritual warmth into ecological practice. Their symbiosis has become the core value pursuit of contemporary climate fiction. Kim Stanley Robinson's *The Long Summer* takes rigorous climate science as its narrative foundation, breaking through the traditional perception of "opposition between science and literature". It organically integrates climate scientific knowledge, scientific practice with humanistic narration and ecological ethics, accomplishing a creative literary transformation of climate science narration. From an interdisciplinary research perspective, this paper combines theories of science communication, ecocriticism and narratology to systematically analyze the pathways of literary transformation of climate science narration in *The Long Summer*, interpret the symbiotic logic of scientific rationality and humanistic care, and explore its multiple values in science communication, literary innovation and ecological practice. Research shows that Robinson realizes the transformation of climate science from a "knowledge system" to "literary expression" through concrete narration, humanized characterization and value integration, constructing a narrative mode with "scientific rationality as the backbone and humanistic care as the soul". This not only highlights the objectivity and seriousness of climate science, but also conveys the humanistic idea of "symbiosis between humans and nature", providing important reference and ideological support for contemporary climate fiction writing, science communication and ecological governance.

Keywords

The Long Summer; climate science narration; literary transformation; scientific rationality; humanistic care; science communication

1. Introduction

1.1. Research Background: The Demand for Integration of Science and Literature Amid the Anthropocene Climate Crisis

Since the Industrial Revolution, the unrestrained consumption of fossil fuels and the disorderly expansion of human activities have triggered a series of climate crises such as global warming, glacial melting and frequent extreme weather events. The advent of the Anthropocene has made climate governance a shared global mission of the era. The complexity and globality of the climate crisis determine that its response requires the support of scientific rationality and the guidance of humanistic care: scientific rationality provides precise cognitive basis, technical approaches and practical plans for climate governance, answering the practical question of “how to respond to the climate crisis”; humanistic care focuses on the survival dilemmas of human and non-human beings, reflects on the relationship between humans and nature, conveys ecological ethics and values, and answers the spiritual question of “why we should respond to the climate crisis”.

Against this background, the boundaries between literature and science have gradually blurred. As an important carrier of their integration, climate fiction undertakes the dual mission of “disseminating climate science, conveying ecological ideas and arousing awareness of action”. Traditional climate narration either falls into the instrumental dilemma of “emphasizing science over humanities”, reducing literature to a carrier of scientific knowledge and lacking humanistic warmth, or slips into the idealistic trap of “emphasizing humanities over science”, deviating from the reality of climate science and failing to provide effective ecological guidance. The core breakthrough of outstanding contemporary climate fiction lies in achieving the symbiosis of scientific rationality and humanistic care, organically integrating the objectivity of climate science with the appeal of literary expression, making scientific knowledge perceptible and empathetic, and grounding humanistic ideas with solid support.

As a leading figure in contemporary climate fiction, Kim Stanley Robinson has always adhered to the dual stance of “scientific narration and humanistic care” in his creation, and is hailed as “a master who transforms climate science into literary art”. As a classic representative of his ecological writing, *The Long Summer* is based on realistic climate science research, abandoning illusory sci-fi imagination. It integrates scientific knowledge such as global warming, glacial melting and carbon emission control into human survival dilemmas, emotional struggles and resistance actions, accomplishing a creative literary transformation of climate science narration. The novel not only demonstrates the rigor and objectivity of climate science, but also conveys profound humanistic care, achieving a perfect symbiosis of scientific rationality and humanistic care. It has become a model of the integration of science and literature in contemporary climate fiction, providing an important textual sample for relevant research.

2. Internal Connections Among Scientific Rationality, Humanistic Care and Climate Science Narration

2.1. Connotation of the Symbiosis Between Scientific Rationality and Humanistic Care

Scientific rationality refers to the mode of thinking and practical criterion for humans to understand and transform nature. Its core lies in exploring natural laws with an objective, rigorous and empirical attitude, pursuing truth and efficiency, and providing cognitive and technical support for humans to respond to natural challenges. In the context of the climate crisis, scientific rationality is embodied in exploring the laws of climate change, developing carbon emission control technologies and designing ecological restoration plans, serving as the core support for climate governance.

Humanistic care refers to human attention to the living conditions, emotional needs and value pursuits of oneself, others and non-human beings. Its core lies in respecting life, pursuing justice and advocating symbiosis, infusing spiritual warmth and value guidance into human practice. In the context of the climate crisis, humanistic care is reflected in concerning the survival dilemmas of people of different classes and nationalities, respecting the survival rights of non-human beings, and pursuing the symbiotic relationship between humans and nature, acting as the spiritual core of climate governance.

