Climate abnormal circulation based on monitoring system and marine logistics transportation management

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Abstract
Large scale anomalous circulation is one of the main causes of extreme climate in East Asia. Data mining and statistical analysis of climate reanalysis data are important research methods to understand the characteristics of atmospheric circulation and the occurrence of extreme climate. In this paper, we first use SOM to distinguish the anomalous general circulation models in East Asia from 1979 to 2020. According to the results, we establish the response relationship and monitoring system between various models and climatic factors, and analyze the trend and dynamic mechanism of temperature anomalies in China. Secondly, the atmospheric circulation anomaly model is related to the extreme temperature and precipitation events in East Asia, and studies the climate anomaly characteristics under the complex effects of atmospheric circulation anomaly and monsoon system. The following analysis follows all the basic characteristics of land logistics of marine logistics, but due to the high risk of transportation, transportation time is long, so freight management is different. The existing marine logistics transportation management system has many deficiencies in information exchange, cargo management and transportation. The proposal and application of blockchain technology can effectively supplement it. The consensus mechanism is the core of blockchain technology. The decentralized credit structure and the nonoperability of the consensus mechanism of blockchain can effectively overcome the risk of freedom of contract, optimize the maritime logistics and transportation management model, improve the rationality of the sense of responsibility, ensure the transaction efficiency and transportation safety, and comply with the flexible trend of modern maritime trade. This paper introduces the monitoring system and applies it to the management of climate abnormal circulation and marine logistics transportation, which can effectively improve the management of climate abnormal circulation and marine logistics transportation.

Keywords Monitoring system · Abnormal circulation of climate · Marine logistics · Transportation management

Introduction
In the past few decades, more and more extreme climate events have had a profound impact on the ecosystem, economic development and people’s life in the world (Pal and Chakrabortty 2019). Frequent climate disasters have attracted wide attention in all fields. Some studies show that climate change in East Asia reveals several new evolutionary characteristics in time and space under the background of global warming (Mahala 2018). The specific signs are the frequent occurrence of extreme high temperature events, the polarization of precipitation spatial distribution and the large-scale high-intensity cold wave activity in winter, the increase of the frequency, intensity, duration, and influence range of various extreme events, which indicates that the survival of all people will face more severe challenges in the future (Michard et al. 2010). Many scholars have pointed out that atmospheric circulation factors, such as terrain height field, sea level pressure field, horizontal, and vertical wind field, are one of the main reasons for the anomalous circulation in East Asia (Moses 2017). In order to understand the formation mechanism of the abnormal cycle of climate change in East Asia, it is very important to study the regulation of other cycle factors in time and space. This paper divides the data into two periods: 1979–1998 and 1999–2020, and analyzes the changes and
causes of extreme climate events according to the monitoring system (Naqvi et al. 2013). The results show that the decrease of extreme wave and the increase of maximum warm wave are mainly related to thermodynamic factors, but on the contrary, the contribution of motion factors to the change is very small, sometimes exists but also has inhibitory effect. The results confirmed the importance of global warming to the abnormal cycle of climate change in the region (Pradeep et al. 2015). However, with the continuous upgrading of express service, logistics companies, and transport vehicles have increased logistics support, especially marine logistics has brought great pressure (López-Vicente et al. 2008). Therefore, it has become a reality to promote the online tracking, remote monitoring system, management and safety of large-scale marine logistics ships (Ouabid et al. 2017), and more and more people’s attention. At present, in the long-distance transportation management of ships vulnerable to high temperature and spontaneous combustion, the common problem of logistics transportation industry is the low efficiency of long-distance scheduling and wireless communication, and the logistics transportation ships are not unified (Ouassou et al. 2006). According to the design idea of “Internet of things + logistics”, this document develops a series of shipboard terminal systems to meet the needs of logistics ship and enterprise management (Nyesheja et al. 2019). By studying the logistics and transportation service technology system to collect shipboard data, analyze data convert protocols, and interact with data, the on-board terminal system innovatively integrates the mainstream 4G wireless communication technology, GPS technology, GPS technology, etc., Sensor technology, and network communication technology (Lu et al. 2004).

