AD HOC MTG on LORAN/CHAYKA, Haugesund, Norway

STATUS and FUTURE of FERNS CHAINS

24th-25th, Sept., 2007

Seung-gi GUG

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Chairman of FERNS TWG

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KOREA MARITIME UNIVERSITY

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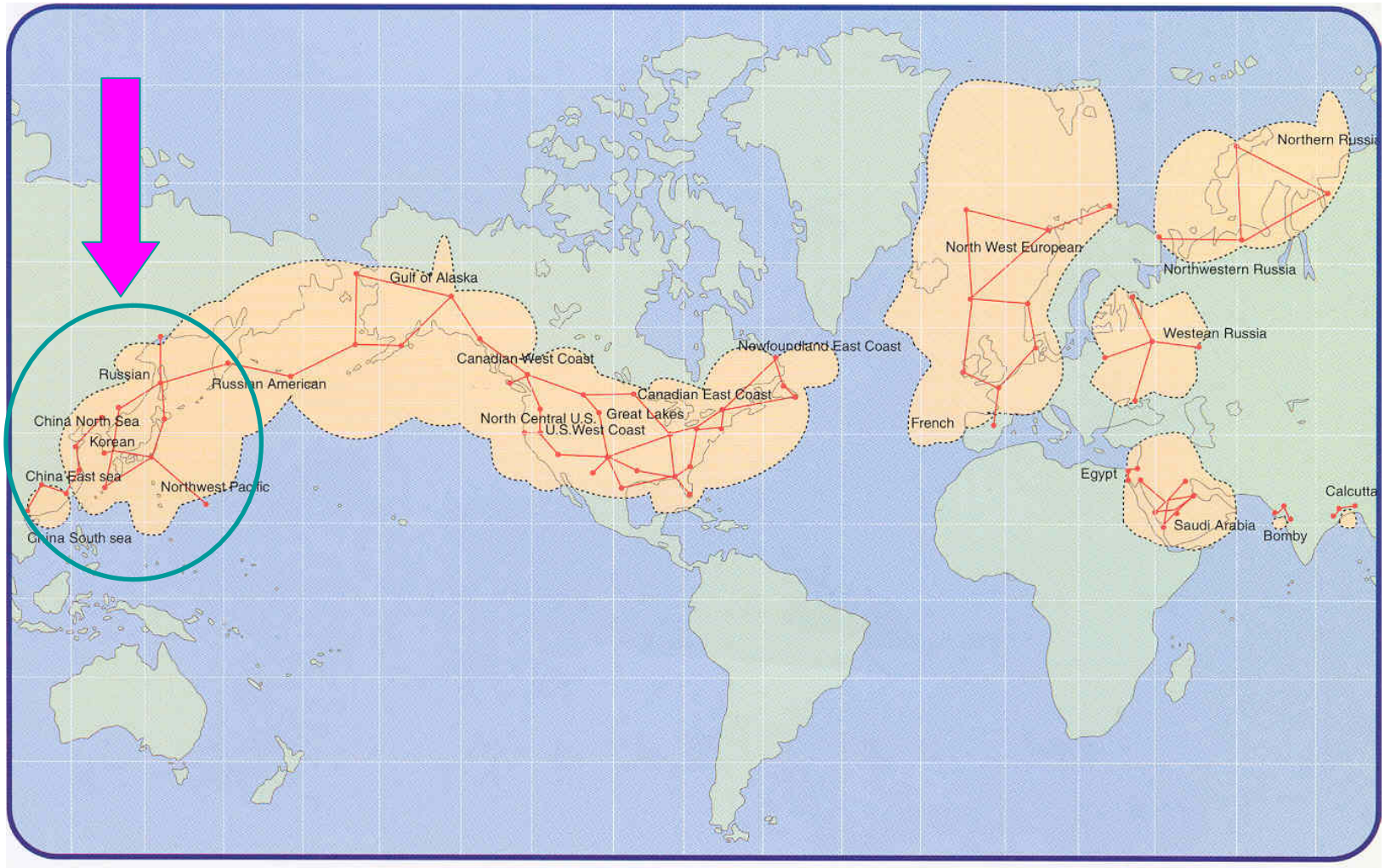
Far
East
Radio
Navigation
Service

FERNS chains(6 chains, 16 stations)



ADMIMISTRATIVE SCHEME FOR FERNS COOPERATING CHAINS

FERNS Council

IIC	MOMAF, Korea	JCG	CMSA
T: 7-095-926-2501 F: 7-095-926-2883	T: 82-2-3674-6343 F: 82-2-3674-6346	T: 81-3-3591-6361 F: 81-3-3591-5047	T: 86-10-6529-2887 F: 86-10-6529-2245
Khabarovsk CS	Daejeon CS	Chiba CS	
T: 7-495-626-2501 F: 7-495-626-2883	T: 82-42-824-0940 F: 82-42-824-0513	T: 81-43-241-9118 F: 81-43-248-5346	T: F:
B-Chain	**C-Chain**	**D-Chain**	**E-Chain**
Alexandrovsk Petropavlovsk Ussuriisk Tokatibuto Okhotsk	Pohang Kwangju Gesashi Niijima Ussuriisk	Niijima Gesashi Minamitorishima Tokatibuto Pohang	Rongcheng Xuancheng Helong

F-Chain
Xuancheng Rongcheng Raoping

G-Chain
Hezhou * Raoping Chongzuo

B = Russian chain(Russian-Japanese)
C = Korea chain(Korean-Japanese-Russian)
D = N.W. Pacific chain(Japanese-Korean)

E = China North Sea chain, F = China East Sea chain , G = China South Sea Chain

2. Activities of FERNS

Activities

◦ **Sessional Council Meeting**

- **Annual MTG hosted by Rotation among the Member Countries**
- **on the General Matters for the Chain Operations according to FERNS Agreement and Operational Guidelines**
- **16th Session : 29th Oct. – 2nd Nov. 2007, Tokyo, Japan**

◦ **Technical Working Group Meeting**

- **Intersessional MTG of the Council MTG (if needed)**
- **during the Sessional Council Meeting**
- **on the Technical Matters for the Chain Operations & other Radio-navigation services**

◦ **Bilateral Meeting**

- **during the Sessional Council Meeting**
- **on the Technical Matters between 2 countries concerned**

◦ **Joint Measurement & Meeting (annually, Japan- Korea)**

- **Measurement for Loran Signal Using the Evaluation Vessels**
- **Data Exchange**

Agenda

1. Opening of the session.
2. Adoption of the agenda.
3. Presentation of reports by each country on the Loran-C/Chayka programme.
4. Operational matters for FERNS co-operating chains.
5. Technical matters for FERNS co-operating chains.
6. Co-ordination of other radionavigation services in the Far East.
7. Any other business.
8. Date and venue of the next session.
9. Closing of the session.

