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Geospatial Data Availability for Haiti: An Aid in the Development of GIS-Based Natural Resource Assessments for Conservation Planning

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Cover photo: Landsat ETM+ mosaic courtesy of the Global Land Cover Facility (U.S. Geological Survey 2002).

Abstract

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This report documents the type and source of geospatial data available for Haiti. It was compiled to serve as a resource for geographic information system (GIS)-based land management and planning. It will be useful for conservation planning, reforestation efforts, and agricultural extension projects. Our study indicates that there is a great deal of geospatial information available for Haiti, both digitally georeferenced and hardcopy. The sources of geospatial information range from historical maps to recent satellite imagery and thematic maps. The types of information are described and their sources indicated with a series of 14 figures and 15 tables. The sources of information include personal correspondence and Internet and literature searches. The report represents a substantial amount of information and also indicates some gaps in available information. Information not documented in this report may have been missed in our search efforts or is nonexistent. Sources most likely to be missed include work in progress and local government or university work that is not widely distributed. The primary gaps in available geospatial information include information on soils and hazard assessments such as flooding and landslides, information on current conservation areas and practices, and information on wildlife and endangered species distributions.

Keywords: Haiti, remote sensing, conservation planning, GIS, geospatial data, reforestation efforts, watershed restoration.

Contents

Introduction

This report provides information on the sources and availability of geospatial data for Haiti to assist in natural resource assessments and planning. The report covers geospatial information on the watersheds, infrastructure, and natural resources of Haiti, with particular attention to data sets that cover the entire country and data sets that cover specific watersheds, including the uplands bordering the Dominican Republic in southeastern Haiti (the Mapou and Fonds-Verrettes areas). The report will facilitate the compilation of data to assist in prioritizing restoration efforts, determining what those restorations could or should entail, and in planning and implementing conservation and restoration action.

This report describes search efforts, data available, and references to assist in the acquisition of the data. Data descriptions include the following:

- Type of geospatial data available (i.e., topography, hydrology, infrastructure, land cover, soils, or political boundaries).
- Format of the data (i.e., hardcopy, digital, georeferenced, remotely sensed, aerial photo, or maps).
- Scale and extent of the data.
- Source, availability, and cost.
- Ancillary information (i.e., who compiled the data, how old it is, and how accurate it is).
- Utility (i.e., what kinds of information can be assessed from this data type that will be useful in conservation efforts).
- Gap assessment (i.e.,what information or type of information is lacking that would be potentially useful for planning and design of watershed restoration activities).

Background

Haiti is located in the Caribbean Sea on the island of Hispaniola (fig. 1), which it shares with the Dominican Republic. Haiti occupies the western third of the island (fig. 2) and has 8.4 million inhabitants and a population density of 300 people per km^2 (Canadian International Development Agency 2005). The area was populated by the Arawak Indians when Columbus arrived in 1492. From the 1500s to the 1700s, Hispaniola played a role as the testing laboratory for the introduction of new plant and animal species as well as a role as the Spanish administrative and military bastion. Much of what is now Haiti was cleared for the planting of sugar cane and coffee and the initiation of the plantation economy. With the plantation economy and the decline of the native Indian population, African slaves were brought to the island for labor.

Figure 1—Haiti in the Caribbean. Modified from Environmental Systems Research Institute, Inc. (ESRI) world data.

In the 17th century, the Spanish government lost control of the western part of the island to the French, who continued to import slaves in great quantities to keep up the production of sugar cane and coffee. After years of slave revolts, Haiti proclaimed its independence in 1804. It was the second European colony, after the United States, to do so.

Today, Haiti is the most underdeveloped country in the Americas. More than 70 percent of its population lives below the poverty line, most of them earning, on average, a dollar (US$1.00) per day (Canadian International Development Agency 2005). Part of this poverty is a result of the deforestation, land degradation, and soil loss that has continued throughout centuries. Haiti's forests covered only about 1 percent of the total land area in 1995 (FAO 2003). Heavy rainfall continually results in devastating floods, causing further erosion of fertile lands. The country has incurred a large external debt (US$1.2 billion) to provide for its basic necessities (World Facts Index 2004).

Figure 2—Major cities of Haiti. Modified from The Nature Conservancy public access data.