### Materials and methods

#### Data source

This paper is mainly based on: (1) China National ground weather station (V3.0), daily minimum temperature data and data length provided by 2474 institutions, from December 1960 to 2020, after a total of 56 winter half year (defined as the winter half year from October this year to March next year), 3425 data will not be tested. (2) The variables of NCEP/NCAR reanalysis dataset are grid points, such as monthly mean high pressure index and high wind level, with resolution of 2.5° × 2.5°. The time selected in this paper is the winter half year from 1960 to 2020.

#### Correlation coefficient analysis and test

The correlation coefficient $r$ is the physical quantity that indicates the correlation between two meteorological factors. The range of $R$ value is $-1$ to $1$. The higher the absolute value of $R$, the better the correlation between two meteorological factors. The two meteorological data are expressed as $X_i$ ($i = 1,2,..., n$), $Y_i$ ($i = 1,2,..., n$), and the correlation coefficient between the two samples is $R_{XY}$. The specific calculation formula is as follows.

$$r_{xy} = \sqrt{\frac{\frac{1}{n} \sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{\frac{1}{n} \sum_{i=1}^{n} (x_i - \bar{x})^2 \cdot \frac{1}{n} \sum_{i=1}^{n} (y_i - \bar{y})^2}}$$

(1)

The covariance between $X_i$ and $Y_i$ is defined as $S_{xy}$.

$$S_{xy} = \frac{1}{n} \sum_{i=1}^{n} \left( x_i - \bar{x} \right) \left( y_i - \bar{y} \right)$$

(2)

Then the correlation coefficient $r_{xy}$ can be rewritten as follows:

$$r_{xy} = \frac{S_{xy}}{S_x S_y}$$

(3)

#### T test of meteorological research

In the process of meteorological research, t-test is often used to determine whether the event is significant. Specific steps:

1. Establish hypothesis and determine test level.
   - $\alpha$ H0: $\mu = \mu_0$
   - H1: $\mu \neq \mu_0$
   - Bilateral test, test level: $\alpha= $ zero point zero five.

2. Calculate test statistics

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1 + n_2 - 2} \left( \frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

(4)

S12 and S22 are two sample variances; N1 and N2 are two sample sizes.

3. Check the corresponding boundary value table to determine the p value and draw a conclusion.

#### T-N wave interaction flux

Quasi geostrophic T-N wave flux is used to diagnose Rossby wave activity, and T-N wave flux can diagnose the propagation direction of semi surface turbulent energy in zonal
inhomogeneous flow. Because the interference revealed by multi event comprehensive analysis is quasi normal interference part, the phase velocity is very small, and the relevant part of phase velocity is ignored in the analysis. The formula for calculating the horizontal component is as follows.

\[ W_r = \frac{p \cos \phi}{2} U \sqrt{\frac{U}{a^2 \cos^2 \phi} \left( \frac{\phi'}{\lambda'} \right)^2 - \frac{\psi}{\lambda} \left( \frac{\phi'}{\lambda'} \right)^2 + \frac{V}{a^2} \left( \frac{\phi'}{\lambda'} \right)^2 + \frac{V}{a^2} \left( \frac{\phi'}{\lambda'} \right)^2} \]

(5)

**Results**

**Temporal and spatial evolution characteristics of climate anomaly events**

Because of China’s vast territory and complex terrain, we can ignore the frequency differences in some areas of the event by averaging the cooling thresholds of all stations in the country and analyzing the absolute thresholds. If each site uses a different threshold, there is no difference in the frequency of events that the percentile method occurs at each site. At the same time, considering that extreme cooling events are closely related to extreme low temperature in essence, for the convenience of research, we show the division table of the average minimum temperature in winter half a year in China according to Table 1, as shown in Table 1.

