(Form4-2)

JOINT RESEARCH PROJECT

FINAL REPORT
For Japan-Korea Joint Research Project

AREA	1. Mathematics & Physics 2. Chemistry & Material Science ③ Biology 4. Informatics & Mechatronics 5. Geo-Science & Space Science 6. Medical Science 7. Humanities & Social Sciences

1. Research Title:

Acoustic scattering measurements of zooplankton in the Sea of Japan/East Sea

2. Term of Research: From July 1st 2009 To June 30th 2011

3. Total Budget

a. Financial Support by JSPS: Total amount: 2,400 thousand yen

1st Year 800 thousand yen 2nd Year 1,200 thousand yen

3rd Year 400 thousand yen

b. Other Financial Support : Total amount: 0 thousand yen

4. Project Organization

a. Japanese Principal Researcher	
Name	**Tohru MUKAI**
Institution / Department	**Hokkaido University, Faculty of Fisheries Sciences**
Position	**Associate Professor**
b. Korean Principal Researcher	
Name	**Doo-Jin HWANG**
Institution / Department	**Chonnam National University, College of Fisheries & Ocean Science**
Position	**Professor**

c. List of Japanese-side Participants (Except for Principal Researcher)

Name	Institution/Department	Position
Yasuzumi FUJIMORI (2009-2011)	Faculty of Fiseries Sciences, Hokkaido University	Professor
Rie SHIOTA (2009)	Graduate School of Fisheries Sciences, Hokkaido University	MC Student
Ryuzou TAKAHASHI (2009)	Graduate School of Fisheries Sciences, Hokkaido University	MC Student
Yuu KAWATA (2009-2010)	Graduate School of Fisheries Sciences, Hokkaido University	MC Student
Yukiko KUROKAWA (2009)	Graduate School of Fisheries Sciences, Hokkaido University	MC Student
Moe DENAWA (2009)	Graduate School of Fisheries Sciences, Hokkaido University	MC Student
Kohji IIDA (2009)	Faculty of Fiseries Sciences, Hokkaido University	Professor
Yoshiaki FUKUDA (2010-2011)	Graduate School of Fisheries Sciences, Hokkaido University	DC Student
Eun-Ho KIM (2010-2011)	Graduate School of Fisheries Sciences, Hokkaido University	DC Student
Keita KAKUHIRA (2010-2011)	Graduate School of Fisheries Sciences, Hokkaido University	MC Student

d. List of Korean-side Participants (Except for Principal Researcher)

Name	Institution/Department	Position
Sun-Beom JEONG	Chonnam National University	Associate Prof.
Ho-Young SOH	Chonnam National University	Associate Prof.
Miyuki HIROSE	Chonnam National University	Visiting Prof.
Eun-A YOON	Chonnam National University	DC Student
Min-Ho SEO	Chonnam National University	DC student

5. Number of Exchanges during the Final Fiscal Year*

*Japanese fiscal year begins April 1.

a. from Japan to Korea

Name	Home Institution	Duration	Host Institution
Tohru MUKAI	Hokkaido University	4.24.2011-5.1.2011	Chonnam Nat'l University

For Final Fiscal Year(FY2011)	For Final Fiscal Year(FY2011)
Total: 1 persons	Total: 8 man-days

Numbers of Exchanges during the past fiscal years

FY2009: Total 4 persons
FY2010: Total 5 persons

b. from Korea to Japan

Name	Home Institution	Duration	Host Institution

For Final Fiscal Year(FY2011)	For Final Fiscal Year(FY2011)
Total: 0 persons	Total: 0 man-days

Numbers of Exchanges during the past fiscal years

FY2009: Total 3 persons
FY2010: Total 4 persons

6. Objective of Research

Japan and Korea border the common sea known as the Sea of Japan and have used common seafood resources since ancient times. To sustain these food resources into the future, scientific resource management policies based on mutual understanding must be instituted. Scientific research management requires that the existing levels of these resources be determined. One method for doing so is to use acoustics to survey the standing stocks of seafood resources.

Both Japan and Korea have researched ways to improve surveying techniques by using acoustic methods to estimate the standing stocks of useful fish resources. Research efforts have particularly focused on the acoustic characteristics of fish, which determine the accuracy of this method. However, various organisms other than fish inhabit the sea, including small plankton and large plankton such as jellyfish. In acoustic surveys, it is essential to be able to distinguish between these organisms and fish.

Previous research has found that gelatinous animals such as jellyfish are extremely numerous in the Sea of Japan compared to other ocean areas. Euphausiids, copepods and amphipods are also numerous. Among these, the acoustic characteristics of giant jellyfish are considered increasingly important because large numbers of these organisms have been drifting toward the shores of Japan and Korea in recent years. Studies have readily examined and clarified the acoustic characteristics of such jellyfish.

The present study aimed to clarify the acoustic characteristics of other gelatinous animals and small zooplankton, for which acoustic characteristics are still unknown in this ocean area. We will then use these basic data to estimate with high accuracy the standing stocks of useful fish in the common ocean area of Japan and Korea, applying the acoustic method.

7. Methodology

The method was roughly divided into the following three parts:

1. The acoustic characteristics of jellyfish were measured in a large seawater experimental tank at Korea, with close examination of the.changes in scattering caused by posture and pulsation. Measurements were conducted in August 2009 and 2010 in the tank (5 x 5 x 5 m) at the Center for Aquaculture at Chonnam National University, Yeosu, Korea. The echosounders used in the experiments were 38- , 120- and 200-kHz systems. This water tank has a good facility in using for experiments and favorable conditions such as the seawater is usable, samples are readily-accessible as it is near the sea and accomodation facility is adjoining.

2. The acoustic characteristics of small jellyfish and zooplankton (krill and copepods) were measured in a small seawater tank (3.74 x 2.24 x 2.2 m) at National Research Institute for Fisheries Engineering (NRIFE), Japan. Experiments were conducted in November 2009, September 2010, and January 2011. In 2009 and 2011, the targets were small jellyfish. The acoustic characteristics of zooplankton were measured in 2010.

3. A Korean training ship 'DongBaek-Ho' (Chonnam Nat'l Univ.) and a Japanese training ship 'Oshoro-maru' (Hokkaido Univ.) were used to collect acoustic data in the Sea of Japan, Yellow Sea, and South Sea. Possible distinguishing features in each area were examined. Field observations (acoustic and biological sampling) were conducted in October 2009 and 2010 on board the T/S Oshoro-maru, and in April and June 2010 and April 2011 on board the T/S DongBaek.