Summary of Data Available and Its Potential Uses

The findings of this report are divided into five main sections: "Topographic maps," "Satellite Imagery," "Aerial Photography," "Vector and Additional Raster Files," and "Maps." Each section contains a brief introduction with a description of the type of data and its applications. After each section's introduction, the sources are identified and described with the products found for Haiti identified for each particular source. The Internet addresses of the sources are given in appendix 1 table 1.

Topographic Maps

Topographic maps are useful tools in which surface relief is represented by contour lines. Topographic maps can also portray political boundaries, drainage, vegetation, populated places, cultural features, roads, and railroads. The scale of the map will determine the amount of detail it will have. Topographic maps are most often used as general reference maps. However, they can be used for the identification of slopes, valleys, sinkholes, and other topographic features and applied to urban

planning, military defense, emergency and disaster response, and other uses. These maps have the advantage of incorporating topographic and general descriptive features that are very similar regardless of who produced them or what part of the world they are from, making them indispensable as a startup geographical reference. Ultimately, they can be used to produce vector data through digitalization methods.

Two Internet Web sites for topographic maps are (1) Omni Resources map catalog and (2) East View Cartographic. Both Web sites are online map catalogs where you can buy digital georeferenced versions of existing topographic maps from the entire world, among other products. Another source for topographic maps is (3) The Nature Conservancy (TNC).

1. The Omni Resources[1] Map Catalog Web site is an online store of hardcopy and digital maps from different sources worldwide. For Haiti, the site has a countrywide set of 92 1:50,000-scale topographic maps from the National Geospatial-Intelligence Agency (fig. 3). The maps are sold as individual paper sheets, nongeoreferenced digital, or georeferenced digital format. The georeferenced version is priced at US$50 each. For a list of the maps and prices refer to appendix 1 table 2. Omni Map has two other sets of topographic maps available for Haiti with resolutions of 1:250,000 (countrywide) and 1:12,500 to 1:10,000 (8 cities only). These maps are only available in hardcopy.

2. The East View Cartographic online store sells a vast range of maps, books, and other cartographic resources. For Haiti, it contains topographic maps from different sources and at different scales. All sources and specifications are documented on the Web site (app. 1 table 3). There are topographic maps at scales of 1:1,000,000, 1:500,000, 1:250,000, 1:200,000, 1:50,000, 1:12,500, and 1:10,000. However, the 1:12,500- and 1:10,000-scale maps are not available for the entire country. The 1:50,000 scale or greater is well suited to watershed-scale planning in a relatively small country like Haiti. Prices range depending on the resolution, source, and format (app. 1 table 3).

3. The Nature Conservancy (TNC) is an international nonprofit organization whose mission "is to preserve the plants, animals and natural communities that represent the diversity of life on Earth by protecting the lands and waters they need to survive" (The Nature Conservancy 2005). The Nature

[1] The use of trade or firm names in this publication is for reader information and does not imply endorsement by the U.S. Department of Agriculture of any product or service.