In this winter half year, there are great spatial differences in the spatial distribution of extreme cooling threshold in China. According to the above definition, the spatial distribution of the maximum cooling event threshold in China from 1960 to 2020 is given (Fig. 1a). It can be seen from Fig. 1A that the peak cooling events and cooling thresholds in the north are decreasing, which are characterized by spatial heterogeneity, especially latitude heterogeneity. At about 35 degrees north latitude, the cooling threshold in the North usually exceeds 10 °C. The temperature drop threshold of northern Uygur Autonomous Region, Inner Mongolia Autonomous Region, and most of Northeast China reaches 14 °C, and some areas with relatively low values are located in the west of Tarim Basin. Except for the plateau, the temperature in the south is less than 9 °C, and the temperature drop threshold of most coastal areas in the south, Sichuan Basin and Yunnan Province is less than 7 °C. The temperature in South China is slightly higher than that in East China, but there are some areas with lower values in coastal areas. Generally speaking, the cooling threshold has a larger spatial distribution in the

| Region | Corresponding to REOF mode | Cumulative variance contribution | Range | Area description |
|--------|-----------------------------|---------------------------------|-------|-----------------|
| Region1 | REC 0F1                     | 17.54%                          | [115°E~122.5°E,31°N~40°N] | East China |
| Region2 | REOF2                      | 26.98%                          | [95.5°E~115°E,40°N~43°N]; [104°E~115°E,35°N~40°N] | Northern Central China, Central Western Inner Mongolia |
| Region3 | REOF3                      | 33.02%                          | [80°E~95.5°E,40°N~50°N] | Northern Xinjiang |
| Region4 | REOF4                      | 38.8%                           | [114°E~122.5°E,27.5N~31°N]; [114°E~120.5°E,25°N~27.5N]; [110°E~119°E,21°N~25°N] | Southeast China, South China. East |
| Region5 | REOF5                      | 44.08%                          | [104°E~114°E,25°N~30°N] | South Central China |
| Region6 | REC DF6                    | 46.88%                          | [75°E~104°E,27.5°N~40°N] | Plateau, southern Xinjiang |
| Region7 | REOF 7                     | 49.16%                          | [115°E~131°E,40°N~43°N]; [115°E~135°E,43°N~50°N] | South-central northeast |
north and a smaller one in the south, which is consistent with the spatial distribution of temperature in China.

In order to determine the main characteristics of the frequency variation of peak cooling events, the normalized abnormal EOF analysis of peak cooling event frequency in winter half year of China from 1960 to 2020 is as follows. Figure 2 shows the first mock exam result of EOF and its time factor and frequency M-K test.

Figure 3 shows the spatial distribution of the frequency and trend of the extreme cooling events in this winter in China. It can be seen that there are obvious spatial differences in the frequency distribution with the increase of time, but the overall characteristics are basically the same, showing a pattern of frequent occurrence in the north and less in the South.

Analysis of atmospheric circulation when low temperature anomaly occurs

Many scholars are discussing the factors of extreme cold event cycle. In spring, the cold air along the northwest route of Lake Baikal plays a major role in the northeast strong low temperature event, while the primary airflow in the Northeast weak low temperature event comes from the sea of Okhotsk in the Northeast route area. It is also pointed out that through the systematic analysis, the circulation causing the winter low temperature events in China, the important circulation feature of the winter low temperature events in China is the existence of a pair of trough ridges along the northeast to southwest direction in Eurasia. At the same time, the high latitude stratosphere is also related to the low temperature in winter, and the abnormal strength of the stratospheric polar vortex will cause the corresponding geothermal change in winter. According to the lowest temperature region in winter half year of China in the battlefield (Fig. 4), the time series of the lowest temperature in winter half year of each region from 1961 to 2020 can be obtained. In this paper, we use trend analysis, complex difference analysis, t-test, and quasi geostrophic T-N wave flux to diagnose Rossby wave activity. T-N wave interaction flux can diagnose the propagation direction of quasi geostrophic turbulent energy in zonal inhomogeneous flow.
Through the above analysis methods, we will further investigate the causes of winter circulation and low temperature anomalies in seven regions of China in winter.

According to the description in the previous section, the region of the lowest temperature in winter half a year in China is obtained (Fig. 5), and the time series of the lowest temperature in winter half a year in each region from 1961 to 2020 is obtained. After the anti trend standardization of the series, the positive and negative ideal anomalies of each of the seven Chinese regions in the figure are selected. It is considered that the positive (negative) anomaly occurred in that year when the anomaly is greater than (less than) 1 (-1).

The positive and negative anomalies are shown in Table 2.

