

CHAPTER 2

METHODOLOGY

2.1 Sampling

2.1.1 Seawater

Seawater samples at 81 stations (Fig. 2-1) were collected during April-May 1996 on the MV Seafdec cruise. Water samples from at least two depth layers (surface and bottom) were collected using 2.5 liter Teflon coated General Oceanic Go-Flo samplers attached to a rosette and CTD. At stations 2, 3, 4, 5, 6, 17, 24, 26, 46, 51, 69 and 79, water at intermediate depths were also collected to study the vertical distribution of trace metals.

Water samples were immediately transferred in to 1,000 cm³ acid washed Nalgene polyethylene bottles and filtered on board within an hour after sampling, using in-line filtration apparatus with filtered compressed air, using Nuclepore 0.4 µm polycarbonate membranes. Filtered waters were collected in acid washed 250 cm³ Nalgene polyethylene bottles and acidified to pH 3 by Suprapure HNO₃ (Merck) and were analyzed for dissolved trace metals in the laboratory. At each depth, 1-litre of water was filtered and the filter membrane was collected in clean plastic box, stored at -20 °C for analysis of suspended particulate metal.

2.1.2 Sediment

Sediment samples at 81 stations were collected with a Smith McIntyre grab. Top portion sediments were collected with clean plastic spoon and stored in plastic zip lock bag at -20 °C.

2.2 Sample preparation

2.2.1 Seawater

Trace metals in water samples were preconcentrated using the cobalt-APDC (Ammonium-pyrrolidin-dithio-carbamate) coprecipitation technique (Boyle and Edmond, 1977, modified by Huizenga, 1981), (Appendix B).

2.2.2 Sediment

Sediment samples were freeze dried and lightly ground in an agate mortar and pestle to break down the particles. The sample were then sieved through 60 µm plastic mesh. Total decomposition method using hydrofluoric acid (HF) with concentrated oxidizing acids (aqua regia) was used. This method has the advantage because HF is the only acid that completely dissolved the silicate lattices and releases all the associated metals, such as Al, Fe and Li, used for the normalization of the data (Loring and Rantala, 1992), (Appendix B).

2.2.3 Particulate

Particulate samples on filtration membranes were decomposed and analysed with the same process as the sediment, but the volume of HF was reduced.

2.3 Sample analysis and quality control

Cadmium, copper, iron, nickel, and lead in the samples were measured using a Perkin Elmer Zeeman Graphite Furnace 4100ZL atomic absorption spectrophotometer. Merck standard solution of these metals diluted by Milli-Q water were used as standards. Certified reference materials CASS-2 of the Institute for Environmental Chemistry Canada, MAG-1 Reference Materials of the Geological Division, US Geological Survey USA and BCSS-1 of the National Research Council Canada were included in every batch of seawater, particulate and sediment samples, respectively, to ensure the accuracy of the results of dissolved, suspended particulate and sediment trace metals, respectively.



สถาบันวิทยบริการ
จุฬาลงกรณ์มหาวิทยาลัย

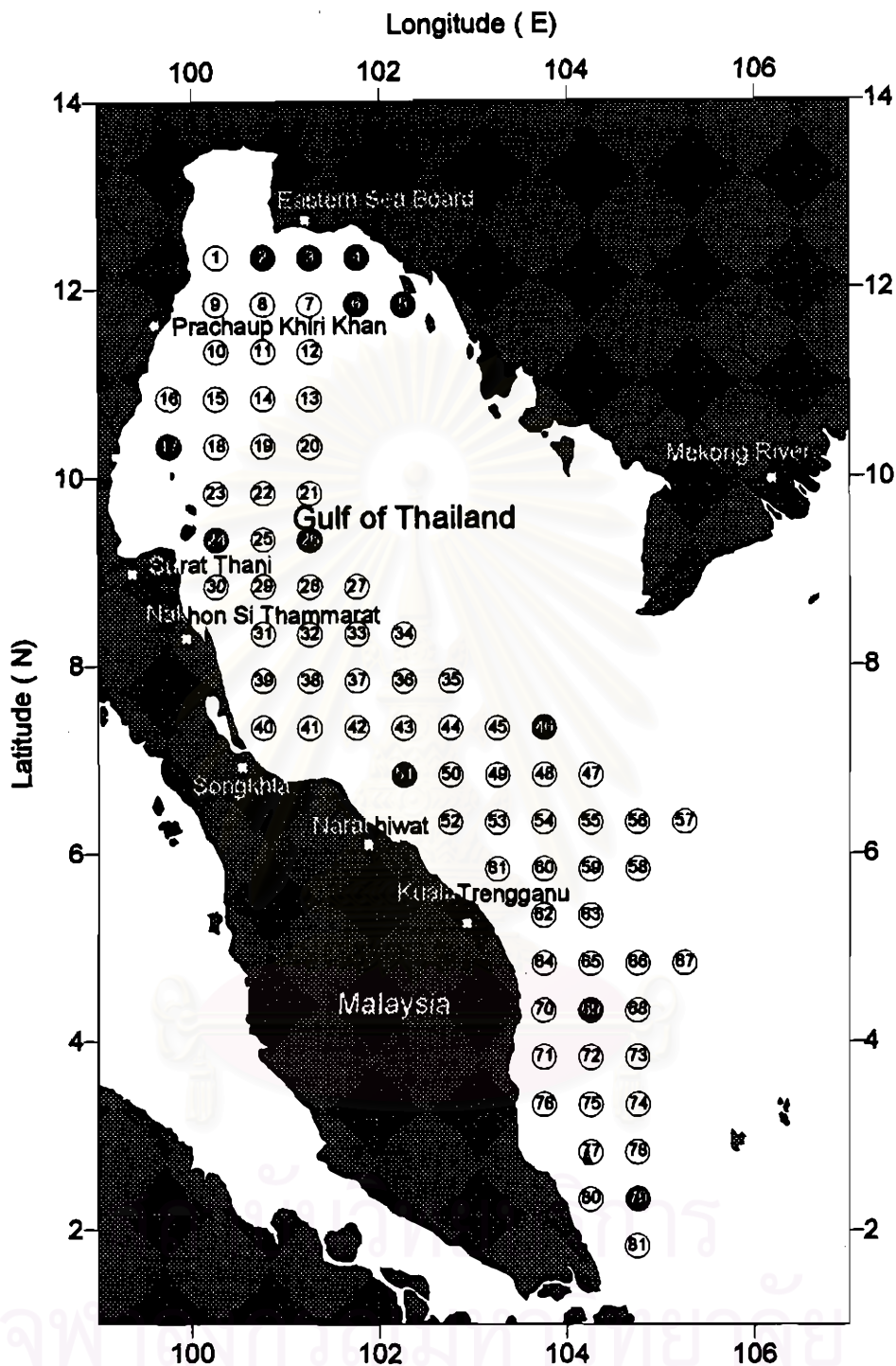


Fig.2-1. Sampling stations in the Gulf of Thailand and East Coast of Malay Peninsula (April-May 1996),

Stations in the dark circles were stations where samples were taken it more than two depths.