

## Comparative Analysis of Earthquake Emergency Response in China & Japan Based on Timeline ——311 Earthquake vs 512 Earthquake

DU Xiaoxia<sup>1</sup>, ZHANG Jun, XU Jianhua, HE Zhuan, LAI Junyan<sup>2</sup>  
KIMURA Reo<sup>3</sup>, HAYASHI Haruo<sup>4</sup>, HOSOKAWA Masafumi<sup>5</sup>, SAKURADA Yukihisa<sup>6</sup>

<sup>1</sup> Senior Engineer, National Earthquake Response Support Service CEA, Beijing, China

<sup>2</sup> Engineer, National Earthquake Response Support Service CEA, Beijing, China

<sup>3</sup> Associate Professor, School of Human Science and Environment, Hyogo University, Himeji, Japan

<sup>4</sup> Professor, Disaster Prevention Research Institute, Kyoto University, Kyoto, Japan

<sup>5</sup> Group leader and Senior Researcher, Earthquake and National Disaster Laboratory, National Research Institute of Fire and Disaster, Tokyo, Japan

<sup>6</sup> Researcher, Disaster Prevention Research Institute, Kyoto University, Kyoto, Japan

Email: duxx\_bj@126.com

### ABSTRACT:

A devastating earthquake with magnitude Ms 8.0 occurred in Wenchuan County, Sichuan Province of China on 12<sup>th</sup> May 2008, and another destructive earthquake of magnitude Mw9.0 occurred near the east coast of Miyagi Prefecture of Japan on 11<sup>th</sup> March 2011. For the two earthquake disasters, the national and local governments of Japan and China had taken emergency response measures rapidly and effectively after the earthquake occurred, both gained some invaluable experience and learned some lessons. In order to compare the detailed emergency response measures during the earthquake disasters and share the experience and lessons between Japan and China, this paper adopts timeline analysis method, mainly focusing on the level of Sichuan Province and Miyagi Prefecture, to summarize the key emergency responses measures on the aspects of establishment and running of emergency command organization, deployment and dispatch of rescue forces, emergency refuge and resettlement of victims, report and release of disaster information according to the time sequence, then analyzes and sorts the implementation body and time comparatively, and studies the similarities and differences of the two earthquakes. Furthermore the advantages and disadvantages of emergency response measures during the two earthquake catastrophes between Japan and China are analyzed, considering the background of emergency management system in Japan and China. The paper aims to share the experience and provide reference mutually for the earthquake disaster emergency response work of the two countries in the future, so that the two countries could improve the abilities and make progress together in the field of earthquake response.

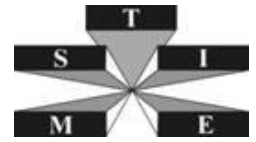
### KEYWORDS:

Timeline, Earthquake, Emergency Response, Comparative Analysis

### 1. BACKGROUND

A magnitude 8.0(Ms) earthquake with a focal depth of 14 km occurred in Yingxiu Town, Wenchuan County, Sichuan Province of China (31.0°N,103.4°E) at 14:28 CST on May 12th , 2008. The earthquake caused 69,227 deaths, 374,643 injured, and 17,923 missing (as of October, 2008), with the affected area of 440,400 km<sup>2</sup> and direct economic losses up to 845.1 billion Yuan. After the disaster, the Chinese government got widely recognized by society for taking rapid and effective measures on command and coordination, rescue and assistance, resettlement and information release. However, the shortcoming of lacking awareness and preparations for disaster prevention and mitigation was exposed.

A powerful 9.0 magnitude earthquake occurred around 130km off the Pacific coast of Tōhoku of Japan (38.1°N, 142.9°E) at 14:46 JST on March 11<sup>th</sup> , 2011, with a focal depth of 24km. The earthquake triggered powerful tsunami waves, both combined, causing 15,776 deaths, 4460 missing and 5,927 injured (by August 31, 2011). Direct losses caused by the Earthquake were reckoned to amount to 16.9 trillion yen. The tsunami caused flood, ports damage and massive power stations breakdown, including the Fukushima Daiichi Nuclear Power Plant



leakage. During the whole disposal process, the Japanese central and local governments kicked off emergency response in time and conducted rescues in a systematic way, which made the world impressive about its disaster relief efforts. Meanwhile, late disclosure of nuclear leakage, especially the Fukushima Nuclear Power Plant leakage, imposed severe challenges upon the Japanese society.

During the two catastrophes, China and Japan suffered from tremendous losses, but they also accumulated precious experience in emergency response. To compare specific actions taken by China and Japan in catastrophe emergency response and to learn from each other's experience, this paper focuses on the two Earthquakes, adopts the timeline analysis method, selects the Sichuan Province and the Miyagi Prefecture as study objects to sort out specific responding measures taken by the two governments in time sequence including establishing and running Emergency Operation Command Center, allocating and dispatching rescue forces, providing shelters and resettlement for victims, reporting and releasing information. The body and time of emergency response measures are compared and analyzed, and common points and differences of the two earthquakes are studied. Based on these information, taking into consideration differences in emergency management systems in China and Japan, this paper analyzes advantages and disadvantages of the two governments in catastrophe emergency response and provides experience and references for future earthquake emergency response, so that both countries could make progress in dealing with earthquakes.