When the extreme low temperature event occurs in the lower tropospheric region 1 (Fig. 6) above 850 hPa, there is a high pressure center in the center of Eurasia, the high
pressure north of 50 degrees north latitude; Most of the western regions are controlled by high pressure circulation; East wind is dominant in the middle latitudes. North wind is prevalent in the eastern part of Mongolia, while most of the western part of China is affected by the west wind. In Mongolia and central and eastern China, the temperature is generally low. There are two cold centers in the west of Baikal Lake and near Bohai Bay. Generally, in the Okhotsk Sea and its north and some high latitudes of Eurasia, the cold will converge in the east of Mongolia, move southward, and then blow and spread in region 1 under the influence of westerly. In the middle troposphere (Fig. 6b), there is a positive ideal center across the Greenwich meridian in the middle latitudes, and a positive ideal center in the high-dimensional Siberian and East Siberian seas. The temperature near this area is usually higher, most of our country is controlled by negative anomaly center, and there are many low temperature areas in Eurasia in mid latitude. Among them, it is the center of the extreme low temperature in Northeast China, and the warm center of the “+..” cycle from west to East in the middle troposphere forms the wave train in northern China and parts of Mongolia. The T-N flux indicates that the energy of Ross ratio wave can be calculated at (0 °E, 45 °N) when it propagates to the east of region 1, and then it goes into the high latitudes of Eurasia and near the sea of Okhotsk. In the high latitudes of the middle troposphere (Fig. 7b), the center of a geopotential height negative anomaly is located at (0 °E, 50 °N). There is a negative anomaly center in the middle troposphere located on the Greenwich meridian transfer eastward to North China. The pressure distribution over Eurasia in mid latitude is similar to that in region 1. The circulation characteristics in the upper troposphere (Fig. 7C) are similar to those in the middle troposphere.

The above analysis can summarize the abnormal properties of the cycle when low temperature events occur in seven regions, as shown in Table 3.

Discussion

Design of marine logistics dangerous goods monitoring system

The risk of dangerous goods mainly depends on the physical and chemical characteristics of the product itself and the external environmental conditions. Serious accidents are usually affected by some external conditions (collision, friction, heat, fire, and water) or the mixed packaging of incompatible materials, poor ventilation, accumulated heat packaging damage, etc. (Abuzied et al. 2016). When the container is transported by truck, Table 4 lists the change trend of the condition parameters of container dangerous goods and the corresponding main influencing factors.

In order to respond to the requirements of monitoring dangerous goods containers and according to the
Fig. 5. Detrended and normalized time series of mean minimum temperature in winter half year of 1961–2020 in seven regions of China (a-g)
characteristics of transportation process, we propose a logistics monitoring framework for dangerous goods containers. As shown in Fig. 8, through the full use of core technologies such as monitoring system, GPS, GPRS, RFID, and sensor collection, we can monitor the whole process of dangerous goods container logistics in real time. The system consists of four subsystems: (1) the terminal of collecting the status information of dangerous goods container, (2) Electronic label of container, (3) Monitoring terminal of automobile dangerous goods, and (4) Remote monitoring and management platform for dangerous goods (Alexakis et al. 2013).

### Defects of traditional marine logistics transportation management system

**Logistics transportation information asymmetry**

The existing logistics system, namely, the asymmetry of logistics information, is a common problem in all logistics processes, especially in marine logistics. There are two main reasons for this: first, sales and transportation are separated. The logistics carrier is usually an independent carrier (Aydda et al. 2019). The carrier departing from the ship directly manages and manages the goods, and the seller’s understanding of the