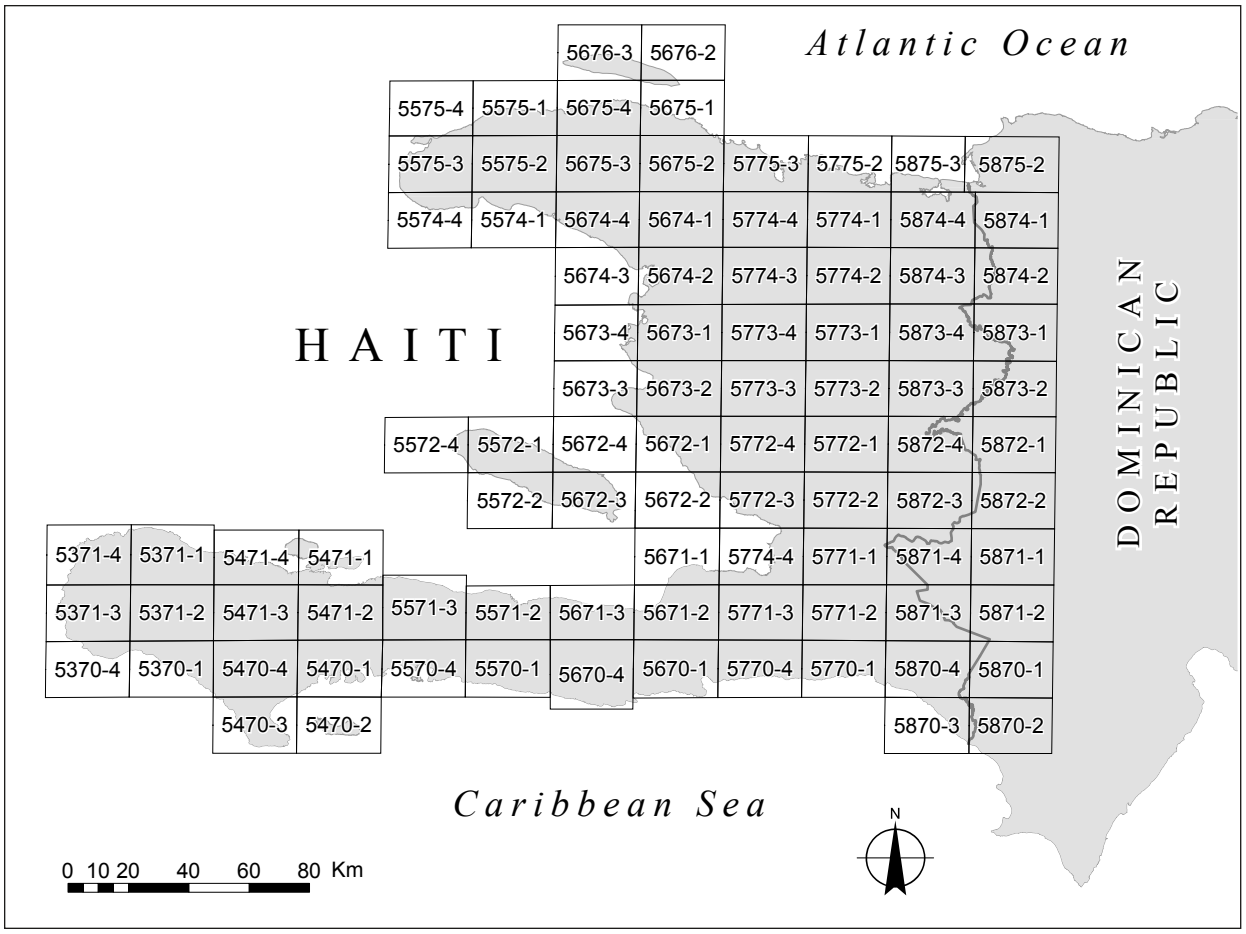

Figure 3—Omni Resources topographic index for Haiti. Modified from Omni Resources online index map.

Conservancy acquired 1:50,000 georeferenced digital topographic maps for most of Haiti (fig. 4). However, this set is not complete. The southern part of the island, between the east part of the Sud department and west part of the Nippes department, is missing. These maps as well as an index vector file can be accessed free of charge through a TNC file transfer protocol (FTP) address obtained from TNC after filling out their disclaimer form (app. 2).

Satellite Imagery

In the last 30 years, satellite imagery has become one of the most important tools for the development of geospatial data and a powerful tool for natural resources assessment. Satellite images are raster images collected from satellites. The type of sensor onboard the satellite determines the type of information the image portrays.

There are a number of different satellites and therefore a wide range of satellite imagery products available. Each satellite has its own specifications and products. Satellite imagery can be obtained either by procuring a special-order mission from