## **2. METHOD**

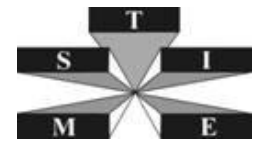
This paper adopts timeline analysis, case study and comparative study to analyze and explore important emergency response measures in the Wenchuan Earthquake and the Great East Japan Earthquake. According to researches, emergency response processes of earthquakes are characterized by timeline. Emergency response work and tasks vary greatly in different post-earthquake stages, which should be prioritized based on actual needs of disaster areas. The timeline analysis method sorts out the whole emergency response process after the earthquake according to time sequence and relates each task with owners and implementation time and displays them in lines and tables, then analyzes emergency response tasks in different time slots and conducts comparative analysis on tasks and actual needs of disaster areas and requirements of emergency plans, so as to provide references and guidance for future emergency response and improve disaster disposal. The case study method mainly focuses on the two earthquakes, first conducting intra-case study to understand emergency response process, characteristics, experience and lessons of each earthquake and master details and key factors of the whole earthquake emergency response process; then conducting cross-case study to conclude experience and lessons of earthquake emergency response, study models and characteristics of emergency response under different backgrounds. The comparative analysis method compares key measures during the two earthquake emergency response processes to explore universal and special rules to deal with earthquakes catastrophes.

## **3. COMPARATIVE ANALYSIS OF EARTHQUAKE EMERGENCY RESPONSE**

After the Wenchuan Earthquake occurred, the governments and relevant departments at all levels in China responded quickly to establish respective Earthquake Relief Command Center, organized and dispatched rescue forces to rescue and relocated victims, provide health care, recover lifeline, maintain security, release information and depose barrier lakes, etc. After the Great East Japan Earthquake occurred, the Japanese governments at all levels and relevant agencies responded quickly to set up Disaster Countermeasures Headquarters, took emergency measures in the aspects of life rescue, shelters and settlements, infrastructure repair, media report, and nuclear leakage disposal, etc. The comparative analysis of emergency response measures in the aspects of the establishment and running of Emergency Operation Command Center, the allocation and dispatch of rescue force, the emergency shelter and resettlement of victims, and the report and release of public information were as follows.

### ***3.1. Establishment and Running of Emergency Operation Command Center***

Strong and effective Emergency Command System is critical to make timely, viable and effective emergency decisions and disposal operations when responding to earthquake catastrophic. After the Wenchuan Earthquake occurred, from central government to central departments, from army to local government, a strong emergency command system was built in a few hours and running speedily. After the East Japan Earthquake, from the



Cabinet to the prefectures and municipalities, Disaster Countermeasures Headquarters was established quickly and organizing disaster relief operations according to the disaster plan. The details about the establishment and running of Emergency Operation Command Center in Sichuan Province and Miyagi Prefecture during the Wenchuan Earthquake and East Japan Earthquake are as follows in Table 1.

Table 1 Comparison of establishment and running of Emergency Operation Command Center

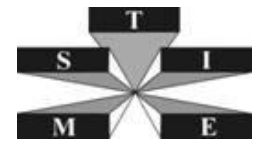
Task	512 Wenchuan Earthquake (Sichuan Province)	311 Japan Earthquake (Miyagi Prefecture)
Set up Details	10 minutes after EQ, Provincial HQs set up and emergency meeting held	When EQ occurred, The Prime Minister's Residence HQs set up
	10 minutes after EQ, HQs of Chengdu Military Region set up	When EQ occurred, Prefecture Disaster Countermeasures HQs set up
	8 hours after EQ, National HQs established	4 minutes after EQ, Defense ministry set up Disaster Countermeasures HQs
	In the evening of 12th May, Provincial Field Command Post set up	28 minutes after EQ, Cabinet set up Disaster Countermeasures HQs
Running Details	40 minutes after EQ, Commander rushed to the affected area and made 7 relief work instructions on the way	16 minutes after EQ, HQs request rescue assistance from SDF
	8 hours after EQ, HQs issued an emergency notice about disaster relief work	24 minutes after EQ, HQs held the liaison meeting
		44 minutes after EQ, HQs held 1 <sup>st</sup> meeting
	From 2 days after EQ, HQs held Press Conference daily, routine meeting twice a day	50 minutes after EQ, HQs request the State to dispose rescue teams from
	2 days after EQ, HQs held a meeting to carry out important instructions of State Council and issued a notice on donation activity	2 hours after EQ, HQs held 2 <sup>nd</sup> meeting
		3 hours after EQ, General Affairs Department of HQs transferred
	3 days after EQ, HQs issued an emergency notice on disease control and donations statistics	1-2 days after EQ, HQs held 4 meetings per day
		3-4 days after EQ, held 3 meetings totally
4 days after EQ, HQs ordered to implement traffic control of some roads	5 days after EQ, held 2 meetings per day	

### 3.1.1 Establishment of Emergency Operation Command Center

In Wenchuan Earthquake, the government of Sichuan Province established Emergency Operation Command Headquarters in Chengdu City and Field Operation Command Post in Dujiangyan City, which divided into 8 groups including HQs office, medical group, transportation group, communication group, water conservancy group, relief supplies group, media group and foreign rescue coordination group. The "Worst-hit Area Frontline Command Posts" were established in the six worst-hit cities, which were responsible for command and coordination of relief operations. In the later period after earthquake, housing resettlement group, partner assistance coordination group, recovery and reconstruction planning group, production recovery group and supervision and inspection group were added according to the actual needs, which implement corresponding work. While in East Japan Earthquake, the government of Miyagi Prefecture established the Disaster Countermeasures Headquarters at the first time, which divided into operation group, strategy group, information group, communication group, media group and general affairs group, emergency rescue group, helicopter group, shelter group, liaison group. Then relief supplies raise group, relief supplies group and relief supplies allocation group were added to carry out the corresponding work. Also Field Disaster Countermeasures Headquarters was set up in 16 hours after the earthquake, to organize and command the relief operations.

