

序 文

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近年、日本のみならず世界中で大きな地震や津波が発生し、甚大な被害をもたらしている。このような状況の中で、地質災害や自然災害と言う言葉を耳にする機会が多くなっている。我々の暮らしている日本は、4つのプレート境界に隣接して北東から南西に長く島嶼が列をなすように国土が成り立っている。このような地質学的な日本の成り立ちを理解し、安全で安心な社会の構築には、地質情報を整備し理解を深めることが重要である。産業技術総合研究所地質調査総合センターで長きにわたって行ってきた地質調査は、陸域・海域も国土を有効に利用するために重要な役割を果たしてきた。平成19年に発生した能登半島地震や新潟県中越沖地震は、甚大な被害を沿岸の産業や生活基盤に与えてしまった。海岸付近の沿岸域においては、調査船舶が入れないなどの理由、また都市域の地質調査は露頭が構造物に隠されてしまっていることから調査が難しく、残念ながら地震発生前に活断層の存在が正確には認識されておらず、活断層の分布や陸域から海域にかけて連続的な地質情報が十分に整備されていないことが浮き彫りになった。このような背景から、沿岸域の重要インフラの地震災害リスク軽減や産業立地の安全に資するため沿岸域の地質情報整備が緊急の課題であると判断して、平成20年から地質調査総合センターとして取り組む政策課題「沿岸域の地質・活断層調査プロジェクト」として、沿岸域を中心とした活断層や地盤地質に関する地質情報の整備と調査技術開発を実施してきた。

沿岸の陸域から海域までを調査範囲として、陸域の地質・活断層調査や反射法地震探査、海域の地質構造及び海底堆積物の調査、海陸に及ぶ重力や空中磁気などの物理探査、平野域の水文環境調査など、様々な手法によって、平成20年度には能登半島の北部沿岸域、平成21年度には新潟の越後平野を中心とする沿岸域、平成22年度には博多湾周辺沿岸域、平成24年度には石狩低地帯の南部沿岸域、平成25年度には駿河湾北部沿岸域を主な対象域として調査を実施した。そして、地質・地域特性に応じた調査技術の開発や手法の確立を行いながら、沿岸域の地質情報の空白域を埋めるとともに、海陸にわたって活断層や地層の連続性、重力や磁力の分布などを明らかにし、最終的には、海陸シームレス地質図などを作成して、それらをまとめた。

この5年間の成果を踏まえて、平成26年度からはプロジェクトの新たなフェーズとして、特に大都市圏沿岸域における地質・地盤情報整備を行うために、先ず3年間のプロジェクトとして、関東平野南部沿岸域の調査・研究を実施した。房総半島東部沿岸域の浅海域の高分解能音波探査、堆積物調査、陸域の露頭断層調査、ボーリング調査、地球物理調査や既存データのコンパイルなどを実施した。房総半島東部沿岸域は、南

西側に相模トラフ，東側に日本海溝が存在し，西方へ沈み込んだ太平洋プレートのスラブの上位にフィリピン海プレートのスラブが接触する領域にあたる．複雑な地質構造をなしている地域と言える．調査の結果，沿岸部の陸域から海域にかけての地質情報の整備を行い，海陸の地質構造の分布やその連続性に関する詳しい知見を得た．海陸シームレス地質情報集「房総半島東部沿岸域」は，これらの調査データ及び解析結果をまとめたものである．以下，それぞれ独立したマップと報告書が含まれている．今後，これらの成果は，沿岸地域での活断層の分布を考慮した地震災害軽減対策や施設の建設計画や土地利用などに活用されることを期待する．

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Preface

Kohsaku Arai (Deputy Director of the Research Institute of Geology and Geoinformation)

Devastating earthquakes and tsunamis capable of causing significant damage to human societies and economies have frequently occurred in Japan as well as many other locations around the world. As a result, “geological hazards” and “natural disasters” are receiving increasing amounts of attention from the media and the general public. Because Japan is a long and narrow island arc located at the junction of four plates (the Eurasian and Philippine Sea Plates in southwest Japan; and the North America and Pacific Plates in northeast Japan) that faces the Pacific Ocean, it has probably suffered the highest number of earthquake and tsunami events anywhere in the world. Hence, geology and geoinformation investigations are extremely important, not only for understanding the geological development of Japan but also for forecasting geohazards and securing the safety of infrastructures and the population.