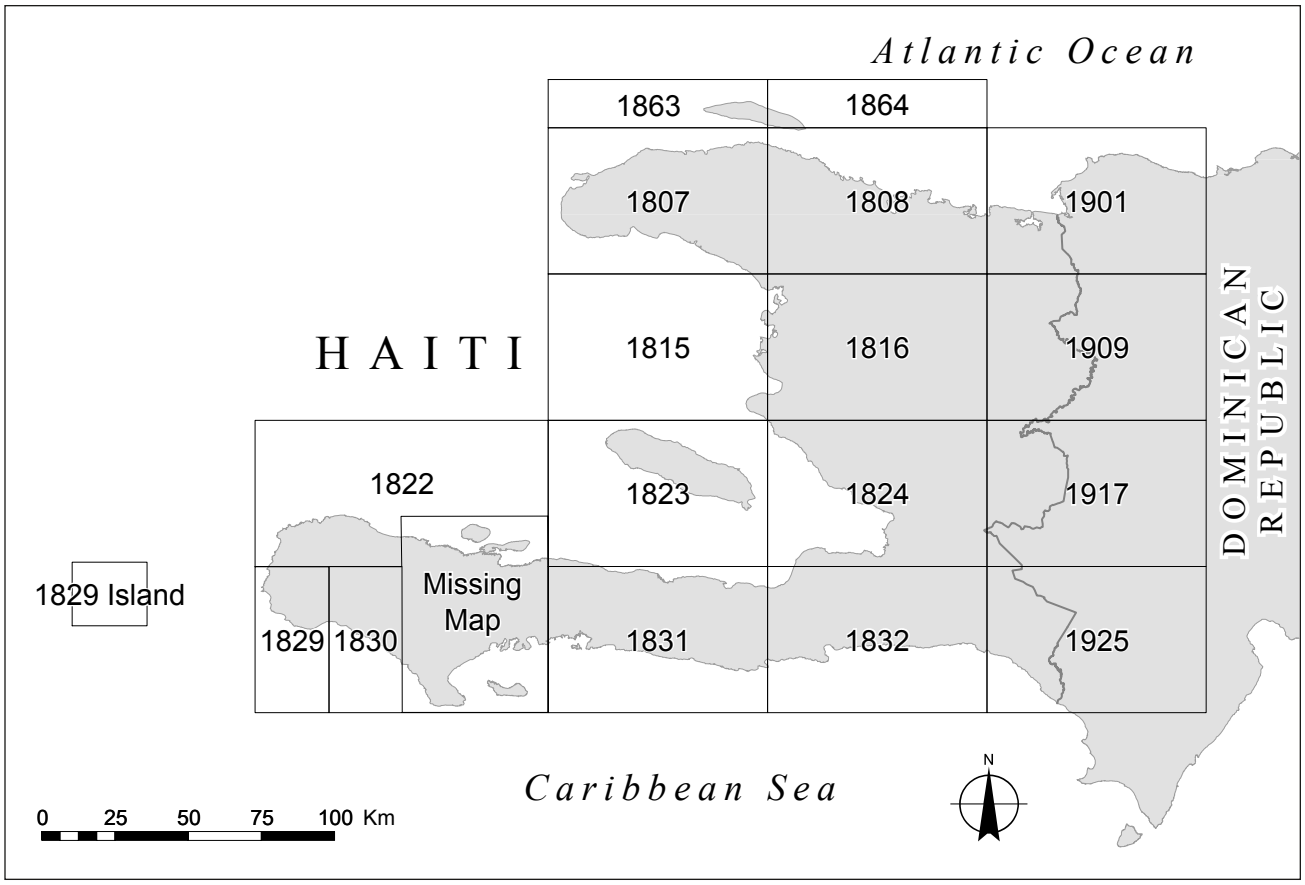

Figure 4—The Nature Conservancy's topographic map index. Modified from The Nature Conservancy public access data.

a satellite imagery company or by purchasing archived images that have already been collected by the satellite during past missions.

In a special-order mission, the desired specifications for the satellite imagery (such as geographical area and maximum cloud cover percentage per scene) are provided to the company. The satellite is then programmed to acquire new imagery with the required specifications over a period of time. After collecting all the imagery, some preprocessing is typically done before final delivery of the product. Satellite companies usually offer different levels of preprocessing depending on the user's needs and budget. Note that special-order missions are more expensive than archived images. Also, the waiting time will be longer, as the images need to be collected, preprocessed, and assessed for accuracy.

Online satellite imagery catalogs are very common and convenient tools. They offer a selection of archived images already collected by satellites in past missions. Some online catalogs provide images from more than one satellite. These catalogs use a graphic interface, which enables the user to perform a search for images and

products by using a wide selection of criteria options such as country or region, percentage of cloud cover, date, quality, angle, and other parameters depending on the company or agency. The images can also be previewed before ordering.

Optical—

Multispectral—Optical multispectral satellite sensors collect a certain range from the electromagnetic spectrum and record the intensity of that particular range as pixel values. Each range creates one image. The images for each band can be displayed together by using image processing software, with each band displayed in different colors to create true or false color images that can enhance certain features of the landscape depending on how they are combined. Multiple bands can be analyzed by using principal components analyses or other multivariate statistical processes to assess similarity between pixels and to classify images.