| Region   | Range                                      | Positive and negative abnormal years |
|----------|--------------------------------------------|--------------------------------------|
| Region 1 | [115°E−122.5°E,31°N−40°N]                 | Negative abnormal year: 1968, 1970, 1974, 1977, 1982, 1984, 1986, 2011, 2013 |
|          |                                            | Positive and abnormal years: 1962, 1965, 1966, 1973, 1995, 1999, 2002, 2007 |
| Region 2 | [95.5°E−115°E,40°N−43°N], [104°E−115°E,35°N−40°N] | Negative abnormal year: 1968, 1970, 1971, 1977, 1985, 1986, 1992, 1996, 2005, 2011 |
|          |                                            | Positive and abnormal years: 1962, 1965, 1966, 1973, 1978, 1979, 1990, 1991, 1999, 2002, 2007 |
| Region 3 | [80°E−95.5°E,40°N−5°N]                     | Negative abnormal year: 1967, 1969, 1971, 1977, 1985, 1988, 1994, 2011 |
|          |                                            | Positive and abnormal years: 1963, 1966, 1981, 1983, 1990, 2007, 2009 |
| Region 4 | [114°E−122.5°E,27.5°N−31°N], [114°E−120.5°E,25°N−27.5°N], [110°E−109°E,21°N−25°N] | Negative abnormal year: 1963, 1968, 1970, 1974, 1977, 1984, 1986, 1996, 2005, 2011 |
|          |                                            | Positive and abnormal years: 1966, 1969, 1973, 1975, 1979, 1998, 1999, 2001, 2002, 2007 |
| Region 5 | [104°E−114°E,25°N−30°N]                   | Negative abnormal year: 1968, 1976, 1977, 1985, 1988, 1994, 1996, 2005, 2011 |
|          |                                            | Positive and abnormal years: 1965, 1966, 1973, 1975, 1981, 1999, 2002, 2007, 2009, 2015 |
| Region 6 | [75°E−104°E,27.5°N−40°N]                  | Negative abnormal year: 1968, 1977, 1983, 1986, 1992, 1995, 1998, 2011 |
|          |                                            | Positive and abnormal years: 1965, 1966, 1969, 1972, 1975, 1990, 1999, 2007, 2009 |
| Region 7 | [115°E−131°E,40°N−43°N], [115°E−135°E,43°N−50°N] | Negative abnormal year: 1970, 1977, 2001, 2010, 2012, 2013 |
|          |                                            | Positive and abnormal years: 1989, 1990, 1991, 1992, 1995, 1996, 1998, 2002, 2007 |
transportation process is also subject to the conclusion of the transportation contract; second, the transportation risk is high. The carrier can not only choose the transportation route and return route of the goods, but also choose to give up the goods. In case of maritime danger, the carrier can adapt to the needs of navigation according to the situation, so that the buyer and the seller or the insurance company cannot determine the transportation situation of the goods (Benselama et al. 2018).

**High cost of logistics transportation**

First of all, sea transportation takes a long time. Compared with land transportation, it requires a lot of transportation. Moreover, due to a lot of goods, it is necessary to estimate its own logistics and transportation costs. The cost is determined by the size of the goods to be transported. More importantly, the market situation is constantly changing, and the products often appear in the process of transportation. In other words, the carrier must change temporarily, because the buyer has sold the goods to a third party in other locations during the transportation. This requires the carrier to temporarily change the transportation route, at this time the goods are under the control of the sea carrier, does not rule out the possibility of the carrier waiting for an opportunity to increase the price. In order to complete the transportation as soon as possible and reach the purpose of the contract, the seller can only choose compromise.

**Unclear responsibility**

The Hague rules stipulate that the carrier shall not be liable for the loss of goods caused by negligence in ship management,
and China’s maritime law also follow this rule. However, due to the ambiguity of ship management and cargo management, the responsibility of maritime logistics is still unclear. In fact, there is no pure ship management (Bouchaou et al. 2008). Product management is closely related to product management. They have the same behavior and the same consequences, and it is usually difficult to clarify. With the advance and retreat of interest contest and the development of science and technology, the traditional "tubular ship’s fault" (such as hatch cover) is not tightly closed, the pipe valve is properly confused, and the ship’s loading is improper. If the carrier wants to avoid the responsibility, he must bear a lot of burden of proof. Except for the negligence of the captain, the carrier cannot prove the damage or loss of the goods caused by the threat of force and the risk of accidents. The fault of the captain and the crew is mainly related to the sea transportation. Therefore, the crew and the carrier should bear the responsibility (Bouderbala et al. 2019). At the same time, the risks are interrelated. In the face of this uncertainty, it can be said that the carrier is more and more cautious about using it as the defense of "no negligence immunity".