### 3.1.2 Running of Emergency Operation Command Center

In Wenchuan Earthquake, some basic working rules and regulations were set up and implemented when the



headquarters established to ensure the smooth command process, including 24 hours emergency duty, daily routine meeting, information collecting and reporting, major issues consultation, daily working briefing as well as other temporary rules. After the headquarters established, the commander issued a directive requiring all the provincial leadership divide into 3 batches: 1 batch work at the six Worst-hit Area Frontline Command Post, 1batch work at the Field Operation Command Post in Dujiangyan, and 1 batch stay at the Emergency Operation Command Headquarters in Chengdu. The provincial headquarters hold regular meetings twice a day to coordinate and arrange relief work, and also established mechanisms of close relation, communication and coordination, quick disposal with military forces, police and other command center, to ensure the command system running smoothly, orderly and effectively. In East Japan Earthquake, Disaster Countermeasures Headquarters of Miyagi Prefecture rapidly implement disaster relief operations in accordance with the provisions of the local disaster prevention plan and the related laws and regulations. In the initial stage after the earthquake, the HQs quickly collected disaster situation, timely contacted and requested for assistance, released the announcement of shelter and organized field rescue operation. On 11<sup>th</sup> March, the headquarters hold 4 meetings and transfer the General Affairs Department to the suitable place according the actual needs. Meanwhile, the routine meeting and press conference system was established, Self-defense Forces Contact and Coordination Center was set up, and also liaison and coordination system with SDF, police, fire protection, and other headquarters was build up. All the relief forces communicated and coordinated through participating headquarters meeting and sharing information, then implemented relief operation jointly.

### 3.2. Allocation and Dispatch of Rescue Force

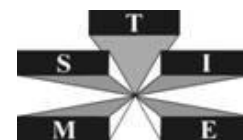
After the Wenchuan Earthquake and the East Japan Earthquake, governments from two countries mobilized all available resources, deployed military forces and USAR teams carrying numbers of rescue equipment to rescue lives. Due to the difference in national administrative system and emergence response mechanism, the rescue operations from China and Japan have different features. The comparison between the rescue resources and efforts in the seriously stricken areas, like Sichuan Province and Miyagi Prefecture, are as follows.

#### 3.2.1 Military rescue force

After the Wenchuan Earthquake, military forces were immediately mobilized for relief operation, including almost all military units. They were deployed into the affected area through airplane, railway, highway, ship, etc, and collected disaster situation, repaired road, evacuated victims and assisted victims, playing tremendous and irreplaceable role in the relief operation. After the east Japan earthquake, Japan government mobilized and deployed police, self-defense forces and maritime security headquarters etc, to collect disaster situation, rescue victims, search the missing and assist the victims. During the two earthquakes, the military rescue forces and the rescue operation in Sichuan Province and Miyagi prefecture are listed in Table 2.

Table 2 Comparison of rescue situation of military forces of two countries

Time	512 Wenchuan Earthquake (Sichuan Province)	311 Japan Earthquake (Miyagi Prefecture)
0-2h after EQ	After EQ, the Central Military Commission immediately mobilized the military forces	4 minutes after EQ, Self-defense Department set up Disaster Countermeasures HQs
	8 minutes after EQ, Chengdu military area deployed about 6100 persons to the hit area and commanded the reserve militia to act	15 minutes after EQ, SDF transmitted disaster situation video through helicopter
	Established military steering group and set up Field Joint Command Center	44 minutes after EQ, SDD held 1 <sup>st</sup> meeting
2h-24h after EQ	7 hours after EQ, 150 armed forces were deployed with 7 large-duty loader	59 minutes after EQ, maritime SDF collected disaster situation along the coast by airplane
	10 hours after EQ, nearly 20,000 PLA and armed forces arrived at the hit area, HQs of General Staff issued command of disaster	3 hours after EQ, Disaster Dispatch Order of Large Scale was issued. Air rescue forces was set up and deployed
		4 hours after EQ, Dispatch Order was issued in response to the nuclear accident.



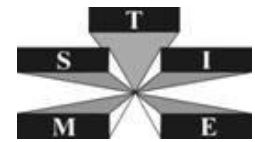
	relief and mobilized 34,000 forces	8 hours after EQ, the order of reinforcement was issued
	16 hours after EQ, 22 persons small group arrived at the epicenter–Yingxiu.	24 hours after EQ, SDF deployed 20,000 people, 190 airplanes and 45 warships
24h after EQ–the end of rescue	2 days after EQ, deployed 30,000 armed forces equipped with tools and appliances	2 days after EQ, Joint Mission Team was build up, land, sea and air of SDF began joint rescue
	3 days after EQ, the troops arrived at all the stricken towns for relief. More than 30,000	3 days after EQ, established Coordination Office between Japan and USA to conduct joint operation.
	4 days after EQ, 100,000 armed forces worked in the hit area	6 days after EQ, recruit reserve SDF, and set up the liaison & adjustment office
	Throughout the whole relief period, the military dispatched 150,000 people covering 20 branches of army services.	Since April, several focused searches were carried out to search the missing victims.
		Up to July, SDF deployed 1,058 million people, 50,000 helicopters and 4,900 warships

### 3.2.2 Professional rescue force-USAR teams

In Wenchuan Earthquake, professional rescue forces are comprised of three parts: national and local earthquake USAR teams, fire brigade and police rescue teams, and Mine & HazMAT Rescue team, with total disposal of more than 20,000 people. These professional teams are more capable and efficient which enables them to rescue trapped victims who the other rescue forces cannot access. Although the number of rescued victims was less than that of other forces, they played a very important role in rescue operation. In East Japan Earthquake, professional rescue forces consist of land and air branches of fire institutions around the country. These forces divided into local firefighting HQs, firefighting mission, firefighting supporting unit, emergency firefighting team, and air forces to take important actions in the affected area, including investigating the disaster situation, conducting evacuation mobilization and saving the lives of victims. During the two earthquakes, the professional rescue forces dispatched in Sichuan province and Miyagi Prefecture are listed in Table 3.