The research and management applications of optical multispectral satellite images depend on their spatial (pixel size) and spectral (number of bands) resolution of the collected images. For the purpose of this report we classified the multispectral satellites by spatial resolution. Low-spatial-resolution satellites include AVHRR and MODIS, medium-spatial-resolution satellites include Landsat MSS, Landsat TM, Landsat ETM+, EO-1 ALI, and SPOT 5, and high-spatial-resolution satellites include IKONOS, Orbview, and QuickBird. For sensor specifications refer to appendix 1 table 4.

Low-resolution images are characterized by a footprint of several hundred square kilometers, typically with a high revisit capability that offers permanent monitoring of environmental phenomena on a regional or global scale. In some cases, low-spatial-resolution satellites have the capability to collect more bands within the electromagnetic spectrum, therefore, producing images with a larger spectral resolution (i.e., MODIS). This allows better analyses of vegetation and soil properties by using multispectral indexes or other unique band combinations that enable the identification of environmental patterns and that can enhance the identification of landscape features.

Medium-resolution images typically offer a balance between spatial and spectral resolution. Most multispectral medium-resolution sensors collect seven or more bands of spectral information. This makes them suitable for vegetation and soil indexes for identifying environmental patterns. However, because the footprint of these images is smaller and the revisit capability is lower, they are less appropriate for large regional or global monitoring. Instead, they are often used for local to regional-scale observation of environmental phenomena such as land cover and detection of land cover change.

High-resolution images have a very high spatial resolution, usually ranging from less than 1 m to 5 m pixel size. They often (but not always) have lower spectral resolution and are typically 5 bands: one panchromatic (black and white), three bands in the visible part of the spectrum (blue, green, and red), and one near-infrared band. The high spatial resolution permits the identification of metric and submetric objects on the landscape, extraction of detailed information for urban planning, urban forestry, geomarketing, and defense, and texture analysis for forestry and agricultural applications.

Several online catalogs were searched to assess the availability of multispectral images for Haiti including (1) U.S. Geological Survey (USGS) Earth Explorer, (2) Global Land Cover Facility (GLCF) Earth Science Data Interface (ESDI), (3) Spot Image SIRIUS, (4) Space Imaging CARTERRA online, (5) Digital Globe Archive, and (6) ORBIMAGE online archive. An additional source of satellite images for Haiti is (7) The National Geospatial-Intelligence Agency, Web-Based Access and Retrieval Portal (WARP).

1. The USGS Earth Explorer is an online catalog where different types of geospatial data can be purchased. Although Earth Explorer contains data mainly for the United States, some satellite imagery can be obtained for other parts of the world. However, some products are available only to approved USGS researchers. For a list of prices of USGS Earth Explorer products, refer to appendix 1 table 5. A Haiti imagery search produced results for the following satellite sensors: AVHRR, Landsat MSS, Landsat TM and Landsat ETM+ images for the whole island, and EO-1 ALI images for parts of the island (fig. 5). For a full list of products available for Haiti from Earth Explorer, refer to appendix 1 table 5.

2. The GLCF is a project from the University of Maryland Institute for Advanced Computer Studies that focuses on the study of land cover change in local and global scales. The project aims to provide remotely sensed satellite data and products through their Earth Science Data Interface (ESDI) for the study of land cover change. These online data sets are available to download for free from FTP links provided in ESDI.

   Haiti images were found from the following satellites: AVHRR, MODIS, Landsat MSS, Landsat TM, and Landsat ETM+. Countrywide coverage was found for all of these satellites, with corresponding metadata describing image preprocessing. For the Landsat TM and ETM+ satellites, both individual images and mosaics that cover a larger area are available. The Landsat TM mosaic was produced from images from the years 1985 to

