

**Cs-137 Background Measurement in the  
Marine Environment of the Asia-Pacific Region  
to Support Emerging Challenges of On-Site  
Inspection (OSI) in Seas**

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# Comprehensive Nuclear-Test-Ban Treaty (CTBT)



- The International Monitoring System (IMS)
- Consultation and Clarification
- On-site Inspection (OSI)
- Confidence-Building Measures

# Comprehensive Nuclear-Test-Ban Treaty (CTBT)



UNE

- List of OSI relevant radionuclides (Cs-134, 137, I-131, Tc-99m)
- Capacity building
- On-site Inspection Manual
- Equipment

# Comprehensive Nuclear-Test-Ban Treaty (CTBT)



Under water Explosion (UNDEX)

# Historical Underwater Nuclear Explosions



Baker, USA, 1946



Joe17, USSR, 1955



Wahoo, USA, 1958

122 (Korall-1), USSR, 1961



Wigwam, USA, 1955 30 kT

48, USSR, 1957

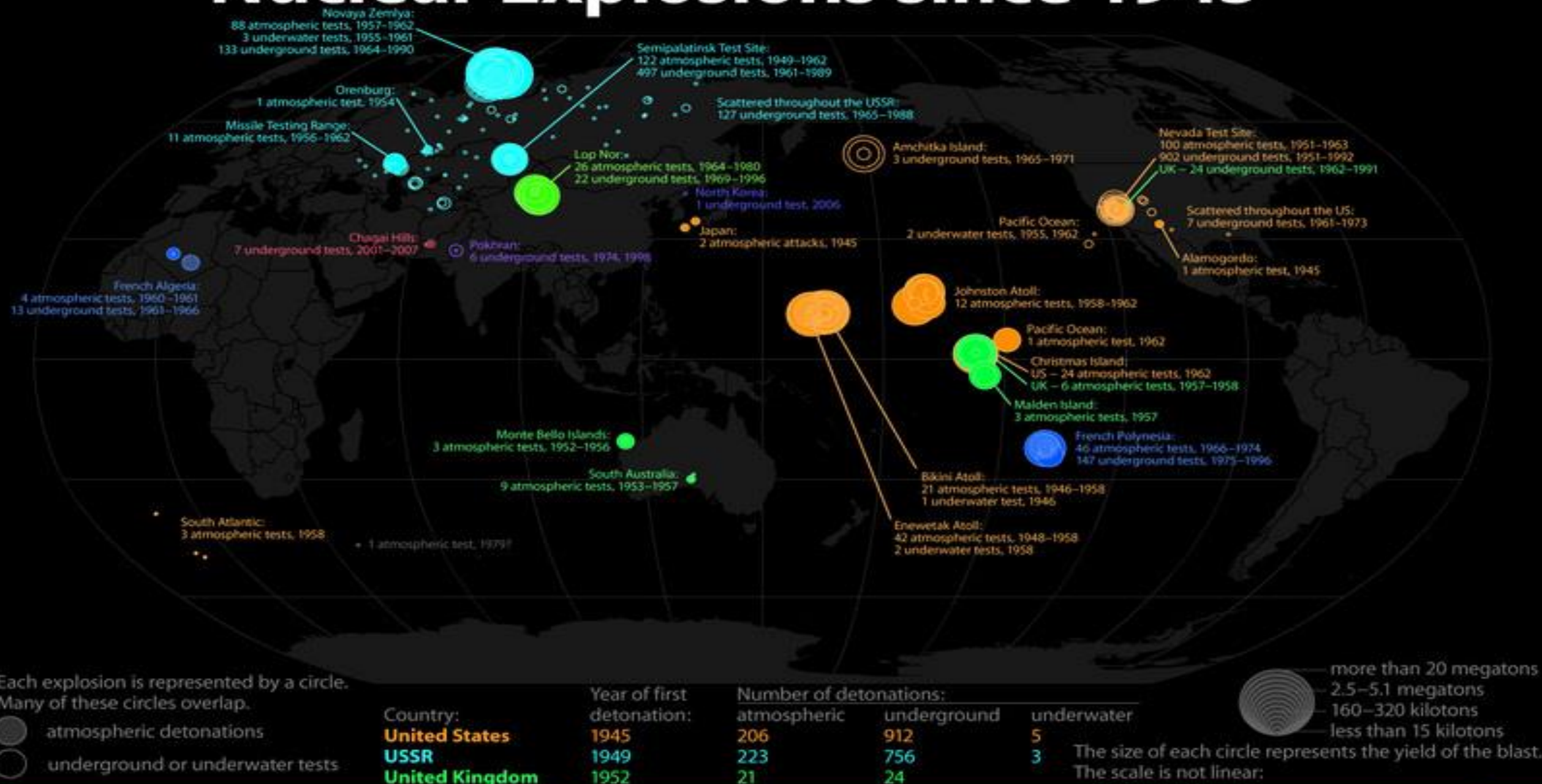


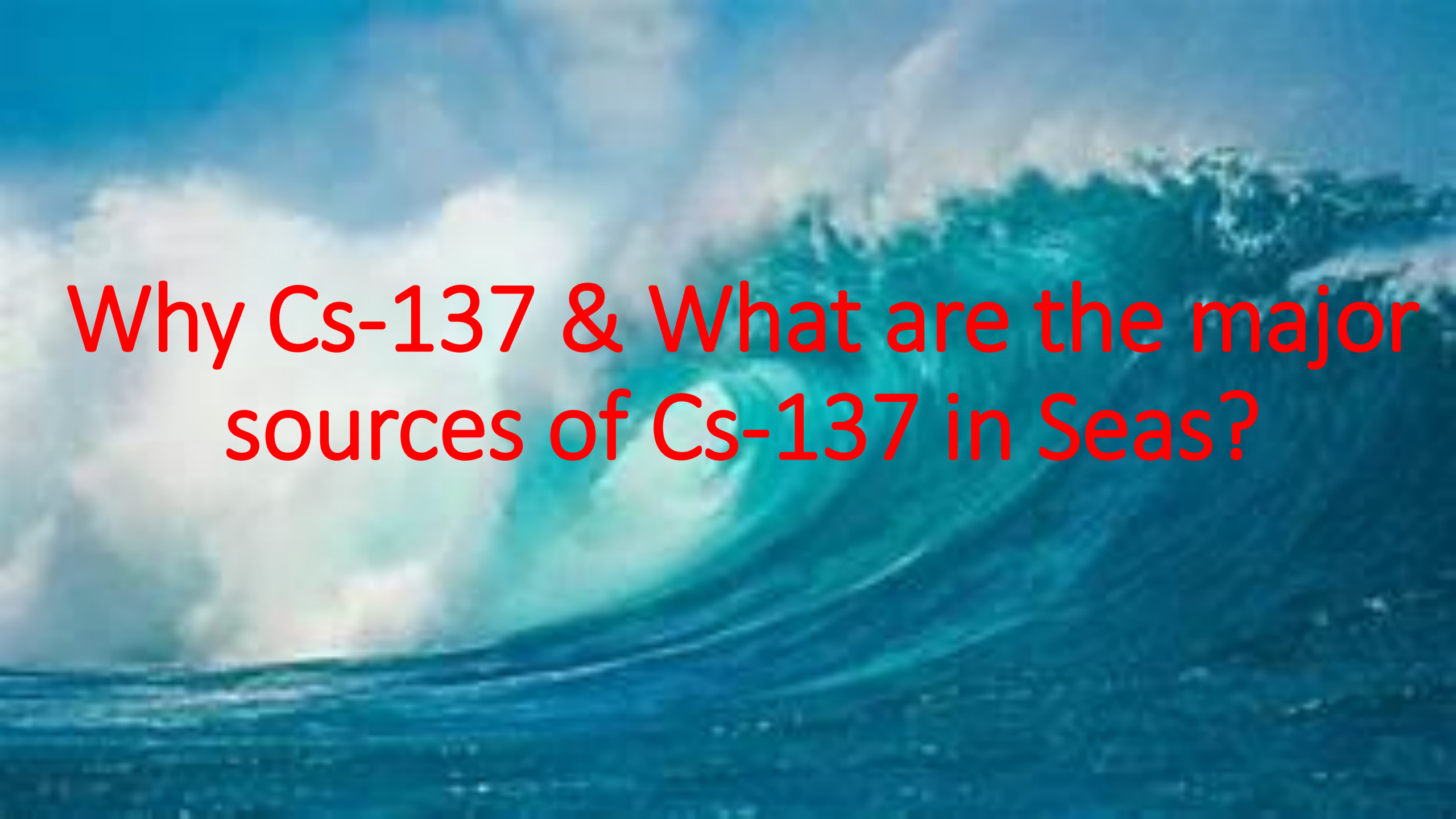
Umbrella, USA, 1958



Swordfish, USA, 1962

# Nuclear Explosions since 1945













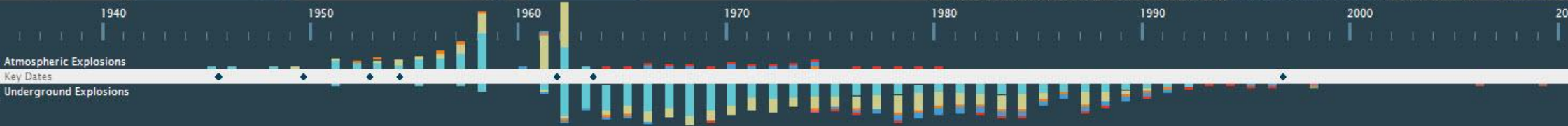
Why Cs-137 & What are the major sources of Cs-137 in Seas?

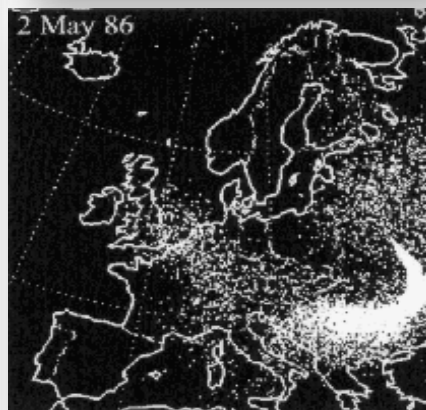
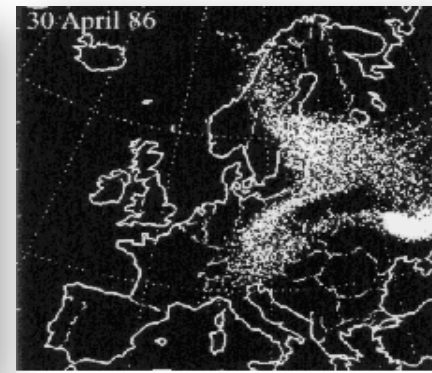
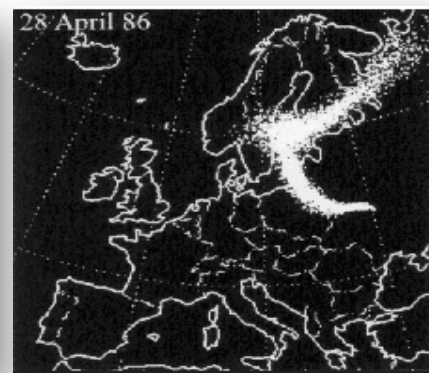
Nuclear Weapons used in  
World War II, August 1945

Test Sites:

-  USA
-  USSR
-  UK
-  France
-  China
-  India
-  Pakistan
-  DPRK

The figures used in this map are approximate and based on official government sources, as well as on information provided by research institutions such as the Natural Resources Defence Council in Washington D.C., and the Stockholm International Peace Research Institute (SIPRI).

