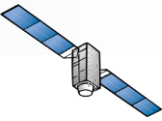


# Status Update on the QZSS Emergency Warning Services

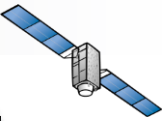
ICG-14 WG-B Meetings  
10-12 December 2019

QZSS Strategy Office,  
National Space Policy Secretariat  
Cabinet Office, Government of Japan



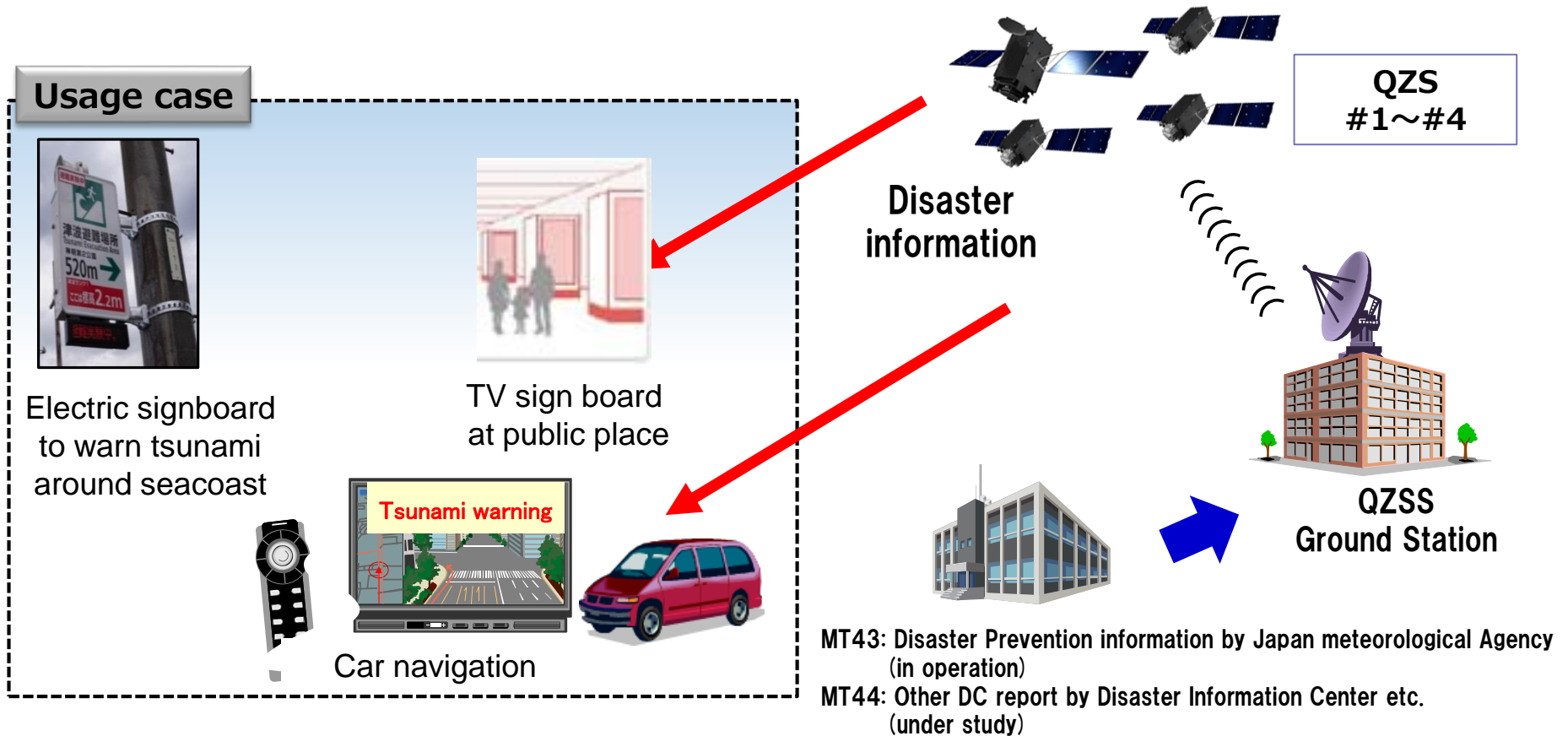
# Items

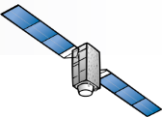
1. QZSS EWS services
  1. Outline of QZSS Satellite Report for Disaster and Crisis Management
  2. Actual performance
2. R&D status of EWS
  1. EWS correspondence group activities
  2. Testing report



# 1.1 Outline of QZSS Satellite Report for Disaster and Crisis Management

This service provides disaster-related information. The service is capable to treat two type of messages, MT43 and MT44. The DC report is transmitted by L1S signals as the part of SLAS message. The service has started in operational since November 1st, 2018 and provides metrological information using MT43, such as earthquakes and tsunamis.



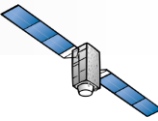


# 1.2 QZSS actual DC report

- DC report broadcasts the message every 4s interval.  
60s/4s \* 60m \* 24h \* 30 = 648,000 (month)
- The service has broadcasted all report without no lack after the operation start.
- Each disasters are categorized into 3 classification, maximum priority, priority, and regular.
- DC report schedules the report by the classification and broadcasts repeatedly.
  - User can receive the important message immediately.
  - User can receive the regular warning message without no relation to the turn-on RX timing.