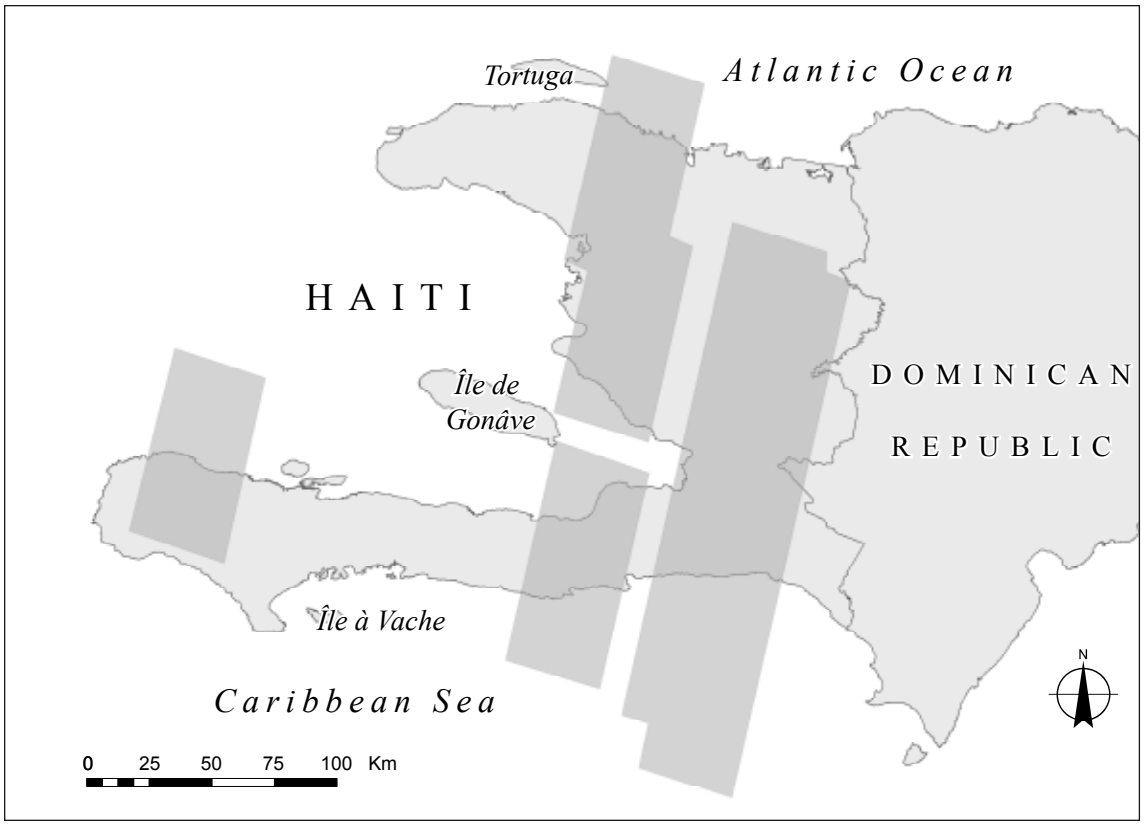

Figure 5—Archived EO-1 ALI satellite image coverage (dark grey area) of Haiti on the USGS Earth Explorer online archive. Modified from the USGS Earth Explorer online archive search results map (U.S. Geological Survey 2005).

1993, and the Landsat ETM+ mosaic was produced from images that range between the years 1999 and 2002.

3. Spot Image is the company that launched the SPOT series satellites. Their online archive, called SIRIUS, stores archived images from past missions that can be purchased from within the catalog. The catalog archives images from all SPOT satellites. For a list of prices as of December 1, 2005, refer to appendix 1 table 6. For Haiti, archived images were found for most of the country from different dates and SPOT satellites (fig. 6).

4. CARTERRA is the online archive for Space Imaging, the company that launched the IKONOS satellite. CARTERRA has images available from the IKONOS satellite and the Indian Remote Sensing (IRS) system satellites 1C and 1D. Through a partnership with Antrix Corporation, Limited, a division of the Indian Space Research Organization (ISRO), Space Imaging has exclusive marketing and distribution rights for IRS satellite imagery outside India (Space Imaging 2005a). Prices were not provided in Space Imaging's Web site; instead it instructed the user to contact customer