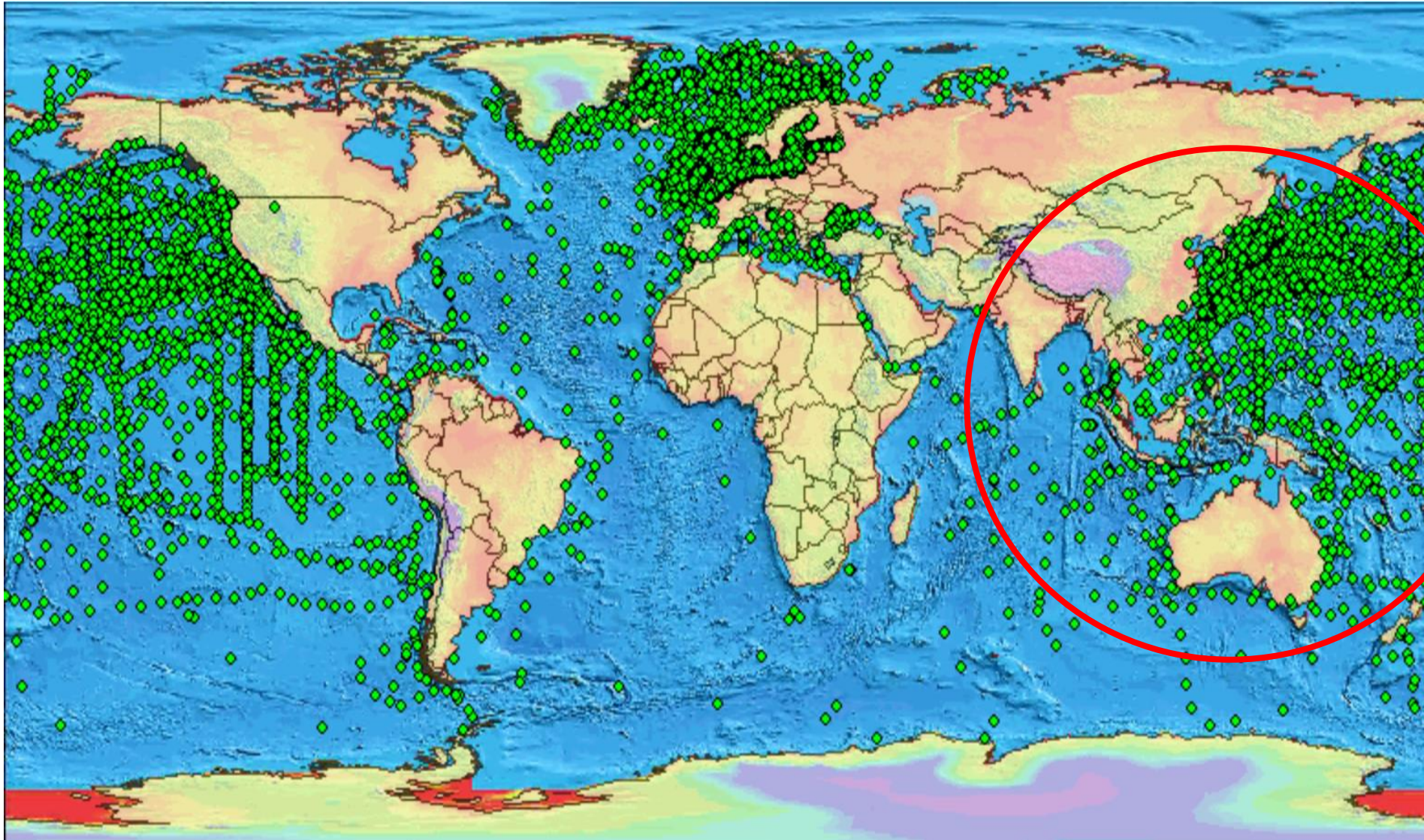




Mar 12 05:00 2011



# Marine Environmental Radioactivity Monitoring in the Asia-Pacific Region

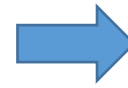
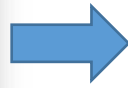


<https://maris.iaea.org/>

# Seawater Collection & Measurement of Cs-137



Seawater Sampling



HPGe Gamma  
Spectrometry  
80000 sec or longer

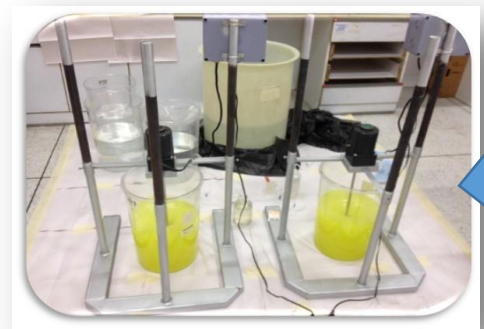
# Seawater Collection & Measurement of Cs-137



Van Dorn Water Sampler

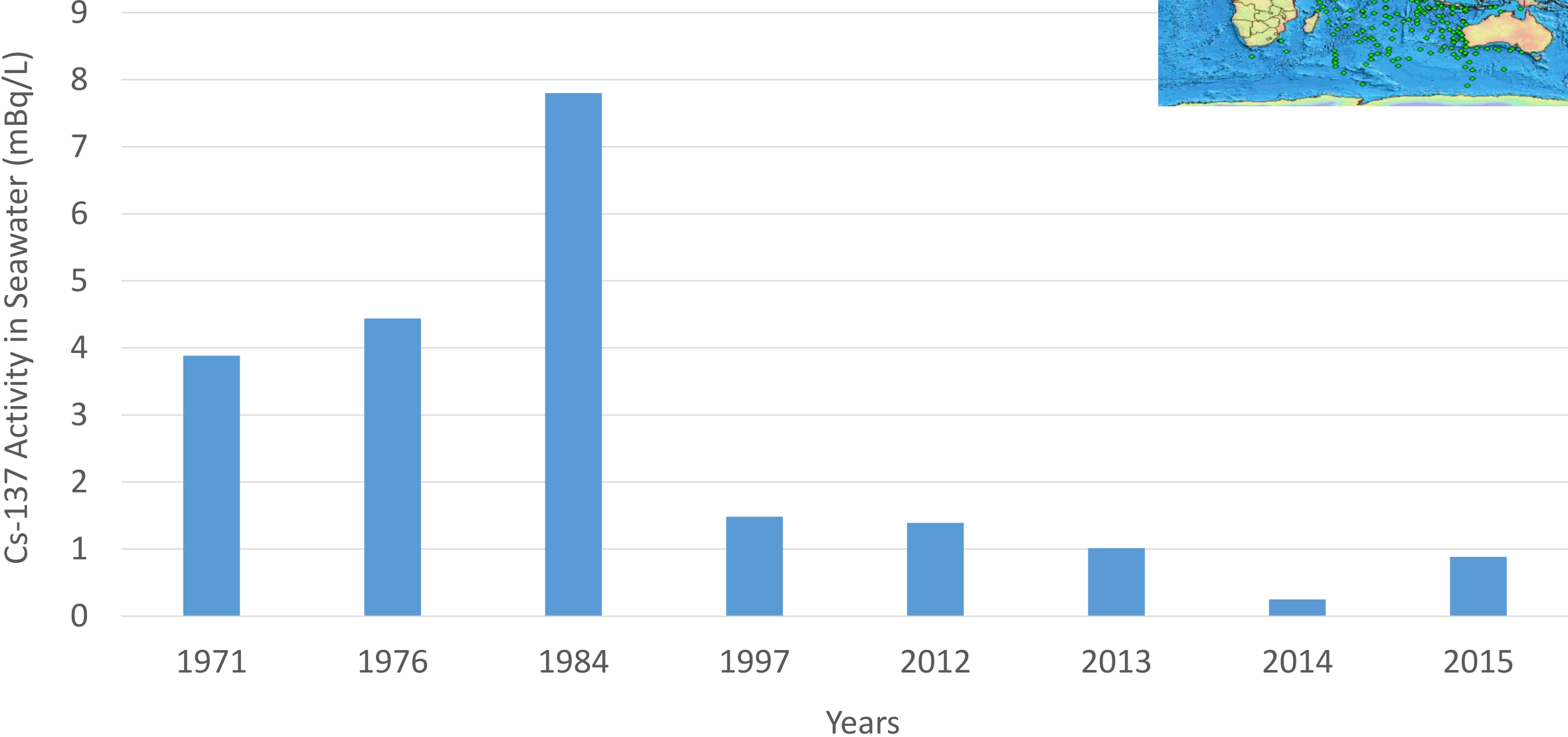
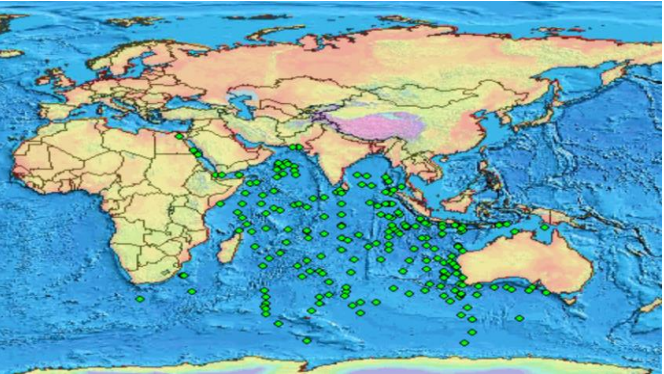