Table 3 Comparison of professional rescue forces in seriously hit area after the quake

Time	512 Wenchuan Earthquake (Sichuan Province)	311 Japan Earthquake (Miyagi Prefecture)
0–2h after EQ	5 minutes after EQ, Chengdu firefighting branch of 800 persons was deployed	When EQ occurred, 12 local firefighting HQs took action
	9 minutes after EQ, Sichuan USAR team convened and were ready to deploy	14 minutes after EQ, Sendai firefighting air forces conducted rescue in Sendai city.
	12 minutes after EQ, Mianyang firefighting branch deployed 75 persons for SAR operation	44 minutes after EQ, Sendai firefighting bureau requested for emergency rescue
	17 minutes after EQ, Deyang firefighting branch deployed 180 people for SAR operation	50 minutes after EQ, Miyagi firefighting Rescue Coordination HQs was set up
	72 minutes after EQ, CISAR was deployed	54 minutes after EQ, firefighting rescue teams deployed
	2 hours after EQ, Sichuan Safety Monitoring Bureau issued rescue order to Mine & HazMAT Rescue team	77 minutes after EQ, Internal Affairs Ministry deployed Sapporo rescue team
2h–24h after EQ	7hours after EQ, Sichuan General Fire Brigade deployed forces to reinforce Beichuan	7hours after EQ, Tokyo Fire Department Command rescue team arrived and acted
	8 hours after EQ, CISAR team of 184 people arrived and headed to Dujiangyan for rescue	10 hours after EQ, 12 local firefighting HQs deployed 2664 people for rescue operation



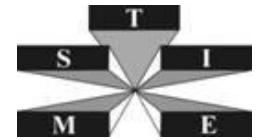
	8 hours after EQ, 6 Mine & HazMAT Rescue teams of Sichuan were deployed	10 hours after EQ, all firefighting mission deployed 11,728 people for rescue operation
	11 hours after EQ, 4 Mine & HazMAT Rescue teams deployed to Shifang, Mianzhu, etc.	15 hours after EQ, firefighting team of Toyama arrived at Natori for rescue
	12 hours after EQ, Ministry of Public Security Fire Department mobilized 1,182 people	17 hours after EQ, Sapporo firefighting command rescue team arrived
	20 hours after EQ, the third batch of Mine & HazMAT Rescue teams arrived.	24 hours after EQ, firefighting department deployed 363 teams, 30406 persons and rescued 4094 victims in total
24h after EQ—the end of rescue	1.5 days after EQ, Ministry of Public Security Fire Department mobilized the second batch of rescue forces including 5070 persons	2 days after EQ, firefighting teams of Kanagawa, Shimane, Mie arrived at Miyagi
	2 days after EQ, Chengdu USAR team of 50 members and 3 dogs arrived at Beichuan	5 days after EQ, firefighting team of Kumamoto prefecture arrived
	2 days after EQ, 7718 professional rescue crew of firefighting departments all arrived	Up to the end of May, firefighting departments deployed 297,604 people in total and rescued 6,679 survivors, including land forces and air forces
	2.5 days after EQ, Ministry of Public Security Fire Department mobilized the third batch	

### 3.2.3 Foreign rescue force

After the Wenchuan Earthquake, Japan, Russia, South Korea and Singapore deployed USAR teams to the affected areas. Hongkong, Macau and Taiwan also dispatched rescue forces to the stricken area. Altogether, there were 218 foreign rescuers working in the affected area of Sichuan Province to implement USAR operations and medical aid etc. The details about the foreign rescue forces and operations are listed in Table 4. After the East Japan Earthquake, China, South Korea and other countries deployed international USAR teams to the affected area. Altogether, there are 668 professional USAR team members from 12 countries carrying with search dogs and rescue equipments and conducting rescue operations in the worst affected area. The details of international rescue teams are displayed in Figure 1.

Table 4 Rescue operations of foreign teams in Wenchuan Earthquake

Teams	Operations	Effect
Hong Kong	On May 14, Hong kong deployed 3 USAR and Medical teams, etc. The USAR team arrived in Hanwang to rescue on May 15; Air service team arrived on May 17 and transported casualties with helicopter, hunted for the trapped victims in mountainous area, carried rescuers and materials. They were sent out for 26 times, rescued 96 victims and transported 119 rescuers.	Totally, 281 foreign rescue forces carried out USAR and medical aid operations in Qingchuan, Beichuan, Mianzhu, Shifang and Dujiangyan, and rescued 1 survivor and 76 bodies.
Macao	On May 23, Medical Aid team of 20 volunteers arrived and provided medical service in Chengdu; on June 10, the second medical team and supplies arrived at Chengdu and headed to Nanchong for rescue	
Taiwan	On May 16, Red Cross Rescue team arrived in Chengdu, and then headed to Mianzhu and Hanwang for rescue on the next day; on May 20, the Red Cross Medical team of 37 people deployed to Deyang	
Japan	As the first arrived international USAR team, more than 60 members rescued at Qingchuan County and Beichuan county	
Singapore	On May 16, the team arrived in Chengdu and deployed to Hongbai town on the next day for rescue operation	
South Korea	41 team members conducted USAR operation in Hongda Chemical Factory of Yinghua town and rescued 16 bodies of victims	
Russia	on May 16, the team arrived at Chengdu and deployed to Hanwang Town for	



