Mass appearance of the giant jellyfish, *Nemopilema nomurai* along the coastal area of Japan

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History

- 2005
- 2006

More frequent occurrence in 21 century
Nemopilema nomurai in Japanese coasts
Distribution and migration in 1958

- Dense patches in October in Tsushima Warm Current 2nd stream
- Wide distribution in October
- Shimomura (1959)

August

October

September

December
Migration (drift) pattern in 2003

- Surveyed by fisheries experimental stations of prefectures along Japan Sea and Pacific Ocean.

- Similar progress of the giant jellyfish was reported in 2002.

- Main body (or bodies) of the giant jellyfish is transported in the second stream of Tsushima Warm Current.
Migration (drift) patterns in 2004 and 2005

2004                                     2005

Jellyfish appeared along the Pacific side of western Japan.

Numbers in 2004 was far less than those in 2002, 2003.

Jellyfish appeared along the Pacific side of western Japan.
Appearance in 2005
Newspaper on Aug. 5

Aerial photo taken off Kyoto in Sep. 2005
Survey in East China Sea and Japan Sea
Giant jellyfish in East China Sea in Jun-Jul 2005

- Bell diameter increased while the jellyfish drifted on Tsushima Warm Current.

(20cm to 40cm)
Computer model of migration in East China Sea

Concentration (ind./0.5°x0.5°)

- 50-100
- 20-49
- 10-19
- 1-9

Initial area.
Based on Chinese data.
Differences among years are simulated with a good agreement to observation.
Processes that bring mass appearance of the giant jellyfish at Japanese coasts

- **Biological processes**
  - Production of planktonic larvae from polyps
  - Survival in juvenile stage
    - Food, natural enemies, etc
  - Growth in open waters
    - Variation in long time-scale?
      - Global warming, eutrophication, over-fishing, others?

- **Physical processes; drifting**
  - Reproduction area to open waters
  - To Tsushima Warm Current
  - Offshore to coastal areas
  - Variation in short time-scale, maybe in long one too.
Remote sensing survey off Oki Islands

and in 2006

Sep. 29
GPS buoy tracking
Ocean model used for forecasting the giant jellyfish migration 【RIAMOM】

- Developed by Research Institute for Applied Mechanics, Kyushu University
- Assimilate with daily weather, SST (Sea Surface Temperature) and SSH (Sea Surface Height) data
Forecast of jellyfish appearance in coastal waters

Model forecasted that jellyfish pass through the Tsugaru Strait in the middle of Sep.

▲: sighted during Sep. 14 to 16.
Drift simulation in Japan Sea and the Pacific Ocean (2006)

RIAMOM

JCOPE
Public announcement of simulation results

Aug/ 31

Oct/ 12

9月15日を初期値とし、海況予測モデル(JCOPE)から推定された、10月10日、10月25日、11月10日の大型クラゲの分布域

東北太平洋岸における予測情報

独立行政法人水産総合研究センターでは、独立行政法人海洋研究開発機構と共同で海況予測モデル(JCOPE)を用いて、東北太平洋岸における大型クラゲの分布域予測計算しました。9月15日に青森県三沢沖で発見された情報を基にすると、大型クラゲがしばしば岩手県北部沿岸（北緯40度付近）に滞留した後、観測前線沿いに東へ流されると、観測第1分級沿いに南へ流されるものに25%です。このうち、東北沿岸を南下する大型クラゲは、10月中旬には新島山沿岸、10月下旬には岩磐沿岸に達することが示されました。なお、北海道への出現については本予測には含まれません。
Collaboration with China and Korea

- Data exchange
- International workshops
- MOU among national institutes
Giant Jellyfish in Ariake Bay

There were some reports of sighting Nemopilema nomurai in the bay. Searches for larvae and adult jellyfish show no positive evidences.
New technologies in trawl nets
New technologies in set nets

Jellyfish passes through, but fish can see the net.
Jellyfish diameter: ca.80cm
Utilization of giant jellyfish

- Search for functional activities in extracts
  - Reduction of neutral fatty acids, prevention of thrombosis and osteoporosis
- Development of
  - Processed materials for food products
  - Local specialties
  - Traditional salted jellyfish