HPGe Gamma Spectrometry  
80000 sec

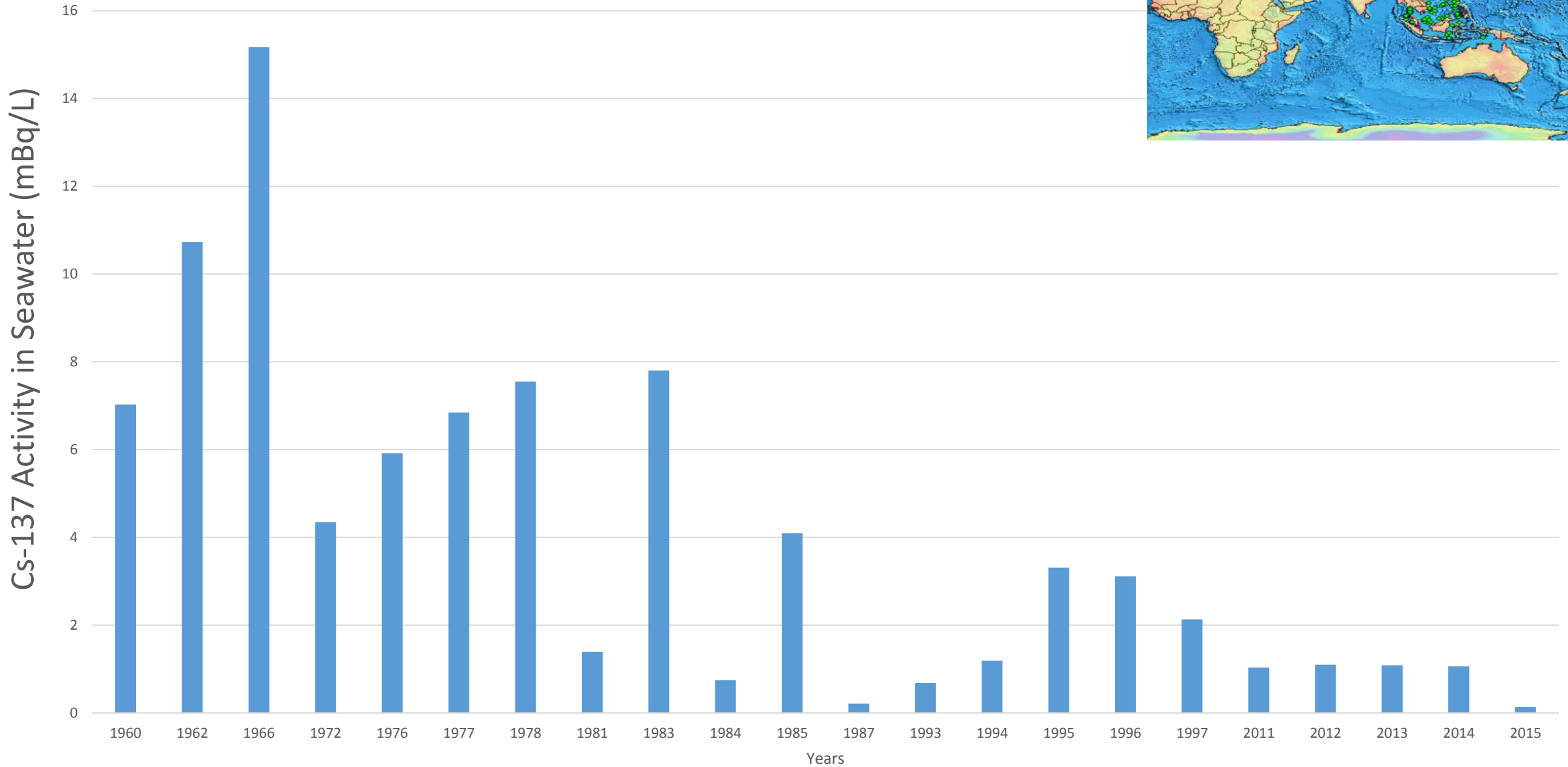
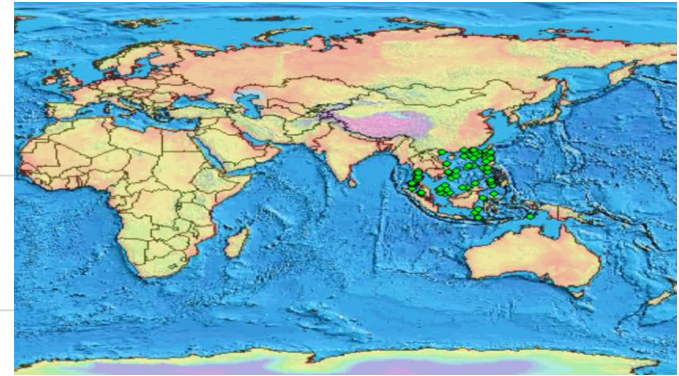


