RESEARCH AND DEVELOPMENT OF DATABASE OF OIL EXPLORATION AND PRODUCTION

Mizuhiko Syoji, Yasushi Arakawa, Yuichi Maruyama[1]

[1]Earth Remote Sensing Analysis Center, 3-12-1, Kachidoki, Chuo-ku,

Tokyo 104-0054, Japan

Email: arakawa@ersdac.or.jp

ABSTRACT

ERSDAC, the Earth Remote Sensing Data Analysis Center, has conducted research and development aiming at application of Terra/ASTER (Advanced Space-borne Thermal Emission and Reflection Radiometer) to the field of natural resources and environment protection. The purpose of this study is to extract and evaluate the factors from many sources including remote sensing itself adding the valuable factors on the Terra/ASTER data for oil and gas exploration and production. Terra/ASTER is multi-spectral sensor that has 3 VNIR bands, 6 SWIR bands and 5 TIR bands with 15m, 30m and 90m spatial resolutions respectively. These functions are very useful for the many stages such as planning, preliminary, reconnaissance and detailed survey stage, of oil and gas exploration and development.

1. INTRODUCTION

The aim of this study is to extract the elements of database for oil and gas exploration and development of Sedimentary Basins. Three areas were chosen from arid, semi-arid and tropical rain forest regions. The basic concept of this database is developing with Terra/ASTER mosaic data as base-map and overlaying various layers on it (Figure 1.). More than 100 scenes of Terra/ASTER data were mosaiced. The data from various sources such as existing geological and geographical data were collected and digitized, vectorized and layered for these three basins. Also the various information interpreted from Terra/ASTER mosaic image was layered. Through this study, it becomes clear that Terra/ASTER image played an important role both as base-map and as data source.

2. METHOD

At first, various existing data listed below were collected and digitized or scanned.

- Plane data
  - Geological map, topographic map etc.,
  - Well location map, concession map, oil and gas fields etc.,
  - Gravity map, magnetic map, structure map, isopach map etc.,
  - Infrastructure (road, pipeline etc.,) etc.,

- Cross Section
    - Geological section, geological column etc.,
    - Seismic section
- Tables

The plane data with accurate coordinates were vectorised and layered. The data that do not contain the accurate coordinates, such as geological section and column and some tables, were also incorporated in the database. These data are linked and displayed on the computer.

Secondary, the Terra/ASTER mosaic images were photo-geologically interpreted and layered. The elements what extracted from Terra/ASTER images are as follows;

- Extracted data on exploration
    - Seismic lines, well location etc.,
- Extracted topographic data
    - Land coverage, drainage texture etc.,
- Extracted geological information
    - Geological information, surface structural information etc.,
- Infrastructure information
    - Road, pipeline etc.,

Once these data were stored as the GIS layer in the computer, the data and Terra/ASTER image can be handled easily. Necessary information is easily drawn from this database as any size. For oil and gas exploration and development, it is effective to show the data from any direction where interpreter wants. Also, to extract the potential area, GIS method should be considered.

3. CONCLUSION

As the published data is sometime limited in the Sedimentary Basins, because of their confidentiality and/or political matters, the interpretation map of geology and infrastructure derived from Terra/ASTER data is very useful for database construction. The database could be anticipated for applying to many stages of the oil and gas exploration and development.

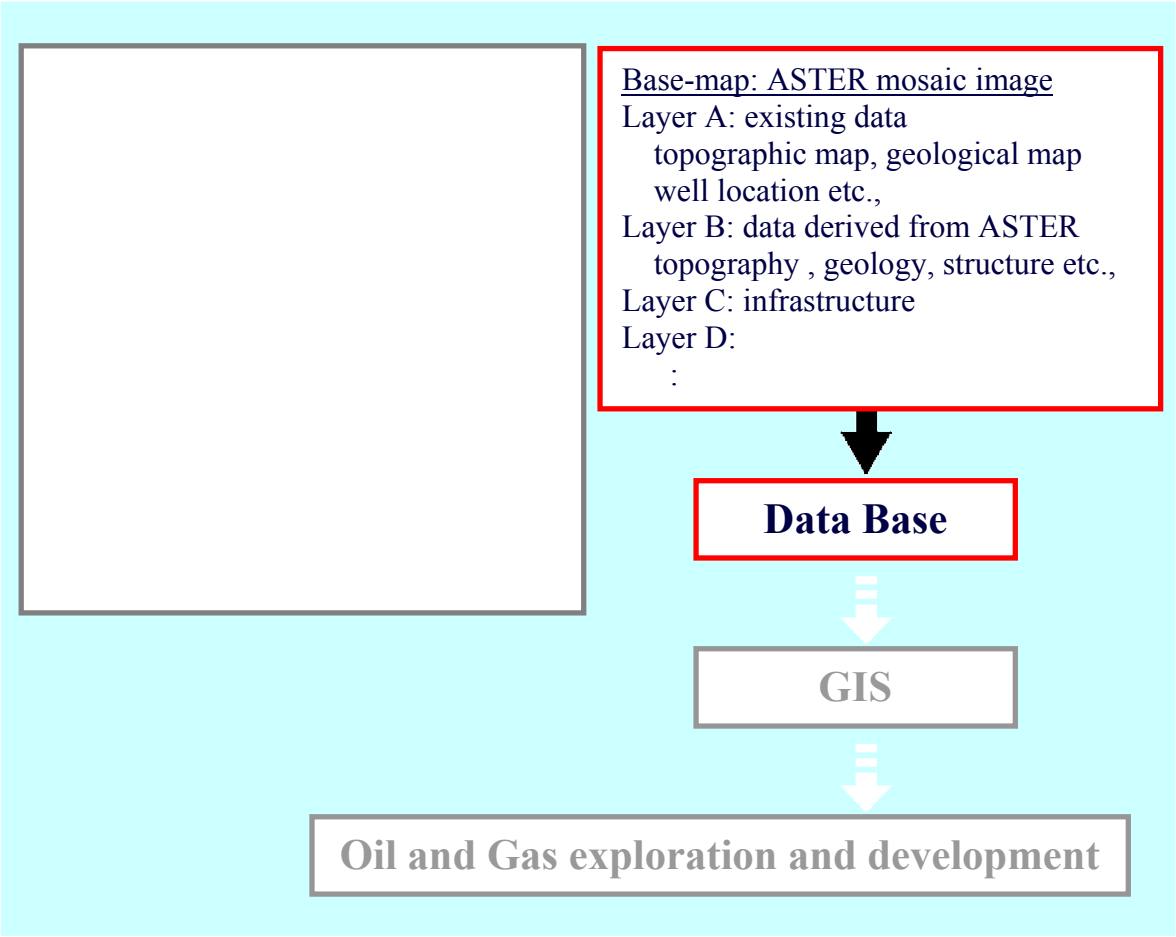

Figure 1. Schematic chart of the study