	rescue. Then they arrived at Dujiangyan in the morning of May 17 and rescued one survivor	
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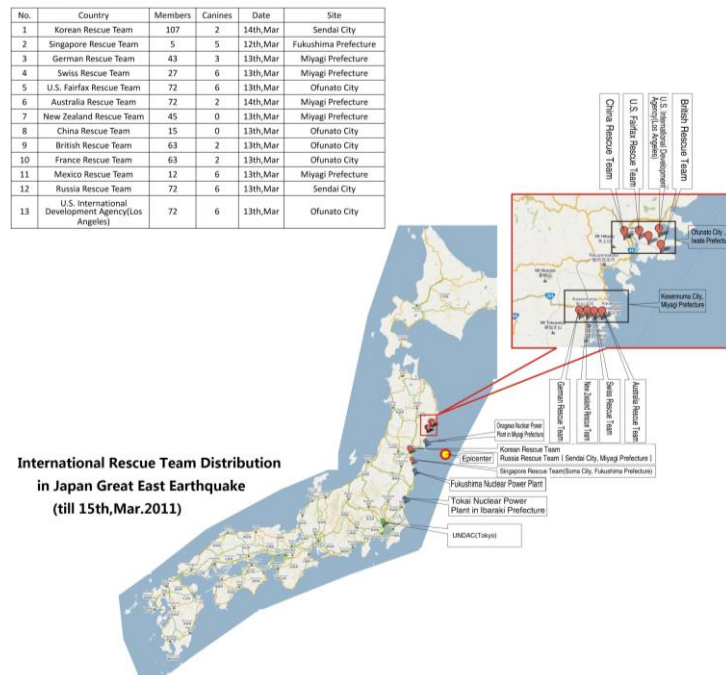


Figure 1 Distribution of international aid team in Japan earthquake

Based on the above analysis, it can be concluded that the dispatch time of rescue efforts during the two earthquakes are shown in Figure 2.

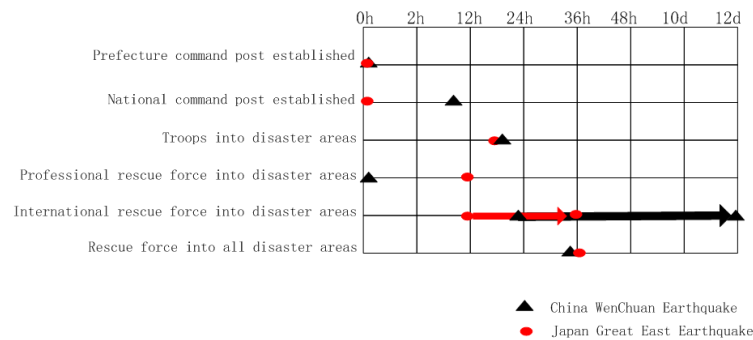


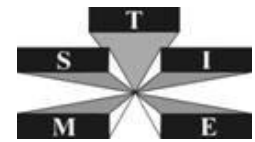
Figure 2 Comparison of rescue development during the two earthquakes

### 3.3. Emergency Refuge and Resettlement of Victims

After Wenchuan Earthquake and Great East Japan Earthquake, the refuge and resettlement of massive victims became an extremely difficulty. The two governments adopted various measures to evacuate and resettle victims. The following part will compare and analyze the measures and specific actions taken by the Sichuan Province and Miyagi Prefecture from the aspects of emergency refuge & resettlement and relief goods transportation.

#### 3.3.1 Emergency refuge and resettlement

After the Wenchuan Earthquake, emergency refuge and resettlement was mainly carried out locally and nearby: tents were built in town areas; public facilities including sports stadiums, cultural centers, educational places and parks were opened to resettle victims in urban areas; shacks were built in rural areas. Except for 26 shelters in Chengdu City, the Jiuzhou Stadium of Mianyang City was also taken as a temporary shelter; but these shelters were far from enough to meet the actual needs. Massive people could not be resettled locally and nearby,



so they had to resettle by themselves, which required a huge amount of tents. In relatively concentrated tent shelters, provisional management committees were set up based on population scale. The committee took responsibility of registering and issuing videos and various goods, collecting needs and suggestions. However, these resettlement sites were densely populated, lack of living facilities, unhealthy in management and organization, unlivable and not standardized and could not last long. For special groups such as the senior who lost their children, the junior who lost their parents and people are dysfunctional and lost their families, government authorities organized special resettlement for them.

During the Great East Japan Earthquake, there were a lot of shelters for survivors, most of which were located in schools and stadiums. The Miyagi Prefectural Office also became a place of shelter, disaster relief command and lodging. The supporting activity of arranging shelters and victims was supposed to be carried out by the Local Administration Division. However, the office building and staff of the Local Administration Division were affected by the disaster, thus paralyzing its administrative function. Therefore, the county government took charge. Up to March 14, the number of emergency shelters reached 1,183 and refugee population reached 320,885. Supporting activities included food and water supply, relief goods offering and bathroom building. People in shelters and volunteers made onigiri and box lunches and distributed them to refugees. Moreover, as time went by, refugees' needs changed. About one week after the disaster, supports were mainly providing food, drinkable water, blankets, medicines and other essential life-supporting goods; after settling down, people had increasing needs on necessities, underwear, personal tastes and bath. Therefore, the government organized people to survey needs of refugees so as to provide better supports.