Technical Working Group

- **Improvement program for FERNS Co-operating Chains (Task 1)**
  - (1) Collect information on Loran-C in USA, Europe, IALA and others
  - (2) Develop technical improvement of Loran-C/Chayka among operational countries concerned
  - (3) Survey activities on radionavigaion including future plans in foreign countries except FERNS member states.
  - (4) Prepare a draft future plan of FERNS Co-operating Chain

- **Mutual interference between DGNSS stations (Task 2)**
  - (1) Confirm or review locations of DGNSS stations deployed in Far East Region
  - (2) Prepare an up-dated survey report on mutual interference between DGNSS stations
  - (3) Study the method for improvement on technical and operational issues of the DGNSS system
  - (4) Prepare a draft report for DGNSS improvement plan

Technical Working Group

- **Information exchange on future plan of DGNSS in FERNS members (Task 3)**
  - **(1) Understand the current activities and future program on DGNSS in IALA**
  - **(2) Consider and discuss the future program on the technical cooperation of DGNSS in Far East Region**

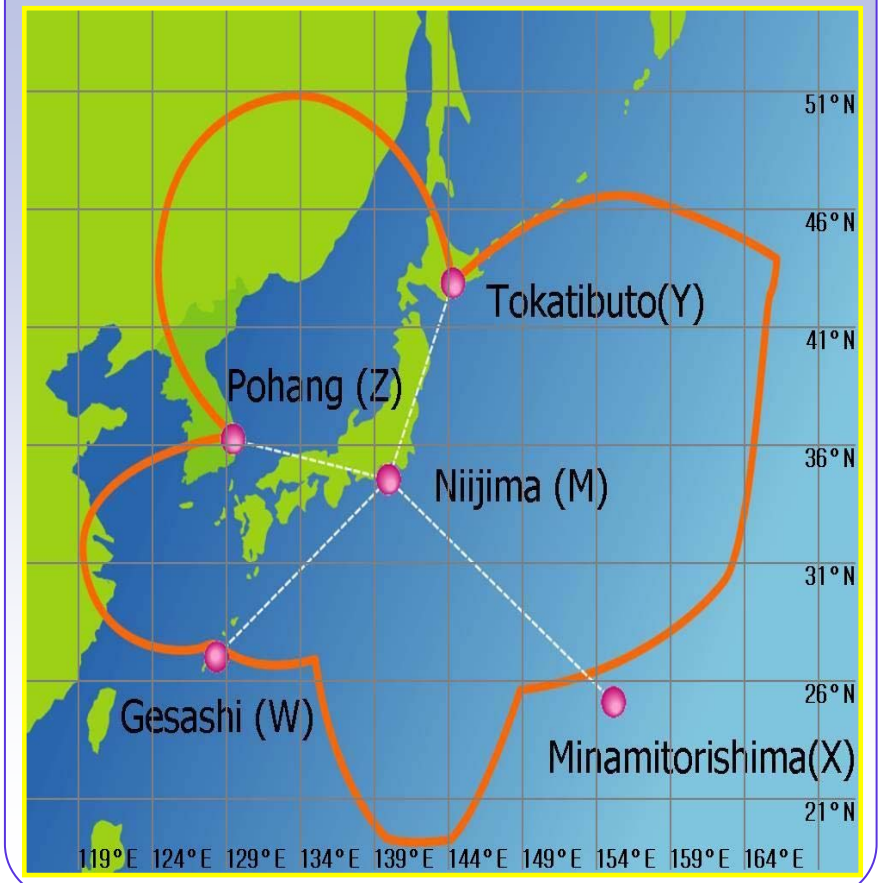
- **Information of the type of Loran-C/Chayka and other integrated user equipment (Task 4)**
  - **(1)Exchange technical information on radio navigation user equipment**
  - **(2) Report the result of the field survey on Loran-C/Chayka users and equipment**

- **Practical use of AIS in the AtoN field (Task 5)**
  - **(1) Exchange information on AIS application and prepare the report concerned**
  - **(2) Discuss the expansion of AIS applications**