Ammonium Molybdophosphate (AMP) technique

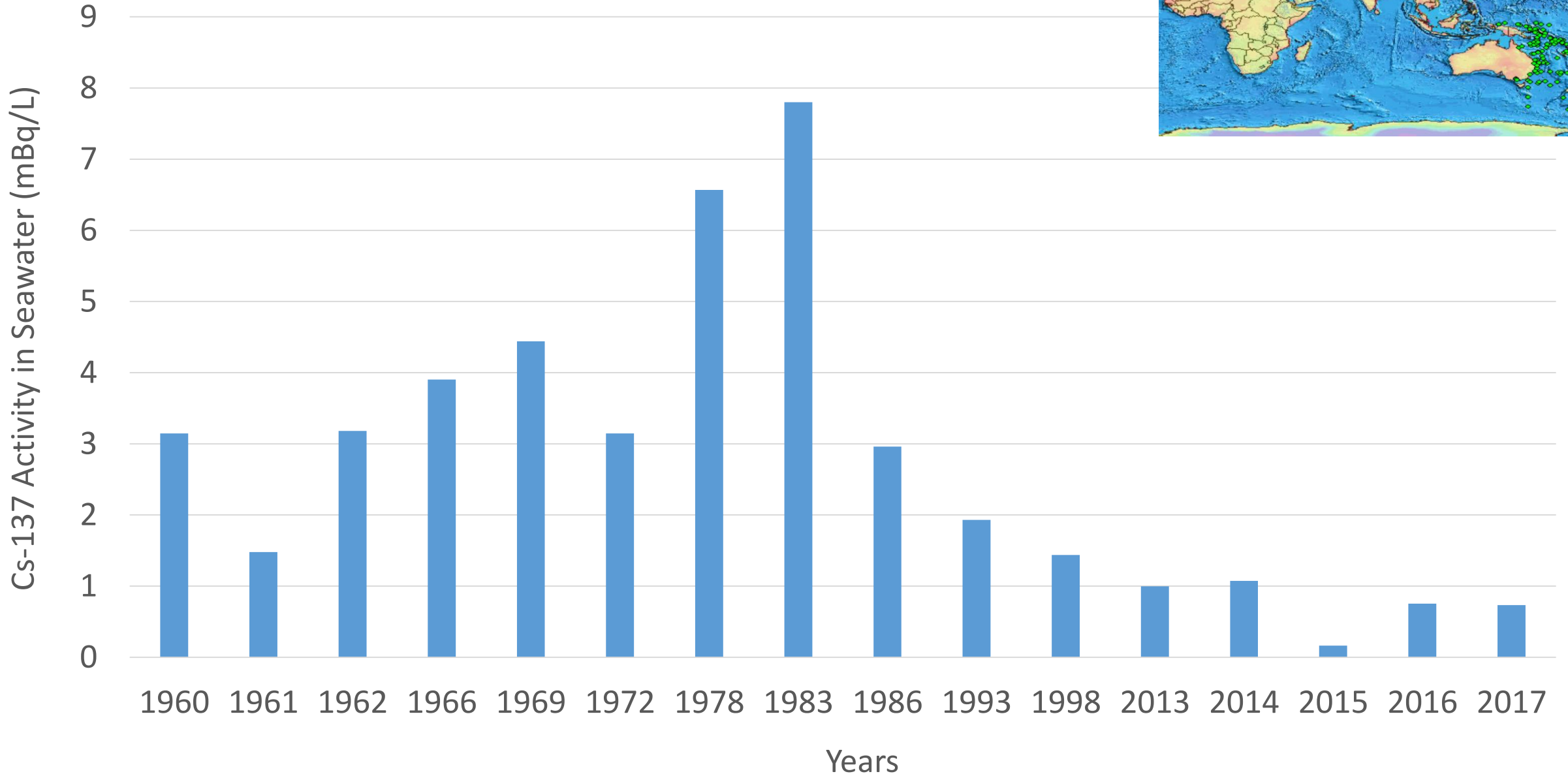
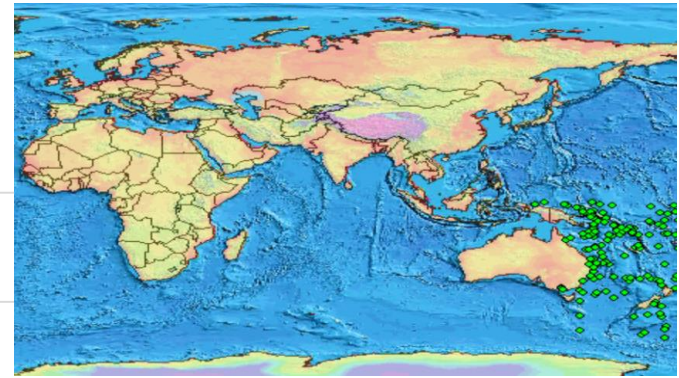
# Indian Ocean (1971-2015)



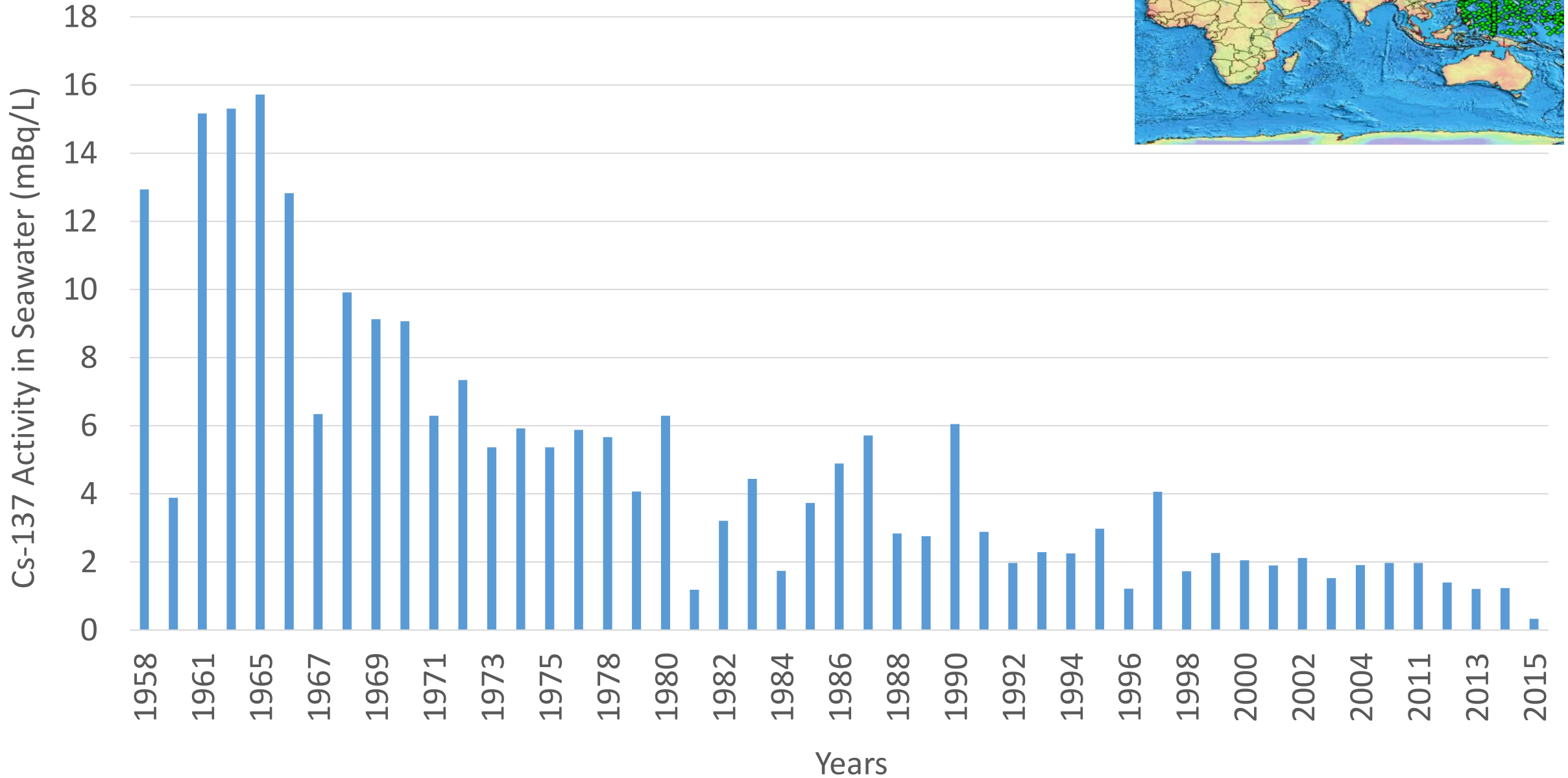
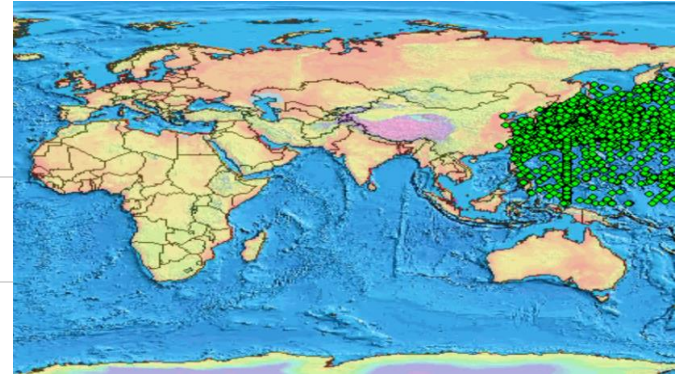
# South China and Southeast Asia Seas (1960-2015)