### 3.3.2 Transportation of relief supplies

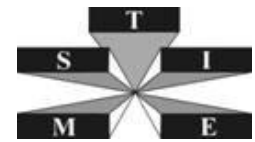
The severe fact of insufficient and simple storage of relief goods had imposed a huge pressure on emergency resettlement. In both earthquakes, problems including serious shortage of relief goods storage in the primary stage, excessive relief goods and unsmooth distribution in the middle stage occurred. During the Wenchuan Earthquake, the Mianyang Repository had only 200 quilts, less than 200 tents, while 600,000 tents were needed. Facing such big gap, the Civil Affairs Department allocated and transported goods from other repositories. But the gap was not narrowed. Therefore the central government had to ask enterprises to speed up to produce tents. By the middle stage of disaster relief, massive instant noodles, drinkable water, cookies and other food piled up in the Dujiangyan area, which imposed pressures on management and storage, while many other disaster areas were lack of necessary relief goods. To ensure timely collection, safe allocation and storage and fair distribution of relief goods, systems of goods reception, storage, inspection, distribution and supervision were set up. The Sichuan Provincial Department of Commerce established an Earthquake Relief and Goods Protection Group, which was divided into goods source group, allocation and transport group and reception group to take charge of goods arrangement, allocation and transport and reception respectively; which provided great support for resettlement and victims' lives.

During the East Japan Earthquake, the government allocated emergency goods by coordinating with the Miyagi Coordination Combined Union and coordinated with convenience stores to allocate and supply food and asked for rice allocation and supply from senior levels. In the primary stage after the earthquake, there was a serious shortage of relief goods; moreover, due to communication and road damage, large range of stricken areas and scattering victims, relief goods could not be distributed to victims in time. Especially due to insufficient fuel, vehicles could not run in disaster areas and it was difficult for victims to warm themselves. Such situation lasted for a long period. 5 days after the earthquake, staff of the government took charge of collecting victims' needs and goods allocation, commanding at logistic bases, entrusting the truck association to transport goods from logistic bases to the goods distribution center of local administration divisions and classifying, managing and distributing relief goods. In addition, the Self Defense Forces also took responsibility of transporting goods from distribution centers to shelters. Through these mechanisms, efficiency of transporting relief goods to shelters was improved a lot, which guaranteed that needs of disaster victims were met. The emergency refuge and resettlement of the Sichuan Province and the Miyagi Prefecture during the two earthquakes were in Table 5.

Table 5 Comparison of Emergency Refuge and Resettlement during the Two Earthquakes

Time	512 Wenchuan Earthquake (Sichuan Province)	311 Japan Earthquake (Miyagi Prefecture)
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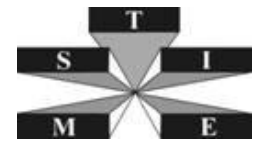
1 <sup>st</sup> day after EQ	After EQ, governments instantly organized victims to take refuge in open areas	12 minutes after EQ, sent written orders of taking refuge used satellite wireless fax
	Department of Civil Affairs of Sichuan urgently allocated 3,500 tents	28 minutes after EQ, sent orders of refuge again used satellite wireless fax
	National Development Reform Commission, State Administration of Grain and Ministry of Finance jointly issued notices to use the goods of Chengdu subsidiary of Central grain reserve to support disaster relief.	The government collected information about the use of schools and stadiums as shelters. The government accepted homeless victims and provided them with food.
2 <sup>nd</sup> to 4 <sup>th</sup> days after EQ	On May 13, Mianyang Jiuzhou Stadium as a temporary shelter to resettle people of as much as 380,000 per day.	On March 12, Consumer Society collected emergency goods and supplied to each cities and towns; applied to provide fuels for urban lifeline institutions; started to allocate goods supply by coordinating with stores
	On May 14, the first batch of rescue helicopters carried relief goods to Wenchuan	On March 12, Ministry of Health, Labor and Welfare issued notices on expenditures of welfare facilities and people who need nursing in shelters
	On May 14, National Light Industry Council advocated enterprises to ensure sources and supplies of relief goods.	On March 12, government entrusted commodity house trading association to provide vacant house information.
	On May 15, Central Military Committee mobilized military strategic reserves and transported goods and equipments	On March 12, with the support of Niigata, 2,420 provisional toilets were provided
	Up to May 15, Ministry of Railway arranged 179 special trains to transport relief goods. Up to May 16, China National Petrol Corporate sent over 3,000 tons of petroleum products to heavily stricken areas	On March 14, government applied to the Assembling Building Association. for building 10,000 provisional houses
5 <sup>th</sup> to 7 <sup>th</sup> days after EQ	Up to May 17, Department of Civil Affairs allocated over 100,000 tents, 220,000 quilts, and 170,000 cotton-padded clothes; the Ministry of Commerce sent 2.16 million boxes of water, 290,000 boxes of instant noodles. 290 tons of cookies, 60 tons of ham, 5,000 tents, 210,000 lanterns.	On March 15, Truck Association put forward relief goods transport proposals according to the convention; shelters took proper care of the disabled and release name lists of victims; asked for grazed rice supply from Ministry of Agriculture, Forestry and Fishery,
	Up to May 19, the Red Cross allocated 18,510 tents, National Development Reform Committee and Department of Civil Affairs organized 75 tent-producers in 18 provinces & cities to speed up to produce tents	On March 16, nutrient food provided by food manufacturers was distributed to each local administrative division. On March 17, sent psychological consultants On March 18, started to supply fuels

### 3.4. Report and Release of Public Information

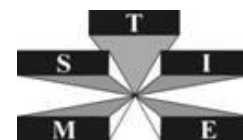
During the two earthquakes, the government and media reported and released public information timely, comprehensively and systematically, on the situation of earthquake, disaster, and rescue progress. Below are some representative measures of reporting and releasing in two earthquakes within the first 30 hours (Table 6).