**Advantages of blockchain consensus mechanism in maritime logistics transportation management**

**Balance the status of logistics contract parties**

The decentralization process of blockchain balances the states of all parties, and the signing of contracts requires all parties to have equal status. Otherwise, it will affect the real expression of intention. For the historical reasons of the development of maritime logistics industry, Britain and other countries with
established transportation have absolute advantages over other maritime international organizations in maritime logistics, and seriously hinder the interests of free contract freight owners (Chafai et al. 2020). The emergence of monopoly or monopsony interest groups is usually arbitrary, so as to include exemption clauses in the contract. These clauses enable multinational companies to have a great say when signing logistics contracts. Therefore, the independence of the contracting parties is under great pressure. Small and medium-sized cargo owners are unable to sign maritime logistics and transportation contracts according to their own wishes, and the freedom of contract disappears. According to the decentralized nature of blockchain, there is no center (i.e., absolute controller) in the process of signing or performing contracts (Dai et al. 2013). In other words, everyone is the center, everyone is equal, and has its own consensus mechanism, service concerns, and needs. In this case, this dominant position will not damage the other party in the contract.

Reduce additional transaction costs

The trust network established by consensus mechanism can promote the conclusion and execution of contracts and save various transaction costs. Because of the asymmetry of information, the freight forwarders do not believe whether the carrier will bear the responsibility in the form of increasing freight, and the insurance company is also worried about the risk (Djoukbala et al. 2018). However, the consensus mechanism has completely changed this situation. Freight forwarders can negotiate directly with all freight forwarders (even insurance companies) and eliminate the process of negotiation brokers, thus saving transaction time and reducing transaction costs. At the same time, the carrier cargo owner insurance company can use the blockchain consensus platform to achieve profit balance through multiparty selection, integration, and supervision according to the needs of each interest. In addition, the cost of the agreement is very low.

Improve the efficiency of evidence collection

The invariance of blockchain ensures the reliability and security of transaction evidence. In the conventional maritime logistics, only the shipping company departing from the ship manages the storage, transportation, and processing of the product warehouse, and when there is a dispute about product damage, it is difficult to investigate and collect evidence. Freight owners are concerned that freight companies abuse the ship’s immunity from negligence to avoid liability, because they have no ability to obtain evidence to explain the way goods are lost at sea. If the burden of proof does not meet
the judge’s internal verification standards, they may also be liable for compensation. However, the judge’s discretion standard depends on personal knowledge, experience, and the policy of the country/region where the court is located. This is because the uncertainty of all evidence makes it difficult to tell the truth of the matter (Ennih and Liégeois 2001). The invariance of blockchain completely overcomes these shortcomings. The consensus mechanism is that the opinions or decisions of participants are saved electronically and cannot be changed by any party. In case of dispute, evidence can be obtained directly from the blockchain system.

Reconstruction of maritime logistics transportation management system under blockchain consensus mechanism

Reconstruction of logistics transportation management mode

As mentioned above, due to the existing marine logistics and transportation management model presents a circulation structure centered on the transportation company, sometimes the efficiency of information transmission is low, the rationality of management is insufficient and inflexible, and it fails to adapt to changes in time. In addition, maritime logistics may contain different contract products, and the choice of carrier’s route and product management is very important on the whole. As long as the contracting parties propose changes, the original route will be affected (Geddes and Dunkerley 1999). It is urgent to provide a mechanism for integrating various information and a platform for rescheduling or managing the plan. Blockchain consensus mechanism is the first choice. Blockchain algorithm is not only the embodiment of decision automation, but also the implementation mechanism of decision automation. Theoretically speaking, according to the consensus mechanism, all parties have the opportunity to participate in the decision-making of cargo transportation and management, including not only the carrier, but also the seller, the buyer and even the insurance company. All stakeholders can search real-time logistics information according to their own needs, and participate in the consensus when necessary, so that they can reach a consensus in specific issues. The transparency of transportation management model not only enables us to cope with the changes of logistics transactions, but also reduces the possibility of man-made maritime accidents to a certain extent and ensures the safety of transactions.