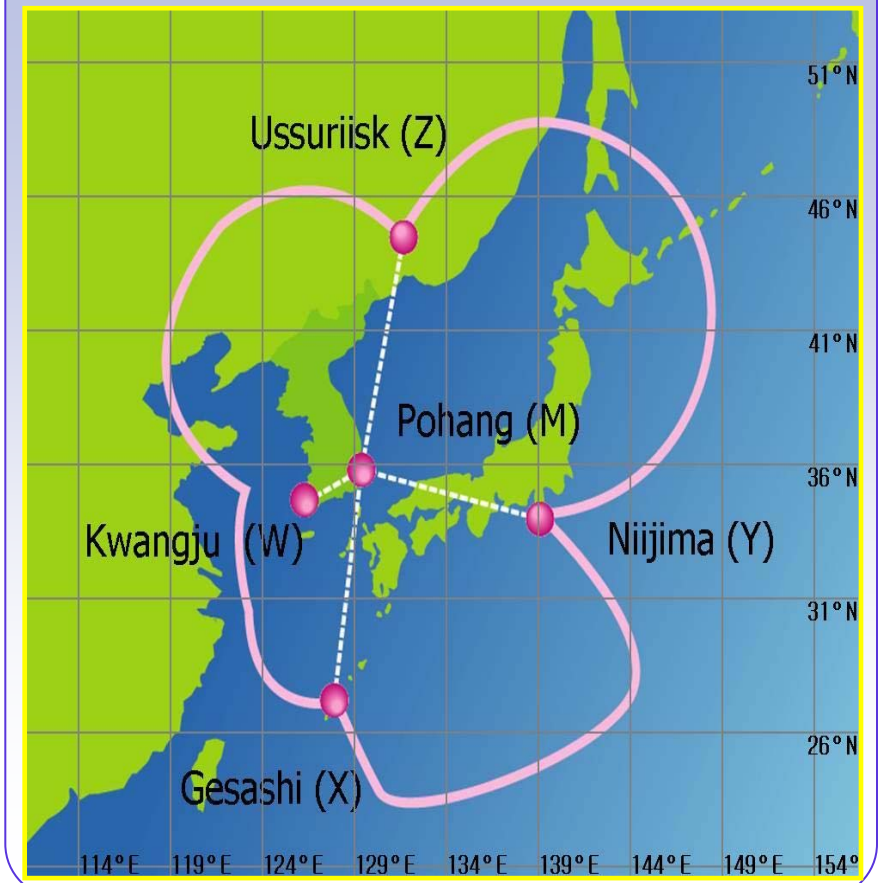
- **Interim report at the session of FERNS Council in 2007 & 2008 respectively**
- **Final report at the 18th Session of FERNS Council in 2009**

Joint Measurement

North West Pacific Chain (GRI 8930)

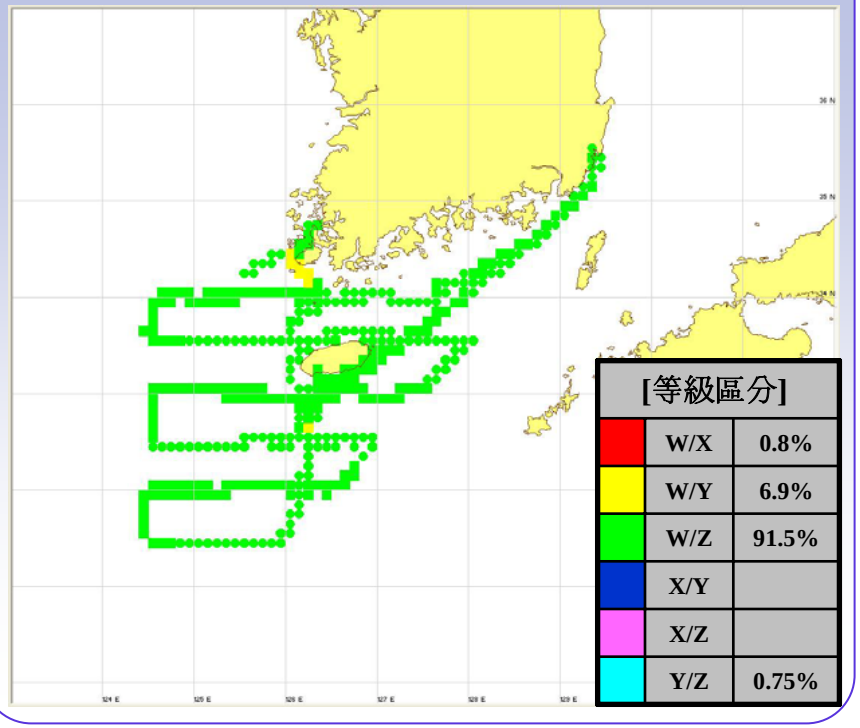


Korean Chain (GRI 9930)



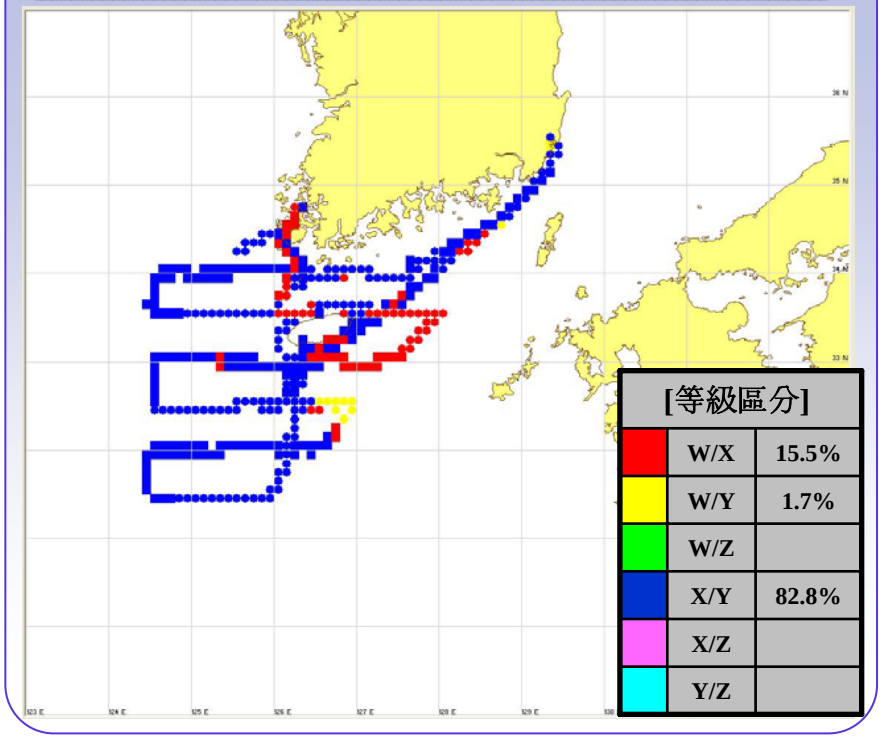
Joint Measurement

Best Combination of Station(GRI8930)