Table 6 Comparison of public reporting and release of two earthquakes

Time	China	Japan
Before EQ		Released early warning on EQ and tsunami.
EQ		All TV stations halted original broadcasting



occurred		plan and started reporting earthquake.
30m after EQ	CEIC released EQ information to the world through the Xinhua News Agency	Japan Meteorological Agency issued warning of tsunami to 37 coastal municipalities
	CCTV reported EQ with rolling sub-titles	NHK issued tsunami warning to the world in Japanese, Chinese and English NHK reported disaster situation by 24 hours
1h after EQ	CNR and CCTV immediately interred cut the EQ information, live broadcasted program and connected the affected areas by telephone.	East Japan Railway Company announced that all new main lines were closed
2h after EQ	CEA held a press conference to confirm the EQ magnitude.	NHK announced that the earthquake had already caused huge casualties.
	Xinhua network posted news about the important instructions of the Sate Council	
	CCTV reported the event around the clock	
3h after EQ	CEA held 2 <sup>nd</sup> press conference to dispelled the earthquake rumor	Prime Minister held 1 <sup>st</sup> press conference and called on the public to watch government information from the media
	National Tourism Administration issued the Emergency Notice on Banning Tourism in the affected Areas	Al Jazeera reported that at least 8 deaths had been confirmed.
4h after EQ	Xinhua network reported 107 deaths and 34 injuries according to Ministry of Civil Affairs	Asahi Shimbun reported the breakdown of No.1,2 reactor of Fukushima Daiichi for fear of nuclear leaking.
	China Meteorological Administration initiated Level II emergency response; National Meteorological Center of CMA broadcasted showery rain.	Prime Minister delivered a speech on TV that part of nuclear plants had stopped running automatically and no leaking of radioactive materials had been found.
6h after EQ	CEA convened 3 <sup>rd</sup> press conference and reconfirmed the EQ magnitude and denied the EQ rumors in Beijing and other areas.	Failing to confirm the existence of nuclear leaking, Premier issued Announcement on Nuclear Emergency, persuading residents in 2 km radius of No.1 nuclear plant to refuge
8h after EQ	The Transportation Bureau of the Ministry of Public Security issued emergency notice on the emergent management of road traffic.	The number of deaths climbed to 59
		Foreign Minister met the journalists, asking the US military in Japan for assistance
		Kyodo News Agency reported the deaths might exceed 1000.
10h after EQ	Sichuan HQs released 8533 deaths partly estimated	Asahi Shimbun quoted the statistics of National Police Agency of Japan that the death number were 133, 530 people were missing and 722 injured.
	Premier arrived in the affected areas and instructed to recovery communication, traffic, and electricity as early as possible	
14h after EQ		Press conference held to brief on situation about EQ, disaster and relief measures
16h after EQ		Premier ordered and recommended the residents in 10km to refuge
		Kyodo News Agency quoted the news from police that 217 deaths and 681 missing
18h after EQ	Sichuan HQs issued emergency notice and required to implement relief work	Premier declared Announcement on Nuclear Emergency for Fukushima No.2 nuclear plant and recognized the nuclear leaking
24h	Sichuan Earthquake Bureau held 1 <sup>st</sup> press	



after EQ	conference	
26h after EQ	National HQs held press conference to release disaster situation and relief work.	
28h after EQ	Sichuan HQs held 1 <sup>st</sup> press conference and released disaster situation and relief work	HQs refuted rumors on the Internet and ordered media to report information actually
30h after EQ		Press conference held in Prime Minister 's Residence

### 3.4.1 The time of information release and report

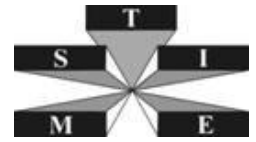
In East Japan Earthquake, the government issued the early warning of earthquake and tsunami 73 seconds before the actual strike of earthquake. When earthquake occurred, NHK's report of the disaster basically coincided with the earthquake and it broadcasted the scenes of trembling only in the next 17 seconds of the breaking out. While in Wenchuan Earthquake, there was no early warning system of earthquake in China, the first release of the news was 17 minutes after the earthquake and it was one hour later that connection with the affected area by telephone was possible. Therefore, in terms of the time of news release and report, it is slightly later in China than in Japan. During the East Japan Earthquake, NHK, as a public media institution and a legal reporting institution specified in the laws, had nine bases equipped with dozens of helicopters. When the earthquake occurred, NHK helicopters took off immediately and sent back the first-hand information. Besides, the complete disaster-warning system in Japan provided time for the publicity of the early warning information. While during Wenchuan Earthquake, Xinhua News Agency and CCTV, as representatives of mainstream media groups, played a good role in shaping public opinion. But the media would to earn time for information release and report in the case of catastrophes, it needs to accumulate experience of effective response to major calamities and draw on the practices of reporting disasters in Japan to improve related systems and mechanisms.

### 3.4.2 The report and publicity of casualties

Timely and accurate release of the casualties is a demonstration of the national capacity of public information reporting. During Wenchuan Earthquake, there was sporadic statistics and reports about casualties within the first 30 hours and the two official reports in Table 6 were rolling broadcasting by all types of media. Since the second day after the earthquake, the State Council released the latest data of casualties to the public honestly through TV, networks, newspapers, broadcasting and text messages in a timely, authoritative and credible manner every day. While during the East Japan Earthquake, there were dozens of reports about casualties within the first 30 hours, in which six times of reporting cited the most were listed in Table 6. From the data, it can be concluded that the report by Japanese media differs a lot from that by Japanese police. It's even fair to say that within the first 30 hours, the government lacked unified and authoritative publication of casualties throughout. Besides, the earthquake led to powerful tsunami which made it difficult to collect the number of casualties and missing people timely. However, under the circumstances of incomplete and incorrect information, the government should consider the issue of speaking with one voice when it came to information reports.