Scientific rationality and humanistic care are not opposed to each other, but a unified entity that supports and dialectically coexists with each other: scientific rationality provides objective basis and practical approaches for humanistic care, preventing it from falling into empty idealism; humanistic care calibrates the value orientation of scientific rationality, preventing science and technology from slipping into instrumentalism and utilitarianism. Their symbiosis is an inevitable requirement for humans to address the climate crisis and achieve ecological salvation, as well as the core value pursuit of contemporary climate fiction.

2.2. Logic of Literary Transformation of Climate Science Narration

Climate science narration is an expressive form that presents and disseminates climate scientific knowledge, scientific practice and scientific controversies through narrative means. The literary transformation of climate science narration refers to converting abstract and rigorous climate scientific knowledge into perceptible and empathetic literary expression through literary narrative techniques (such as concrete depiction, character building and plot construction), achieving the transformation goals of “popularizing scientific knowledge, literaryizing scientific spirit and humanizing scientific practice”.

The literary transformation of climate science narration follows a clear logical path: first, knowledge transformation, converting abstract climate scientific concepts (such as greenhouse effect, ocean circulation and carbon emission peak) into concrete narrative scenes and details, enabling readers to intuitively understand scientific knowledge; second, character transformation, portraying subjects of

scientific practice (scientists and researchers) as humanized figures with emotions, dilemmas and pursuits, breaking the “stereotype of scientists” and endowing scientific practice with humanistic warmth; third, value transformation, organically integrating the practical goals of scientific rationality (such as emission reduction and ecological restoration) with the values of humanistic care (such as ecological justice and win-win symbiosis), enabling scientific practice to carry humanistic values and realize the symbiosis of science and humanities.

2.3. Literary Value of Science Communication in Climate Fiction

As an important carrier of climate science communication, climate fiction’s literary expression possesses unique value for science communication: first, the advantage of appeal, literature animates abstract scientific knowledge through plot construction and emotional rendering, enhancing the attractiveness and empathy of science communication; second, the advantage of cognition, literature enables readers to understand climate scientific knowledge in immersive experience through constructing narrative scenes, deepening their perception of the climate crisis; third, the advantage of value, literature organically integrates scientific knowledge with humanistic ideas, conveying ecological ethics and values while spreading scientific knowledge, and arousing readers’ awareness of ecological action. Through the literary transformation of climate science narration, *The Long Summer* has realized the dual values of science communication and literary expression, highlighting the contemporary significance of climate fiction.

3. Pathways of Literary Transformation of Climate Science Narration in *The Long Summer*

The core artistic achievement of *The Long Summer* lies in accomplishing a creative literary transformation of abstract and rigorous climate scientific knowledge through concrete narration, humanized characterization and value integration. This endows climate science narration with both scientific rigor and literary appeal, constructing a narrative form of “symbiosis between science and humanities”. Its specific transformation pathways are mainly reflected in three dimensions.

3.1. Pathway One: Concrete Narrative Transformation of Scientific Knowledge

Climate scientific knowledge is abstract and professional, and direct presentation is difficult for ordinary readers to understand and accept. Abandoning the traditional model of “knowledge indoctrination”, *The Long Summer* converts abstract climate scientific knowledge into perceptible and empathetic literary scenes through narrative techniques of concrete scenes, concrete details and concrete conflicts, realizing the popularization of scientific knowledge.

Concrete scenes serve as the core carrier of scientific knowledge transformation.

Centering on the core scientific proposition of global warming, the novel constructs a series of concrete narrative scenes, converting abstract climate scientific concepts into intuitive literary experience. For example, instead of giving an abstract theoretical explanation of the core concept of “greenhouse effect”, the novel presents it through the scene of Antarctic glacial melting: “The Antarctic ice shelf cracks softly under the scorching sun; huge ice blocks break off and fall into the ocean, stirring up waves dozens of meters high. Melted freshwater flows along the ice surface, like countless desperate streams, merging into the warming ocean and disrupting the balance of ocean circulation.” This scene not only intuitively presents the scientific fact that the greenhouse effect causes glacial melting, but also makes readers feel the urgency of the climate crisis through vivid depiction.