- Voyage No : 2006-001
- Period : 2006.4.11 – 5.17(37days)
- Measurement Area : South Sea
- Cruising range : 2,368NM
- W/X(0.8%), W/Y(6.9%),W/Z(91.5%) Y/Z(0.75%)

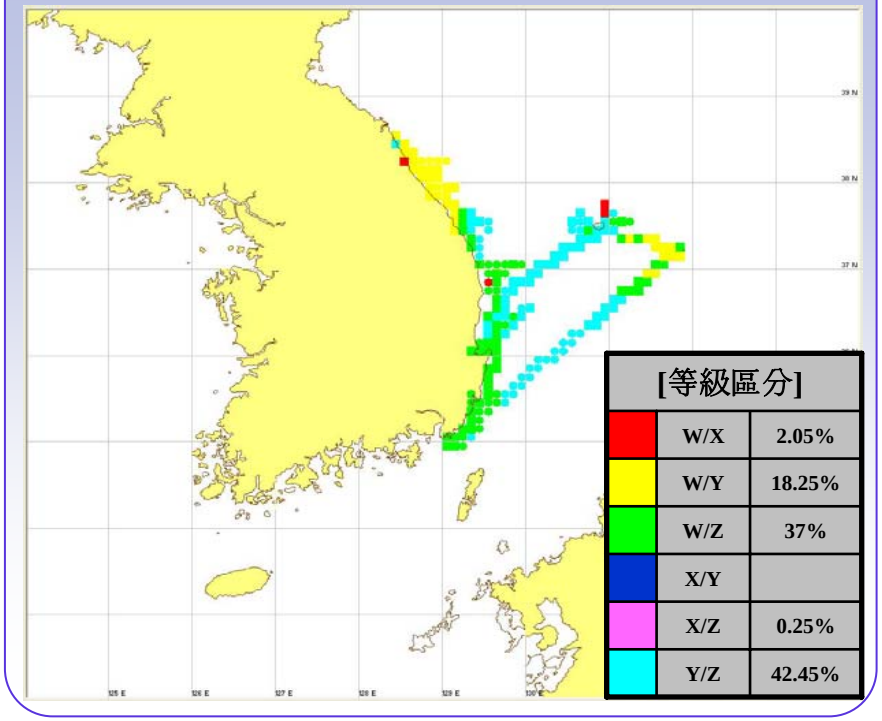
Best Combination of Station(GRI9930)



- Voyage No : 2006-001
- Period : 2006.4.11 – 5.17(37days)
- Measurement Area : South Sea
- Cruising range : 2,368NM
- W/X(15.5%),W/Y(1.7%),X/Y(82.8%)

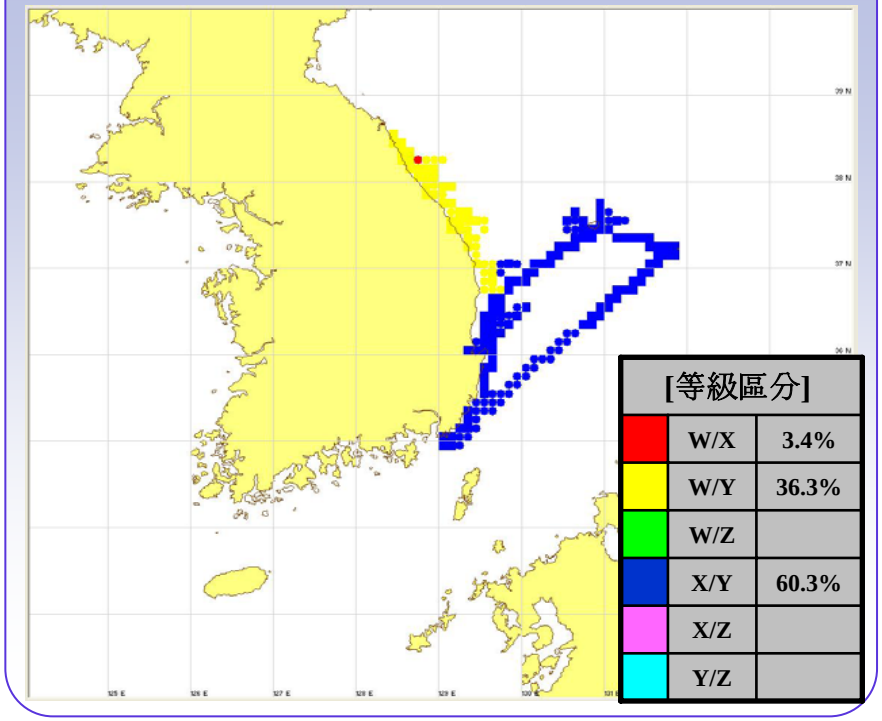
Joint Measurement

Best Combination of Station(GRI8930)



- Voyage No : 2006-002
- Period : 2006.6.15 – 7.26(42days)
- Measurement Area : East Sea
- Cruising range : 1,609NM
- W/X(2.05%),W/Y(18.25%),W/Z(37%), W/Z(0.25%),Y/Z(42.45%)