### 3.4.3 The convening of press conferences

The press conferences are the authoritative way of information releasing. From Table 6, we can see that both governments in China and Japan attached great importance to press conferences from the fact that within the 30 hours after the earthquake, the Japanese government held 4 press conferences to respond to the public's concerns and the Chinese government held 6 of those at multiple levels. As to the time of press conferences, the China Earthquake Administration's first press conference came two hours after the seism and it took the Japanese three hours to do the same thing. But with regards to the levels, the government held one press conference about 26 hours later. About the contents, the three conferences within the first six hours mainly focused on the determination of the magnitude and the denying of rumors. It was not until the afternoon of May 13, more than 24 hours after the quake, that the government convened two press conferences respectively, covering detailed introduction to the disastrous situation, impact scope, general disaster relief measures and assistance from all parties. By contrast, the Japanese part briefed on detailed information more than basic



disastrous situation and related measures 14 hours after the catastrophe. Obviously, Japan was quicker in making information public. Yet it relatively fell behind China in dealing with rumors.

## **4. CONCLUSION**

### ***4.1. Establishment and running of Emergency Operation Command Center***

The establishment of the Emergency Operation Command Center during the two earthquakes was relatively quick. In East Japan earthquake, the establishment and running was more normative and procedural, in strict accordance with the provisions of laws and regulations, which was also adjusted according to the experiences of historic earthquakes. Based on the cooperation agreements in normal times, the emergency command process of the disaster relief operation was smooth and orderly. In Wenchuan earthquake, the Emergency Operation Command Center was established quickly and running orderly, which played an important role in the whole disaster relief operations. Although the responsibilities of the different levels command centers were ambiguous, and the coordination and cooperation among the command centers were deficient at the beginning, the command process became more effective and orderly through building up communication, cooperation and coordination mechanisms. Therefore, the emergency command system should be enhanced in the aspects of standardization and normalization.

### ***4.2. Allocation and Dispatch of Rescue Force***

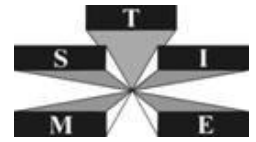
Rescue operations of the two earthquakes show that, the military and professional rescue teams are irreplaceable forces when responding to an earthquake catastrophe. In terms of military rescue forces, the ability of Japan Self-defense Forces to collect disaster situation using helicopters rapidly is laudable. It is worth learning that rescue requests for assistance and dispatch orders for rescue teams are standard and procedural in Japan. While the rescue forces were well organized, with higher flexibility, discipline and fighting capacity in China, which provided powerful support during the disaster relief operations. About the professional rescue forces, the professional technology and equipments were still the weakness of USAR teams in China, especially for the mechanisms of mobilization and dispatch need to improve the efficiency and speed. As to the foreign rescue forces, the USAR teams arrived late and played a limited role in Wenchuan Earthquake. While in East Japan Earthquake, all the international USAR teams arrived at the first three days and played a certain role in relief operations. Therefore, the mechanisms of international assistance acceptance and coordination should be built up and strengthen in the future, in order to make the international USAR teams, who have advanced rescue equipments, skills and rich experience, play a greater role.

### ***4.3. Emergency Refuge and Resettlement of Victims***

The Chinese and Japanese governments had taken various measures to evacuate and resettle the affected people timely and orderly during the two earthquakes. The experiences about emergency evacuation and resettlement in Japan are worth learning and reference, especially for the evacuation instructions issued in the first time after the earthquake, the instructions and signs of evacuation routes, the opening and running of shelters, etc. Due to the comprehensive shelter system established in Japan, most affected people were resettled in the shelters after the earthquake and did not need too much relief tents. However, the shelters in the affected areas during the Wenchuan earthquake were not sufficient, and most victims could not be resettled locally and nearby, so lots of relief tents were needed. In addition, the problems that the reserves of relief supplies were insufficient in the initial period after the earthquake and the relief supplies were too excessive to distribute in the middle period after the earthquake should be avoided in the future. The transportation and distribution of relief supplies should be implemented through appropriate measures and based on the requirements of victims.

### ***4.4. Report and Release of Public Information***

The governments and media of China and Japan played an important role in the report and release of public information during the two earthquakes. About the time of information reporting and releasing, it is slightly later in China than in Japan. The difference is mainly attributable to the usual disaster reporting mechanisms and



the quality of media to report emergency. Besides, the disaster warning system in Japan provided support for the timely release of information. As to the release of casualties, a good relationship of cooperation between Chinese government and the media was established, and the information release is open and transparent, timely and accurate. While in the initial period after earthquake, the Japanese government lacked unified and authoritative release of casualties. In terms of press conference, the Japanese government held press conference more quickly in the initial period after the earthquake. The press conference about the overall disaster situation and relief developments held by the Chinese government was a little later. However, the Chinese government was more quickly and efficiently in the news release about responding to and dealing with the rumors. In addition, it is worth learning that the application and experience of the new media during the East Japan earthquake. More attention should be paid to new media in the disaster information report and release in the future and the application should be enhanced.

#### ***4.5 Suggestions on the construction of disaster prevention and mitigation***

Through the comparison between the two countries of China and Japan in the area of disaster cases analysis, as we can see, no matter how the specific national conditions, in the face of strong earthquakes catastrophe, disaster prevention and mitigation system construction has much in common. First of all, it should be in the form of legal regulation, emergency disposal of each link, clear in the process of crisis handling, in the form of government departments at all levels to establish and fulfill the responsibility. Establish monitoring and early warning mechanism, doing a good emergency preparedness, including emergency supplies, teams, shelters, exercise, information, coordination of each other and so on. Promoting the construction of government emergency command system, the formation and docking and each department contact, connectivity, information sharing, resource sharing of modern emergency command system.

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