Concrete details act as an important supplement to scientific knowledge transformation. Through precise detailed descriptions, the novel converts complex climate scientific principles into specific life details, integrating scientific knowledge into daily life. For example, regarding “the impact of carbon emissions on climate”, the novel presents it through the life details of ordinary families: “The city sky is shrouded in gray haze all year round, making breathing heavy. Summer temperatures rise year by year, and air conditioners become a necessity for every household. The extensive use of air conditioners further increases carbon emissions, forming a vicious cycle. Trees in parks wither year by year, and the number of birds decreases. Once green mountains and clear waters are gradually replaced by drought and desolation.” These detailed descriptions link abstract carbon emission principles to ordinary people’s life experience, enabling readers to deeply understand the internal connection between carbon emissions and the climate crisis.

Concrete conflicts function as an important means of scientific knowledge transformation. By constructing contradictions and conflicts in scientific practice, the novel converts controversies and challenges in climate science into narrative conflicts, demonstrating the rigor of scientific research while enhancing narrative attractiveness. For example, regarding “controversies over climate governance plans”, the novel portrays conflicting views among different research teams: some scientists advocate gradual carbon emission reduction through large-scale afforestation and promotion of clean energy; others propose artificially regulating global climate through geoengineering technologies. Such conflicts not only reveal the complexity of climate science research, but also help readers understand the scientific basis and practical dilemmas of different climate governance plans amid narrative tensions.

3.2. Pathway Two: Humanized Narrative Portrayal of Scientific Subjects

The subjects of scientific practice are scientists and researchers, who are often portrayed as stereotypical images of “supreme rationality without emotions” in

traditional narration, making it hard to arouse readers' emotional resonance. Breaking such stereotypical portrayal, *The Long Summer* shapes scientific subjects as vivid figures with emotions, dilemmas, pursuits and responsibilities through humanized narrative techniques, endowing scientific practice with humanistic warmth and realizing the literary transformation of scientific subjects.

The novel creates diverse and three-dimensional images of scientists, demonstrating their scientific rationality and professional competence as well as depicting their emotional worlds and practical dilemmas. For instance, Alan, a climate scientist in the novel, sticks to the front line of research, devotes himself to the study of global warming, explores climate laws with a rigorous scientific attitude and puts forward a series of feasible emission reduction plans, highlighting the power of scientific rationality. Meanwhile, the novel also depicts his emotional struggles: he neglects his family due to long-term research, leading to estrangement from his wife; facing the grim reality of the climate crisis, he once falls into despair and confusion, but finally reaffirms his research belief under the inspiration of humanistic care. Such humanized portrayal breaks the stereotype of scientists, allowing readers to see the humanistic feelings behind scientific rationality.

The novel not only portrays core scientists, but also focuses on the scientific practice of grassroots researchers and ordinary people, expanding the scope of scientific subjects. Grassroots researchers take root in frontline work, conducting climate monitoring and ecological surveys, overcoming practical difficulties such as funding shortages and harsh environments, and quietly promoting the dissemination and practice of climate science; guided by scientists, ordinary people gradually learn climate scientific knowledge, practice low-carbon lifestyles and participate in ecological protection, becoming important participants in climate science practice. The portrayal of such diverse subjects makes scientific practice no longer an "exclusive field" of scientists, but a common cause of universal participation, highlighting the extensiveness and humanism of science communication.

In addition, the novel reveals the dialectical relationship between scientific rationality and humanistic ethics by depicting the ethical dilemmas of scientists. For example, in the research and application of geoengineering technologies, scientists face tough ethical choices: geoengineering may alleviate the climate crisis in the short term, but may also cause unpredictable damage to ecosystems and affect the survival of human and non-human beings. By depicting such ethical dilemmas, the novel shows scientists' sense of responsibility and conveys the value concept that "science and technology must serve humanistic ethics", realizing the in-depth integration of scientific subjects and humanistic care.

3.3. Pathway Three: Value-Integrated Narrative Fusion of Scientific Practice

The core goal of climate science practice is to address the climate crisis and achieve

ecological restoration, which cannot be realized without the guidance of humanistic values. The *Long Summer* organically integrates scientific practice with humanistic values, enabling scientific practice to carry humanistic ideas such as ecological justice, win-win symbiosis and intergenerational equity through value-oriented narrative techniques, realizing the literary transformation and value sublimation of scientific practice.