Kind of disaster	MT43				MT43				MT43				MT43				MT43				MT43			
	Maximum priority	Priority	Regular	Training /Test	Maximum priority	Priority	Regular	Training /Test	Maximum priority	Priority	Regular	Training /Test	Maximum priority	Priority	Regular	Training /Test	Maximum priority	Priority	Regular	Training /Test	Maximum priority	Priority	Regular	Training /Test
Earthquake Early Warning	21	-	-	840	0	-	-	348	21	-	-	492	24	-	-	0	0	-	-	0	0	-	-	0
Earthquake center	-	13,015	-	0	-	26,362	-	0	-	13,301	-	0	-	12,213	-	0	-	19,539	-	0	-	6,971	-	0
Seismic Intensity	-	2,965	-	0	-	2,219	-	0	-	4,511	-	0	-	1,466	-	0	-	3,560	-	0	-	743	-	0
Nankai Trough Earthquake	-	0	0	0	-	0	0	0	-	0	0	0	-	0	0	0	-	0	0	0	-	0	0	0
Tsunami	0	-	0	1,680	0	-	0	1,044	0	-	0	72	0	-	0	0	0	-	0	0	0	-	0	0
Northwest Pacific Tsunami	-	4,904	-	0	-	0	-	0	-	12,696	-	0	-	6,476	-	0	-	0	-	0	-	0	-	0
Volcano	-	0	6,857	0	-	0	17,717	0	-	13,181	4,004	0	-	0	0	0	-	0	16,646	0	-	17,270	17,525	0
Ash Fall	-	11,692	-	0	-	35,503	-	0	-	7,802	-	0	-	5,460	-	0	-	16,174	-	0	-	10,773	-	0
Weather	-	18,458	248	0	-	18,460	0	0	-	551	0	0	-	2,358	0	0	-	17,750	0	0	-	17,769	0	0
Flood	-	0	0	0	-	0	0	0	-	0	0	0	-	0	0	0	-	0	0	0	-	0	0	0
Typhoon	-	-	135,096	0	-	-	18,249	0	-	-	42,433	0	-	-	46,811	0	-	-	54,679	0	-	-	0	0
Marine	-	-	409,024	0	-	-	636,098	0	-	-	501,664	0	-	-	529,990	0	-	-	627,652	0	-	-	533,749	0
Total	21	51,034	551,225	2,520	0	82,544	672,064	1,392	21	52,042	548,101	564	24	27,973	576,801	0	0	57,023	698,977	0	0	53,526	551,274	0
Total number of reports	604,800				756,000				600,728				604,798				756,000				604,800			

Note: The information is based on QZSS-3 actual record.



## 2. R&D status of EWS

### 2.1 EWS correspondence group activities

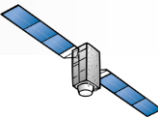
#### ■ Last year successes

- Started defining a common EWS message
- Ran a test in Australia using QZSS satellites
- Presented the current progress at ICG in Xi'an, China
  - Creation of an EWS correspondence group with all GNSS providers + Australia

#### ■ This year

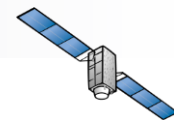
- Produced a first version of a common EWS message format, cooperation between European Commission, AAIT(Advanced Institute of Industrial Technology), and CAO.
- Share this EWS message format with EWS correspondence group
- Run real test cases in Akita prefecture using QZSS satellites in August 2019.
- Ask to review draft EWS definition to industry and research institute.





# (Reference) Parameters Description

- Message Type: Initial Alert/Test/...
- Country ID: ITU Country Codes MID
- Provider ID: National agency raising the alert
- Event Category / Subcategory: Tsunami/Forest Fire...
- Severity: minor/moderate/severe/extreme
- Event Onset: Day/Hour/Minute
- Duration: in hours, from  $< 0.25$  h to 48 h
- Guidance Library: Country Specific list of instructions
- Response Type / Instructions: Evacuate area...
- Target Area: defined with graphic, azimuth
- Parameters, etc. : Additional information (height of tsunami wave, earthquake magnitude...)



## 2.2 Testing of the common EWS message:

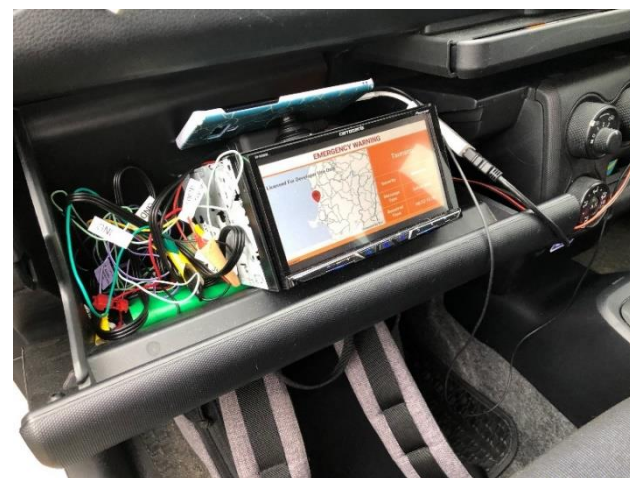
- Concept validated in 2018 with testing performed in Australia.
- AIIT (Advanced Institute of Industrial Technology) conducted fields test during 20-23 August 2019 at Akita prefecture as a R&D phase.
  - The test broadcasts EWS test messages from QZSS and verifies the basic function, such as message reception, alert filtering by location information, and alert reset in two situations.



Akita prefecture



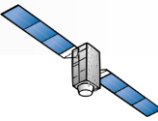
Field test image (received by smartphone)



Field test image (received by car navigation)



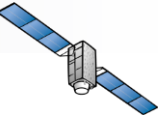
# *Future work*



- Conduct study
  - Japan had experienced strong typhoon in September 2019 and occurred flood many places.
    - We collected actual data of evaluation orders and will use it for the study.



- More work to be done for EWS message definition
  - Review by industry, preparation for next test, etc



धन्यवाद!

Thank you for your kind attention!