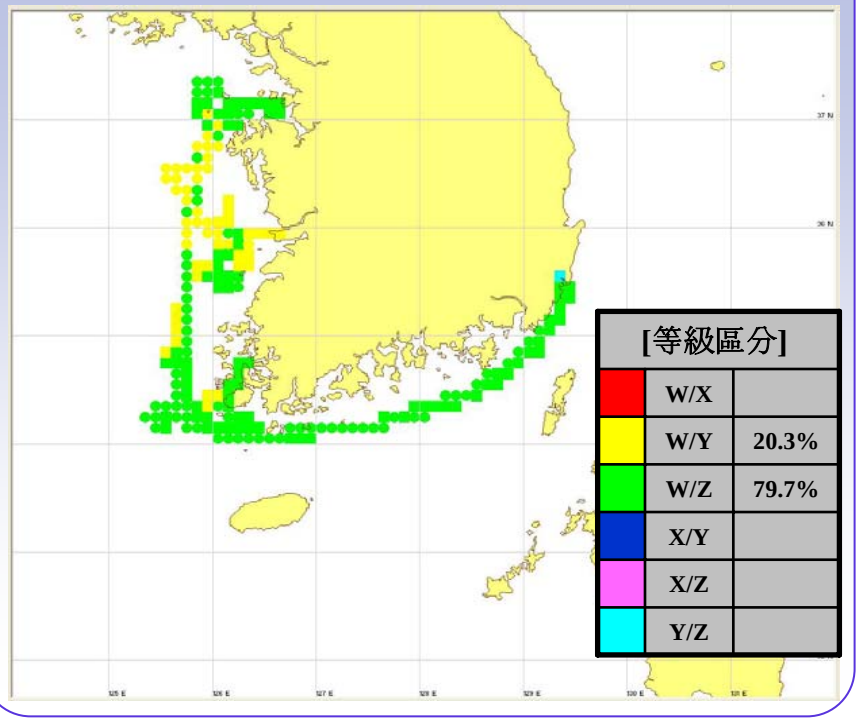
Best Combination of Station(GRI9930)



- Voyage No : 2006-002
- Period : 2006.6.15 – 7.26(42days)
- Measurement Area : East Sea
- Cruising range : 1,609NM
- W/X(3.4%),W/Y(36.3%),X/Y(60.3%)

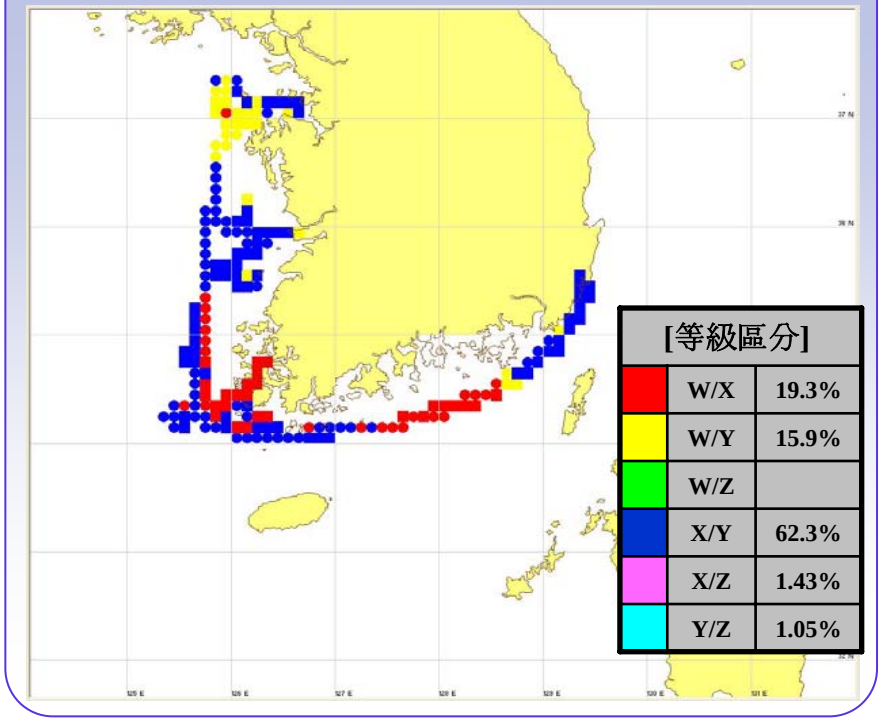
Joint Measurement

Best Combination of Station(GRI8930)



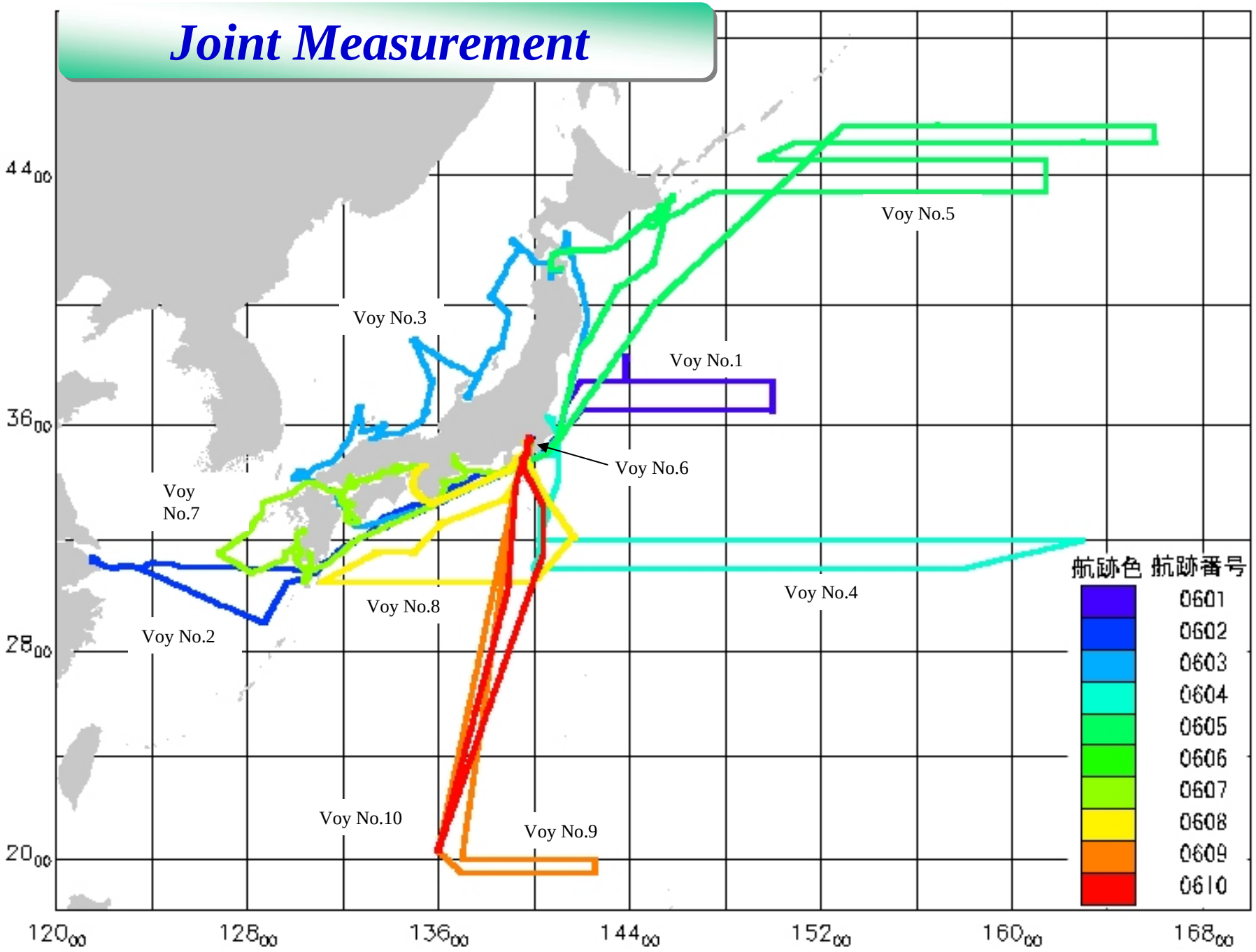
- Voyage No : 2006-003
- Period : 2006.10.18 – 11.4(18days)
- Measurement Area : West Sea
- Cruising range : 1,667NM
- W/Y(20.3%), W/Z(79.7%)