The novel integrates scientific practice with the concept of ecological justice, criticizing injustices in the climate crisis and conveying the value of “common but differentiated responsibilities”. In the novel, developed countries, relying on their technological and financial advantages, shift the ecological costs of carbon emissions to developing countries, leaving the latter facing a more severe climate crisis; developing countries, in turn, are trapped in backward technology and insufficient funding in climate governance. Through the narration of scientists promoting global climate negotiations and providing technical and financial support to developing countries, the novel shows the pursuit of ecological justice in scientific practice, calling on countries around the world to cooperate and jointly address the climate crisis.

The novel integrates scientific practice with the concept of win-win symbiosis, constructing an ecological picture of “symbiosis between humans and nature”. The core of scientific practice is not to “conquer nature”, but to “conform to and protect nature”, repairing damaged ecosystems through the application of science and technology to achieve harmonious coexistence between humans and nature. In the novel, scientists develop ecological restoration technologies, plant vegetation, restore marine ecology and protect biodiversity; ordinary people practice low-carbon lifestyles, reducing energy consumption and waste discharge. The integration of such scientific practice and humanistic ideas vividly demonstrates the ecological wisdom of “win-win symbiosis between humans and nature”.

The novel integrates scientific practice with the concept of intergenerational equity, emphasizing contemporary people’s ecological responsibility to future generations. The impact of the climate crisis is long-term, and contemporary scientific practice and ecological protection are directly related to the survival and development of future generations. In the novel, when conducting scientific research, scientists always adhere to the concept of intergenerational equity, focusing on the long-term nature and sustainability of ecological protection and avoiding sacrificing the survival resources of future generations for short-term interests. Such value integration endows scientific practice with not only practical significance but also long-term humanistic value, highlighting the symbiotic logic of scientific rationality and humanistic care.

4. Symbiotic Logic of Scientific Rationality and Humanistic Care in *The Long Summer*

Through the literary transformation of climate science narration, *The Long Summer* constructs a symbiotic logic of “scientific rationality as the backbone and humanistic care as the soul”. Scientific rationality and humanistic care support and permeate each other throughout the narration, not only highlighting the objectivity and seriousness of climate science, but also conveying profound humanistic feelings, achieving the dialectical unity of science and humanities. Its symbiotic logic is mainly reflected in three levels.

4.1. Scientific Rationality Provides Objective Support and Practical Approaches for Humanistic Care

Without the support of scientific rationality, humanistic care will eventually fall into empty idealism and fail to realize practical ecological value. The humanistic care in *The Long Summer* is always based on scientific rationality, which provides objective cognitive basis and feasible practical approaches for humanistic care, turning humanistic ideas from empty slogans into grounded real actions.

At the cognitive level, scientific rationality provides objective basis for humanistic care. Through the narration of climate science, the novel enables readers to clearly understand the formation mechanism, development trend and harms of the climate crisis, as well as the internal connection between humans and nature, thus arousing human awareness of ecological crisis and humanistic care. For example, through narrating scientific facts such as the greenhouse effect, glacial melting and extreme weather, readers are deeply aware that the climate crisis is not accidental, but an inevitable result of the imbalance between human activities and natural laws. Humans must respect and conform to nature to achieve their own sustainable development. Such cognition based on scientific rationality lays a solid foundation for humanistic care, preventing it from falling into the trap of “blind sympathy”.

At the practical level, scientific rationality provides feasible approaches for humanistic care. The humanistic care in the novel is not merely emotional expression, but realized through scientific practice. For example, instead of merely sympathizing with ecological refugees, the novel offers them hope for survival through ecological restoration technologies developed by scientists, resettlement plans implemented by governments and aid actions from the international community; for non-human beings, the novel guarantees their survival through scientific practices such as biodiversity conservation and ecosystem restoration carried out by scientists. This combination of humanistic care and scientific practice makes humanistic care practically feasible, highlighting the supporting role of scientific rationality.

4.2. Humanistic Care Calibrates Value Orientation and Spiritual Core for Scientific Rationality

Without the guidance of humanistic care, scientific rationality can easily slip into

instrumentalism and utilitarianism, becoming a tool for humans to conquer nature and pursue interests. The scientific rationality in *The Long Summer* is always guided by humanistic care, which calibrates its value orientation and infuses spiritual core, ensuring that science and technology always serve the win-win symbiosis of humans and nature.