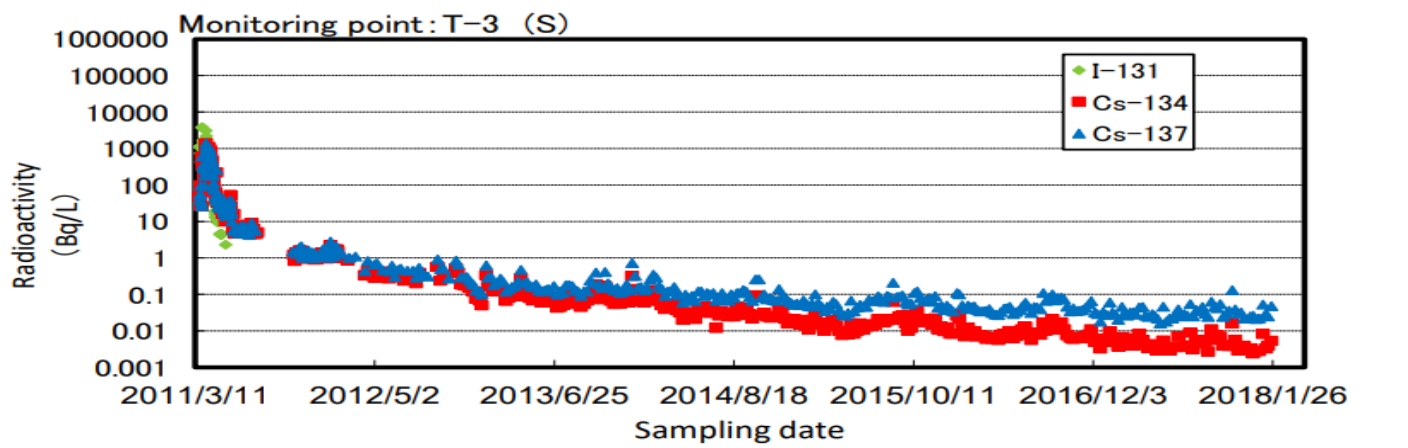
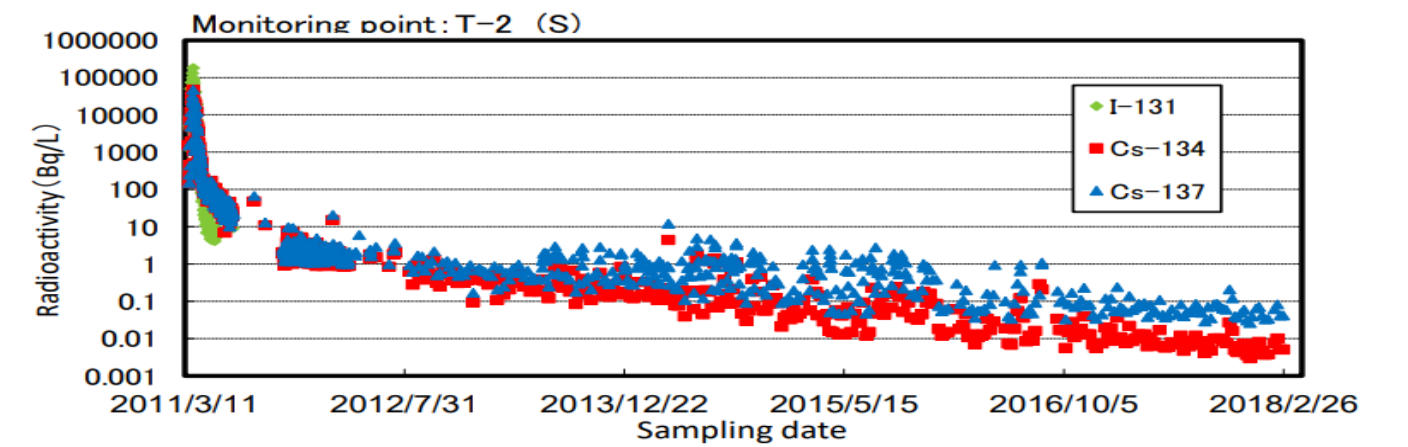
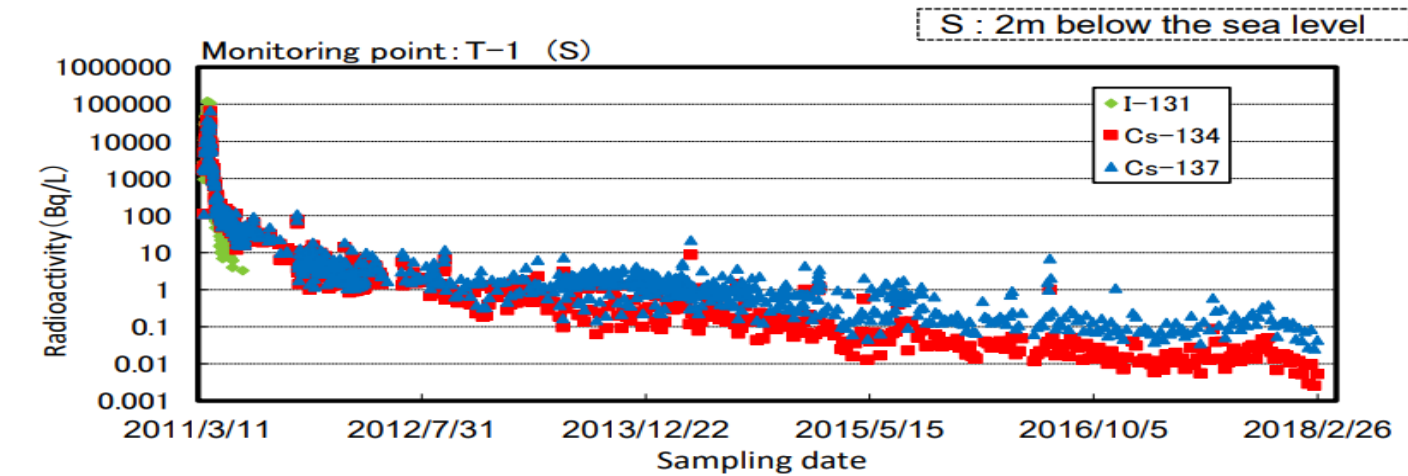
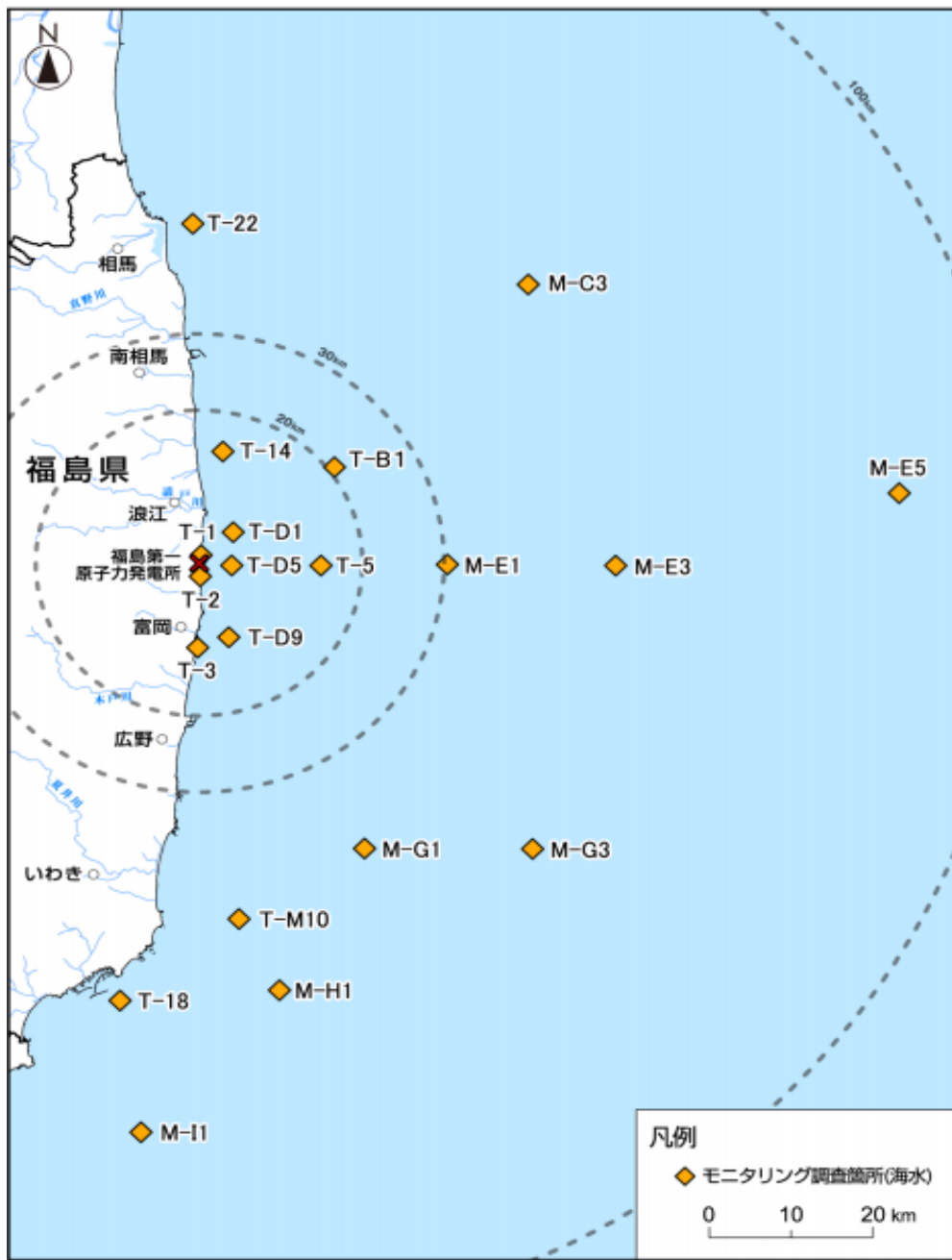