Best Combination of Station(GRI9930)

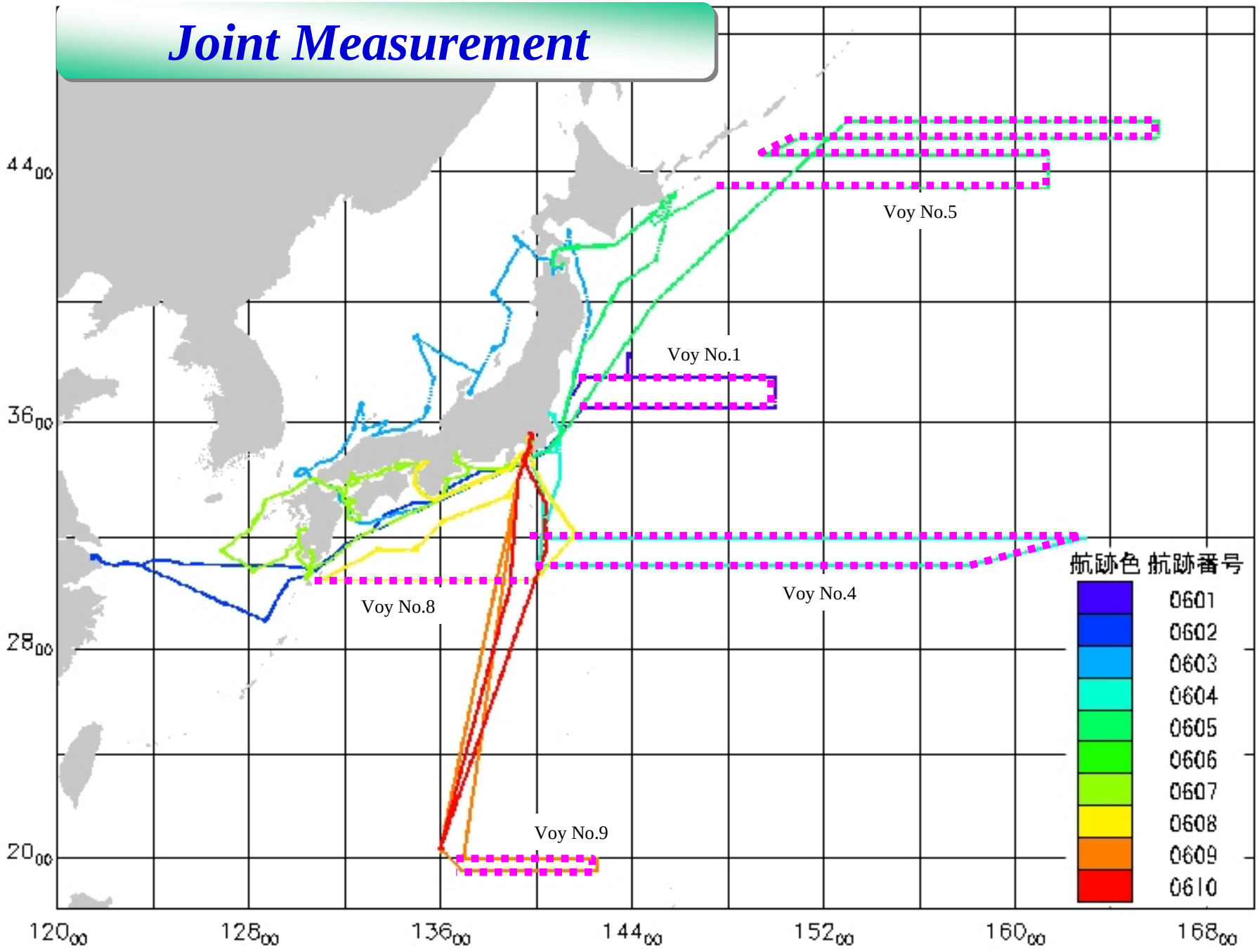


- Voyage No : 2006-003
- Period : 2006.10.18 – 11.4(18days)
- Measurement Area : West Sea
- Cruising range : 1,667NM
- W/X(19.3%), W/Y(15.9%), X/Y(62.3%), X/Z(1.45%), Y/Z(1.05%)