Humanistic care calibrates the value orientation of scientific rationality, preventing the alienation of science and technology. In the novel, scientists' research practice always takes "addressing the climate crisis, achieving ecological salvation and protecting the survival rights of human and non-human beings" as the core goal, rather than pursuing utilitarian interests or power. For example, in the research and development of clean energy technologies, scientists not only focus on technical feasibility and efficiency, but also pay attention to their ecological impacts and humanistic values, ensuring that the application of technologies will not damage ecosystems or harm the interests of vulnerable groups; in the research of geoenvironmental technologies, scientists always stick to the bottom line of humanistic ethics, carefully assessing potential risks to avoid greater ecological crises caused by technology abuse. Guided by humanistic care, scientific rationality always stays on the right value track.

Humanistic care infuses spiritual core into scientific rationality, enhancing the motivation of scientific practice. The process of scientific practice is full of difficulties and challenges, and the emotional power and values conveyed by humanistic care become spiritual support for scientists to uphold research beliefs and overcome obstacles. For example, facing multiple dilemmas such as funding shortages, political pressure and public doubts, the scientists in the novel always stick to humanistic feelings, take "protecting the earth and saving humanity" as their belief, and quietly stay at the front line of research, constantly exploring scientific approaches to climate governance. Supported by such humanistic feelings, scientific rationality is no longer cold logic and data, but full of warmth and strength, driving scientific practice forward.

4.3. Narrative Presentation of Symbiotic Logic: From Individual Awakening to Global Collaboration

The Long Summer vividly presents the symbiotic logic of scientific rationality and humanistic care through the narrative thread of "individual awakening—group action—global collaboration", extending the symbiotic concept from the individual to the group and global levels, forming a complete narrative closed loop.

At the individual level, the novel shows the symbiosis of scientific rationality and humanistic care through the individual awakening of scientists and ordinary people. Scientists gradually realize in research practice that scientific rationality must be combined with humanistic care to achieve ecological salvation; baptized by the climate crisis, ordinary people gradually awaken ecological awareness through

learning climate scientific knowledge, practice low-carbon lifestyles, and integrate scientific knowledge and humanistic care into daily life. Such individual awakening is the foundation of the symbiosis of scientific rationality and humanistic care.

At the group level, the novel shows the symbiosis of scientific rationality and humanistic care through group actions of communities, research teams and social organizations. Communities integrate scientific practice and humanistic care into community construction by promoting clean energy and carrying out ecological protection activities; research teams overcome technical difficulties in climate governance through collaboration, adhering to scientific rationality while conveying humanistic care; social organizations enable more people to understand climate scientific knowledge and arouse humanistic care by carrying out science communication and ecological publicity activities. Such group actions are an important carrier of the symbiosis of scientific rationality and humanistic care.

At the global level, the novel shows the symbiosis of scientific rationality and humanistic care through collaborative governance of the international community. Abandoning the constraints of geopolitics and capital interests, the international community carries out global climate negotiations based on rational cognition of climate science, formulates fair and reasonable emission reduction plans, and promotes collaboration between developed and developing countries; scientists from all countries conduct collaborative research, share science and technology and research results, and jointly address the climate crisis. Such global collaboration is the highest form of the symbiosis of scientific rationality and humanistic care, highlighting the concept of a “community with a shared future for mankind”.

5. Multiple Values of Literary Transformation of Climate Science Narration in *The Long Summer*

Through the literary transformation of climate science narration, *The Long Summer* realizes the symbiosis of scientific rationality and humanistic care, possessing not only important literary value but also unique values in science communication, ecological practice, social development and other aspects, highlighting the contemporary significance of climate fiction.

5.1. Literary Value: Promoting Narrative Innovation and Quality Improvement of Climate Fiction

The literary transformation of climate science narration in *The Long Summer* promotes narrative innovation and improves the literary quality of contemporary climate fiction. First, the novel breaks through the traditional perception of “opposition between science and literature”, constructing a new narrative mode of “integration of scientific narration and humanistic narration”, enriching the narrative content and perspective of climate fiction, enabling it to achieve the organic unity of science communication, humanistic expression and ecological

guidance rather than being limited to disaster narration or ecological criticism; second, through concrete narration and humanized characterization, the novel converts abstract scientific knowledge into vivid literary expression, enhancing the appeal and readability of climate fiction, breaking its “niche” dilemma and promoting it into the mainstream literary discourse; third, the novel organically integrates scientific rationality and humanistic care, elevating the ideological connotation and spiritual value of climate fiction, endowing it with not only literary aesthetic value but also profound ideological enlightenment value, providing important reference for contemporary literary creation.