In 2007, the Noto Peninsula earthquakes in March (Noto Hanto Earthquake) and off Niigata in July (Niigata-ken Chuetsu-Oki Earthquake) caused severe damage to coastal industries and the livelihoods of numerous people in central Japan. However, the active faults responsible had not been clearly imaged before the earthquakes occurred. In fact, the distribution of these active faults has not yet been accurately determined because the coastal area remains generally underexplored and is normally presented as an investigation gap. Investigations of such coastal areas have been hampered because conventional research vessels are too large to conduct operations in nearshore shallow coastal waters and because most coastal plain areas are heavily urbanized, which restricts the amount of terrestrial domain fieldwork that can be carried out. This investigation gap between terrestrial and marine domains impedes the recognition of active faults distribution and must be eliminated.

Since 2008, the Geological Survey of Japan (GSJ) of the National Institute of Advanced Industrial Science and Technology (AIST), which plays an important role in understanding the national land use of Japan, has been engaged in a new project known as “Geology and Active Fault Survey of the Coastal Area” aimed at supplementing coastal zone geological information. The eventual goal of this project is to obtain sufficient information to produce seamless geological maps for densely populated coastal areas where active faults pose potential threats, while also

contributing to earthquake disaster risk information related to important infrastructure and industrial sites in the same coastal areas.

In the first five-year phase (2008-2013), multidisciplinary marine geology and geophysics surveys (high-resolution reflection seismic profiles along with gravity and magnetic anomalies, etc.) were conducted in marine domains. In the same period, terrestrial domain outcrop and drilling investigations were conducted in the coastal areas of Noto Peninsula (Ishikawa Prefecture, central Japan) in 2008, the Echigo plain (Niigata Prefecture, central Japan) in 2009, Hakata Bay (Fukuoka Prefecture, southwest Japan) in 2010, Yufutsu Plain (Hokkaido, northern Japan) in 2011-12, and Suruga Bay (Shizuoka Prefecture, central Japan) in 2013. These new results were then integrated with fundamental data collected in previous investigations.

In this project, we strived to obtain reliable information on factors such as the continuity and activity of active faults and the properties of unconsolidated sediments by using a wide range of survey methods in both the terrestrial and marine domains along selected coastal areas. The resulting data and results for each region were sequentially published as the *Seamless Geological Map of Coastal Zone* for each region.

A succeeding three-year phase of the coastal area investigation that began in 2014 dealt with the southern part of the Kanto plain (i.e., Boso Peninsula) of central Japan, and was aimed at obtaining a better understanding of geological factors, especially around the metropolitan areas. Bound by the Sagami Trough to the southwest and the Japan Trench to the east, the complicated tectonic structure of the Boso Peninsula exists in a region where the Philippine Sea and Pacific plates both subduct westward beneath the Tokyo metropolitan area. In that phase of our investigations, high-resolution seismic profiling surveys, sediment sampling, geophysical surveys and the compilation of existing data on the Boso Peninsula were carried out, thus providing fruitful geological information and detailed knowledge regarding the distribution and continuity of the geological structures along the coastal area of east Boso Peninsula.

These data and results have been summarized and will be published as *the eastern coastal zone of the Boso Peninsula* following the Seamless Geological Map of Coastal Zone map series. As our results have provided critical information regarding the distribution and continuity of subsurface geological structures, we hope that they will be utilized for geohazard mitigation and urban planning purposes, including such uses as references when formulating the construction plans of infrastructure and industrial sites along coastal areas.

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- (3) Sedimentological characteristics of marine core samples obtained from east off Kamogawa, Boso Peninsula, central Japan, and reconstruction of late Quaternary paleoenvironmental changes, by T. Ajioka, N. Nishida and K. Ikehara

- (4) Sedimentary environments and basal topography of postglacial deposits in the Kujukuri coastal Plain, Boso Peninsula, central Japan by J. Komatsubara

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- (7) 1:200,000 Marine and land geological map of the eastern coastal zone of the Boso Peninsula and its explanation, especially with Quaternary crustal deformation, by Masanori Ozaki, S. Furuyama, T. Sato and K. Arai