Take the dpops mechanism as an example, the carrier must transport the goods on the ship, and three sellers A, B, C, three buyers, and insurance companies entrust the ship’s goods for transportation. To complete the shipment to the three buyers A, B, and C, the ship must pass through the three locations in ABC. Next, this is the common journey of all products from the port of departure to point a. In this journey, the parties involved in three different transactions can participate in decision-making, treat each contract as a whole, vote each party as an independent “node”, select a node representing the block, and participate in the consensus of all nodes. The approved inventory certification consensus mechanism allows the representatives of each block (contract) node to negotiate and plan with the carrier (or actual carrier) through the consensus mechanism, and supervise or guide the ship’s route and cargo management in real time. The voting right is exercised according to the percentage of shares held by the block. Meanwhile, all “nodes” of each block have the right to delete and appoint representatives of nodes at any time, thus,
providing high-level autonomy of willingness and information symmetry.

Reconstruction of logistics transportation management responsibility

According to the Hague Rules, the carrier is exempt from the liability of the ship. However, in the process of maritime logistics management, the scope of ship management is very complex, and the law does not clearly define the differences between these scopes (Kouli et al. 2009). In judicial practice, the judge may consider other ship management activities, include the ship management behavior unrelated to transportation into the scope of exemption, or exclude the ship management behavior. The criterion of case law is ambiguous, and different judgments will be made in the same case. For example, is the above incomplete cargo in charge of the ship or the cargo? The British court has ruled that the carrier is exempt from liability, but the United States, which protects the owner of the goods, may give different interpretations. In addition, according to a report by the Institute of Shipping Economics in Bremen, human factors accounted for 77% of the 330 accidents between 1987 and 1991. The loss caused by the carrier’s “fault” is very large. Therefore, it is necessary to redistribute the responsibilities of maritime logistics and transportation management.

The blockchain consensus mechanism provides responsibility autonomy. The consensus mechanism is like providing an uninterrupted “general meeting of shareholders”, which has been running. While eliminating intermediaries, it ensures that shippers express their opinions and participate in decision-making in the same way as “shareholders”. The carrier is the legal representative of the company and has greater autonomy, but it is still limited by the product owner. Insurance companies, like the board of supervisors, always form a trend of three forces. At present, as long as the relevant personnel participate in the decision-making and want to obtain the representative qualification of the node, the navigation and cargo management of the ship can be carried out under the supervision and guidance of the relevant personnel. Therefore, ship management and product management are not “forbidden areas” for the seller, the buyer, and the insurance company. We can check the navigation and cargo management at any time, and directly put forward practical opinions and actual needs to the captain. Once these comments are implemented, the result will be borne by the reviewer, that is, all the nodes represented by the node are selected. After all, freight forwarders are experts in maritime transportation, not counterparties. Consensus mechanism does not mean denying the dominant position of operators in decision-making, but means the artificial constraints of the company’s legal representative. The advantage of consensus mechanism is that it enables other parties to have the opportunity and right to participate in the decision-making of navigation and management, and provides a realistic basis for the accountability system. It enables all parties to show fairness, enables the contract to be carried out with confidence, maximizes the overall profit, optimizes the responsibility of maritime logistics management, and finally promotes the development of maritime logistics and maritime trade.

Conclusion

East Asia is one of the most populous regions in the world. With regard to global warming, in the past few decades, East Asia has experienced severe climate change. The frequency and scope of Extreme Climate Abnormal cycle events are much larger than other regions in the northern hemisphere. Therefore, understanding the law of climate change in East Asia and exploring the main physical mechanism of climate change in this region has become a research hotspot at home and abroad, and the successor of related research has provided many practical and rich research methods. In recent years, with the rise of various data mining technologies, many new research methods have been introduced into the field of climate and meteorology, and some progress has been made. In addition, the relationship between the strong and weak periods of East Asian monsoon and SOM general circulation model and climate anomaly model is further confirmed, and the applicability of SOM technology in climate analysis is further confirmed. Considering the diversity and complexity of the factors affecting climate change, through the comprehensive analysis of the atmospheric circulation and sea level in winter, the interaction between WP, AOENSO, and other remote line type oceans is obtained. In addition, the similarities and differences of three types of remote correlation of temperature change in these regions are described in detail. These similarities and differences are to study four typical remote correlation regions.

Declarations

Competing interests The authors declare no competing interests.

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