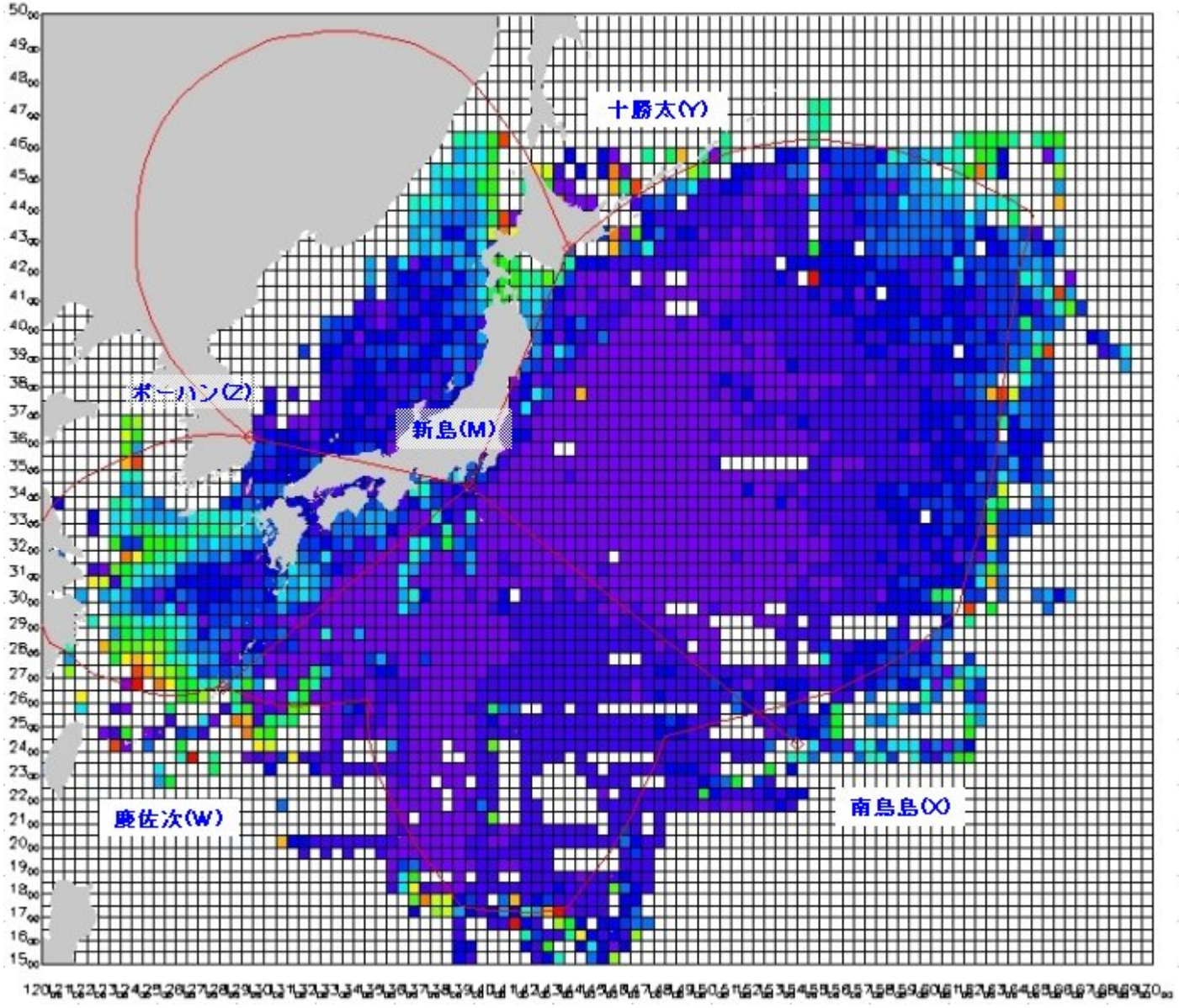
Joint Measurement



Joint Measurement



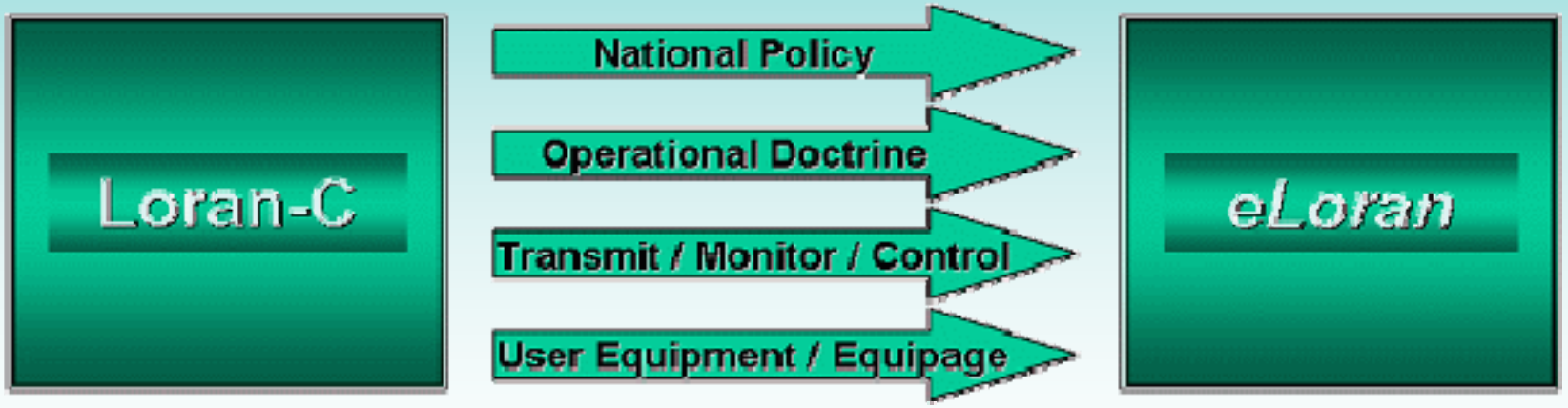
Joint Measurement



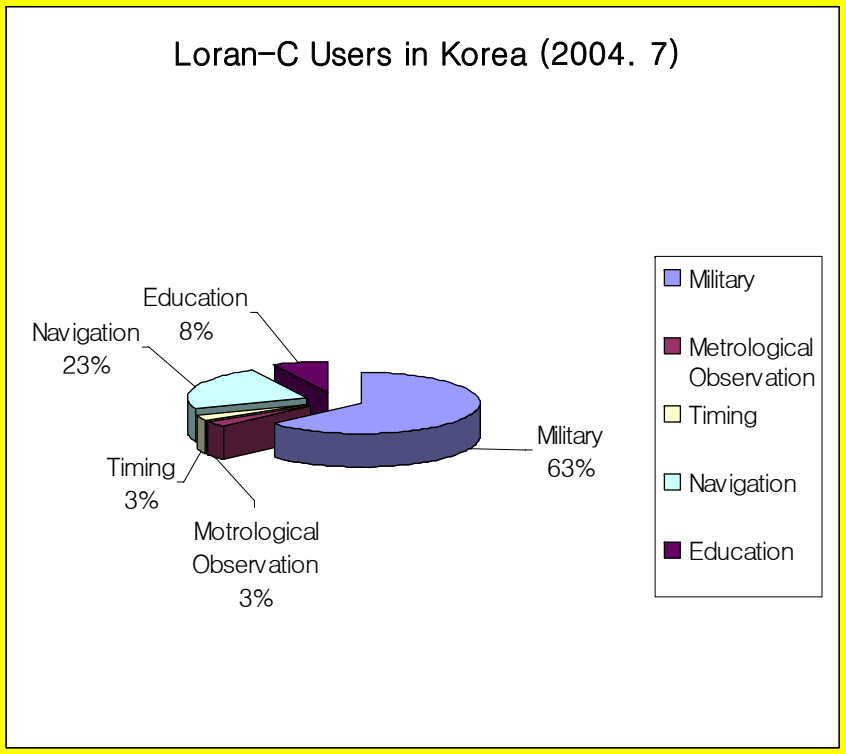
3. Required Modifications to Implement to e-Loran

Goals of e-Loran

- Better Accuracy
- Improved Availability
- System Integrity
- Continuity



How many users?



e-Loran Status of Korean Chain

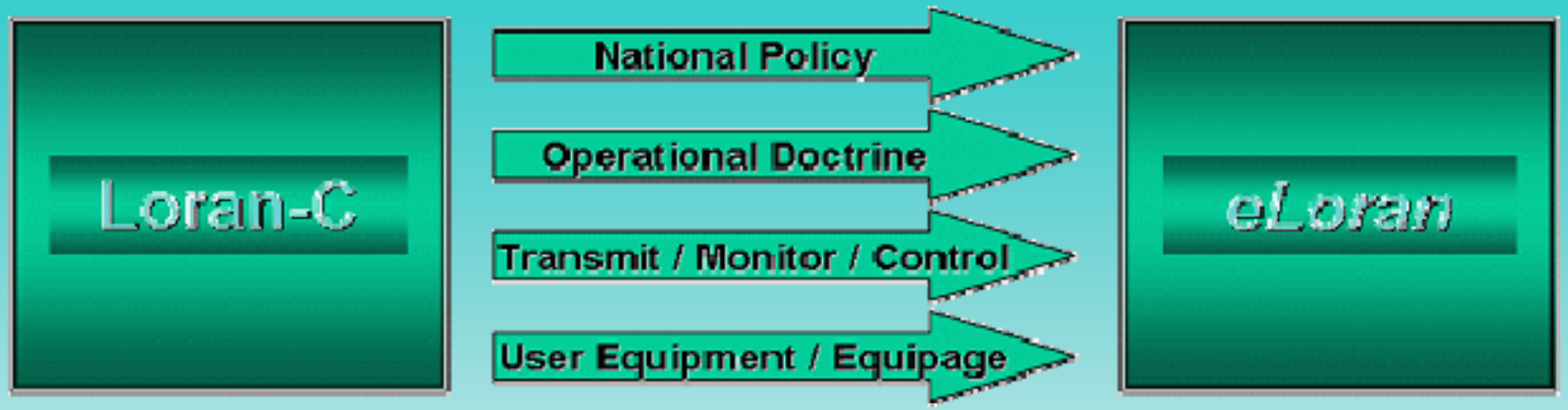
Descriptions	Status
TOT Control	No
UPS	No
Fast Coupler Switch	Yes
UTC Sync	No
Cesium Steering	No
TCS (Transmitter Control System)	No
ABS (Automatic Blink System)	No
Data Channel	No

Upgrade for eLoran System-Price (2005.9.)

Item	Description	Local In-Country Korean contractor cost	Harbors	Pohang LORSTA Cost	Kwangju LORSTA Cost	Chain Control Cost	Pyangteg Monitor Cost	Gonjulgap Monitor Cost
1	Time of Transmitter Control			92,000	92,000		23,000	23,000
2	UPS			200,000	200,00			
3	TCS(including ABS)			1,265,000	1,150,000	575,000		
4	Data Channel			230,000	230,000	115,000		
5	RAIL(Remote Automated Integrated Loran)			288,000	288,000	288,000		
6	Upgrades SAM Control						58,000	58,000
7	Differential Loran Integrity Monitor			115,000	115,000			
8	Differential Loran Reference Station		220,000					
9	ASF Compensation and Chain Calibration Survey	TBD						
10	500 eLoran receivers at $1000 each	550,000						
	Sub. total	$550,000	$220,000	$2,190,000	$2,075,000	$850,000	$81,000	$81,000
11	Installation	$233,000						
	Grand total	$6,280,000						

4. Conclusions

WHAT'S THE FURTRUE OF LORAN IN FAR EAST? On the Assumption that ……



Essential Conditions

- **How to increase the Users? (Mandatory or Regulation???)**
- **Opening & Providing the eLoran Technology (No special Permission or Patent to use it)**
- **Cooperation among Countries concerned the chain operation**
- **Revising the FERNS Agreement and Operating Guidelines (with the diplomatic channel)**

Thank you
for your kind attention!