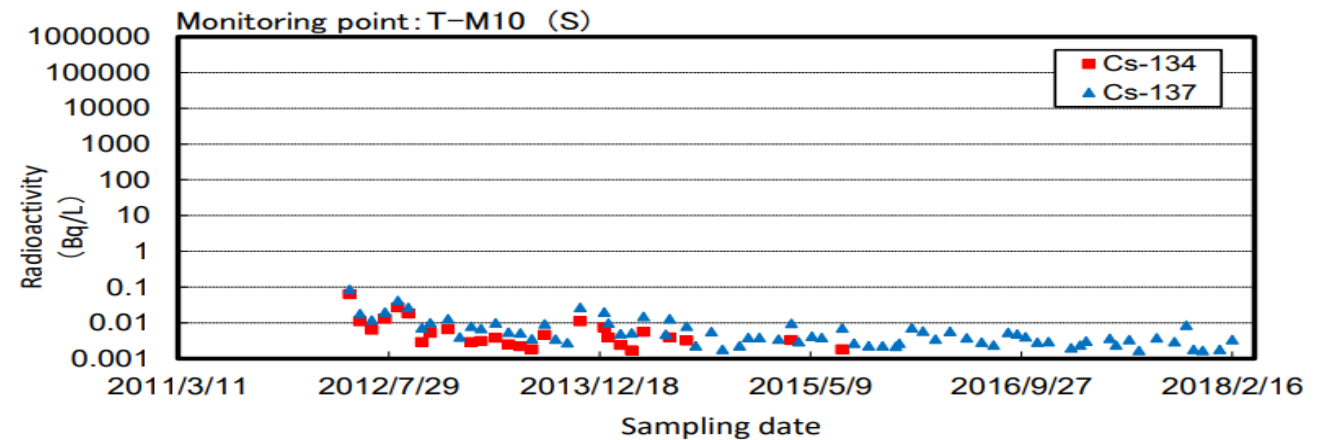
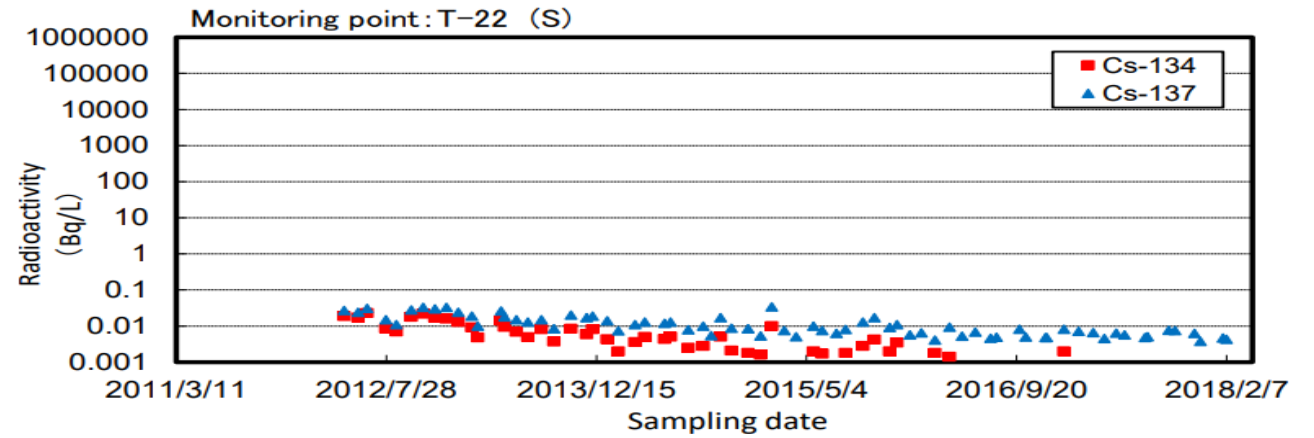
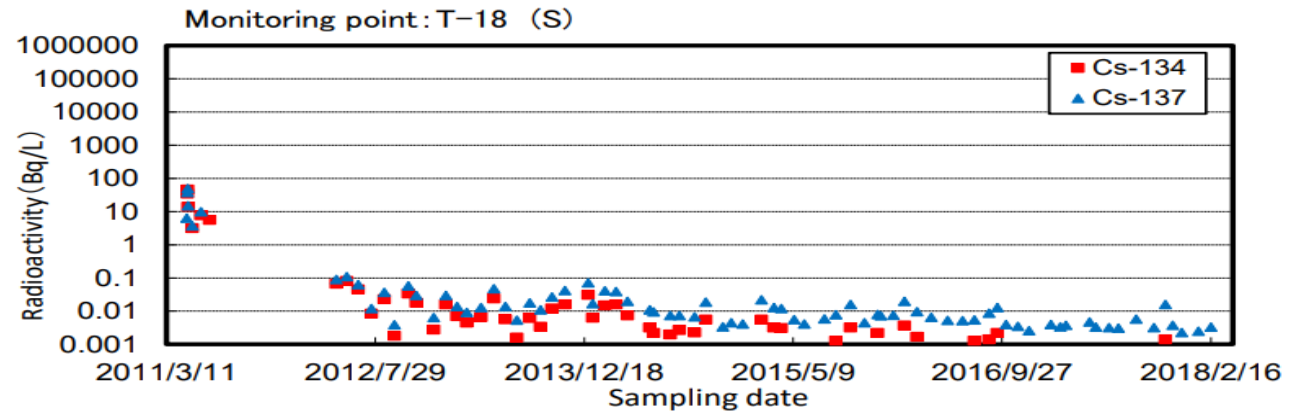
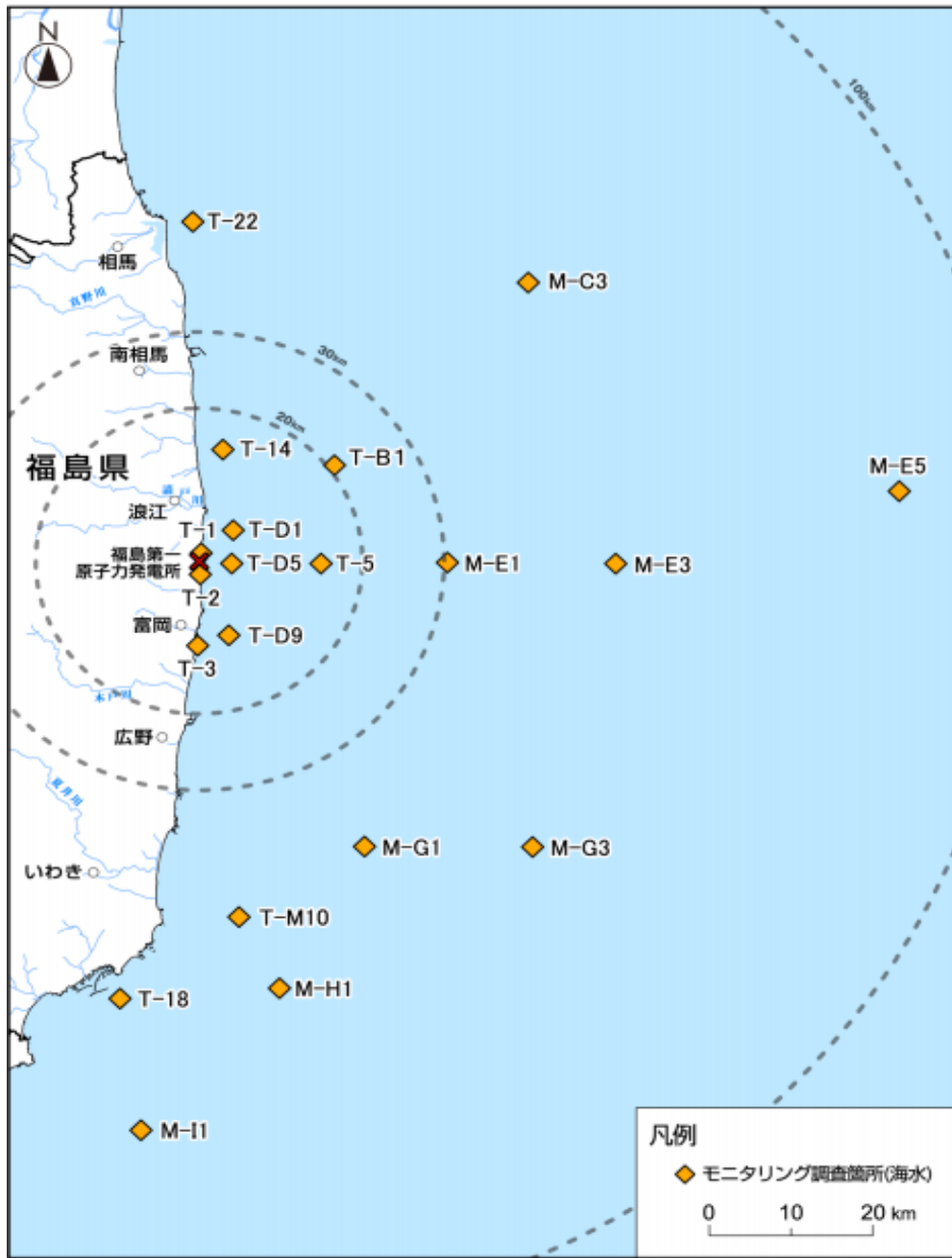
# South Pacific Ocean (1960-2017)



# Northwest Pacific Ocean (1958-2015)







# Conclusion

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- Indian Ocean: 0.82-0.95 mBq/L (2015)
- South China and Southeast Asia Seas: 0.13-0.61 mBq/L (2015)
- South Pacific Ocean: 0.72-0.75 mBq/L (2017)
- Northwest Pacific Ocean: 0.52-3.44 mBq/L (2015)
- Fukushima Daiichi NPP: 1-56 mBq/L (2018)

# Acknowledgements

- Asia-Pacific Marine Radioactivity Database (ASPAMARD)



ASPAMARD (Asia Pacific Marine Radioactivity Database)

- Marine Information System (MARiS)

MARiS - Marine Information System