5.2. Science Communication Value: Broadening Dissemination Paths and Audience Scope of Climate Science

As an important carrier of climate science communication, the literary transformation of *The Long Summer* provides new paths for climate science communication, broadens its audience scope and improves communication effects. First, the novel popularizes and concretizes abstract and professional climate scientific knowledge in literary form, enabling ordinary readers to easily understand and accept it, breaking the limitations of “professionalization and niche orientation” in climate science communication; second, through emotional rendering and plot construction, the novel enhances the attractiveness and empathy of climate science communication, allowing readers to not only learn scientific knowledge but also generate emotional resonance and arouse awareness of ecological crisis and action in literary experience; third, through the portrayal of diverse characters and global narrative perspective, the novel breaks geographical and class boundaries in climate science communication, covering audiences from different countries and classes, promoting the global dissemination of climate scientific knowledge and laying a cognitive foundation for global climate governance.

5.3. Ecological Practice Value: Providing Spiritual Support and Practical Guidance for Anthropocene Climate Governance

The literary transformation of climate science narration in *The Long Summer* provides important spiritual support and practical guidance for contemporary Anthropocene climate governance. First, through the narration of scientific rationality, the novel offers precise cognitive basis and technical approaches for climate governance, enabling readers to clearly understand the severity of the climate crisis and the feasibility of response, enhancing confidence in climate governance; second, through the narration of humanistic care, the novel conveys ecological ideas such as “symbiosis between humans and nature”, “ecological justice” and “intergenerational equity”, arousing human awareness of ecological responsibility and promoting the transformation from “ecological cognition” to “ecological action”; third, through the narration of global collaborative governance,

the novel advocates global cooperation to jointly address the climate crisis, providing a referential practical model for global climate governance, highlighting the concept of a “community with a shared future for mankind” and offering spiritual support for Anthropocene ecological salvation.

5.4. Social Value: Promoting the Transformation of Development Models and the Reconstruction of Humanistic Spirit

The literary transformation of climate science narration in *The Long Summer* bears important social value, promoting the transformation of human development models and the reconstruction of humanistic spirit. First, through narrating the climate crisis and presenting scientific practice, the novel criticizes the traditional “high-consumption, high-emission” development model, advocates a “low-carbon, environmentally friendly and sustainable” development model, and promotes the transformation of human society from “conquering nature” to “symbiosing with nature”; second, through humanistic narration, the novel reconstructs humanistic spirit, emphasizing respect for life, pursuit of justice and advocacy of symbiosis, promoting the value transformation of humans from “anthropocentrism” to “ecological symbiosis”; third, through narrating the collaborative actions of diverse subjects, the novel advocates universal participation in ecological protection, forming an ecological atmosphere of “everyone is responsible and everyone participates”, and promoting the progress and development of social civilization.

6. Conclusion

The outbreak of the Anthropocene climate crisis has promoted the in-depth integration of science and literature, and the symbiosis of scientific rationality and humanistic care has become the core value pursuit of contemporary climate fiction. Taking rigorous climate science as its narrative foundation, Kim Stanley Robinson’s *The Long Summer* accomplishes a creative literary transformation of climate science narration through concrete narration, humanized characterization and value integration, constructing a narrative mode with “scientific rationality as the backbone and humanistic care as the soul” and achieving a perfect symbiosis of scientific rationality and humanistic care.

In the novel, scientific rationality provides objective basis and practical approaches for humanistic care, preventing it from being empty; humanistic care calibrates the value orientation and spiritual core of scientific rationality, preventing science and technology from being instrumental. Supporting and permeating each other, they vividly present the symbiotic logic through the narrative thread of “individual awakening—group action—global collaboration”, conveying the ecological wisdom of “win-win symbiosis between humans and nature”.

The literary transformation of climate science narration in *The Long Summer* carries multiple values: literarily, it promotes narrative innovation and quality improvement

of climate fiction; in terms of science communication, it broadens dissemination paths and audience scope of climate science; ecologically, it provides spiritual support and practical guidance for Anthropocene climate governance; socially, it promotes the transformation of development models and the reconstruction of humanistic spirit. Amid the increasingly severe climate crisis, the novel's creative practice not only provides important reference for contemporary climate fiction writing and new paths for climate science communication, but also offers ideological support at the literary level for humans to address the climate crisis and achieve ecological salvation. It reminds humanity that only by adhering to the symbiosis of scientific rationality and humanistic care can humans achieve harmonious coexistence with nature and drive human civilization toward a sustainable future.

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