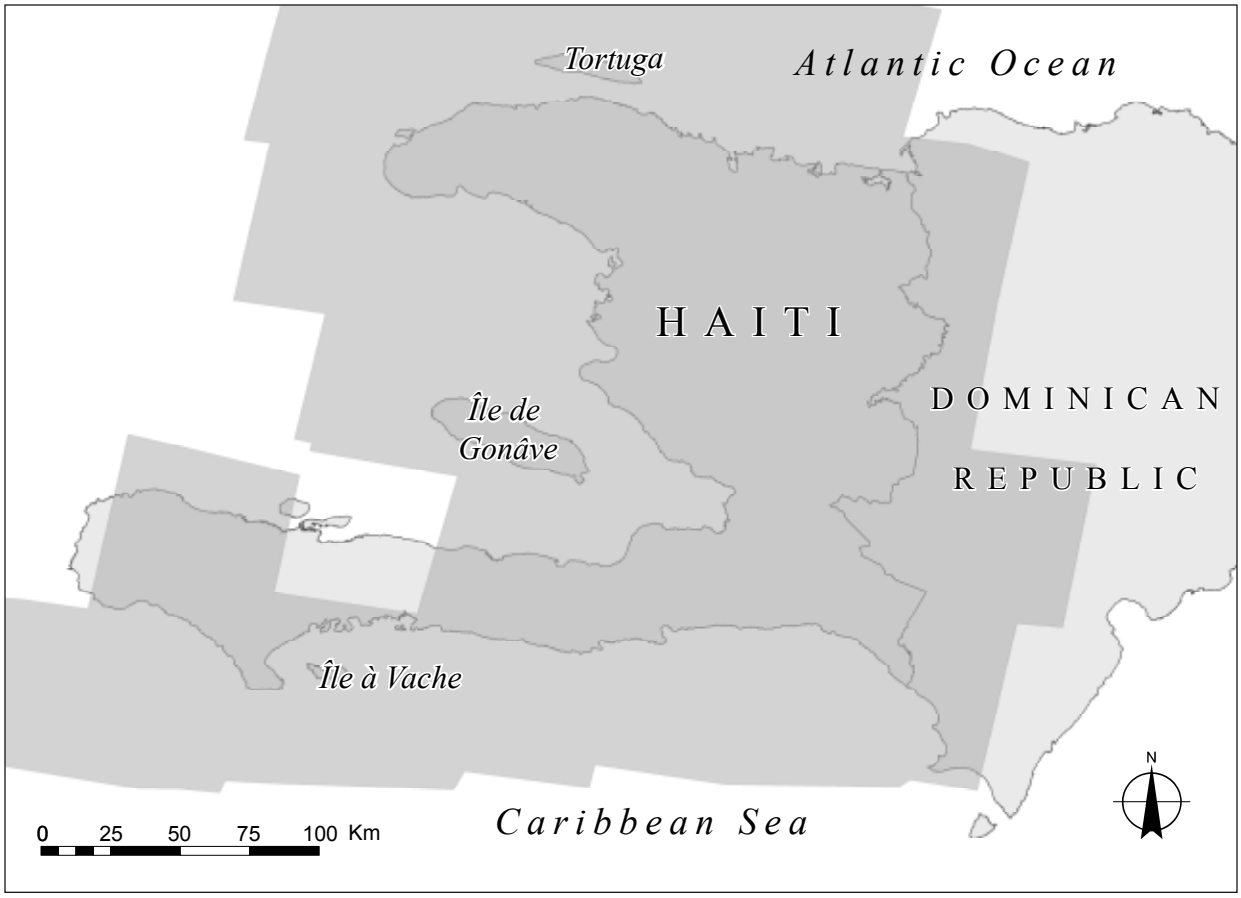

Figure 6—Archived SPOT satellite images coverage (dark grey area) of Haiti on SIRIUS. Modified from SIRIUS search results map (SPOT Image 2002).

service or a sales representative from an authorized reseller. However, the Web site for LAND INFO Worldwide Mapping, LLC, a Space Imaging authorized reseller, has price quotes for images of various parts of the world including the Caribbean. Similar Web sites of other resellers showed the same prices. For the IKONOS product prices provided by the authorized resellers, refer to appendix 1 table 7. For IRS 1C/1D product prices from LAND INFO Worldwide Mapping, LLC, refer to appendix 1 table 8.

A search for Haiti imagery within CARTERRA resulted in IRS 5-m-resolution panchromatic images (fig. 7) and IKONOS 1-m panchromatic/4-m multispectral images (fig. 8). Archived images for neither satellite cover the entire island, although the IRS images cover most of it.

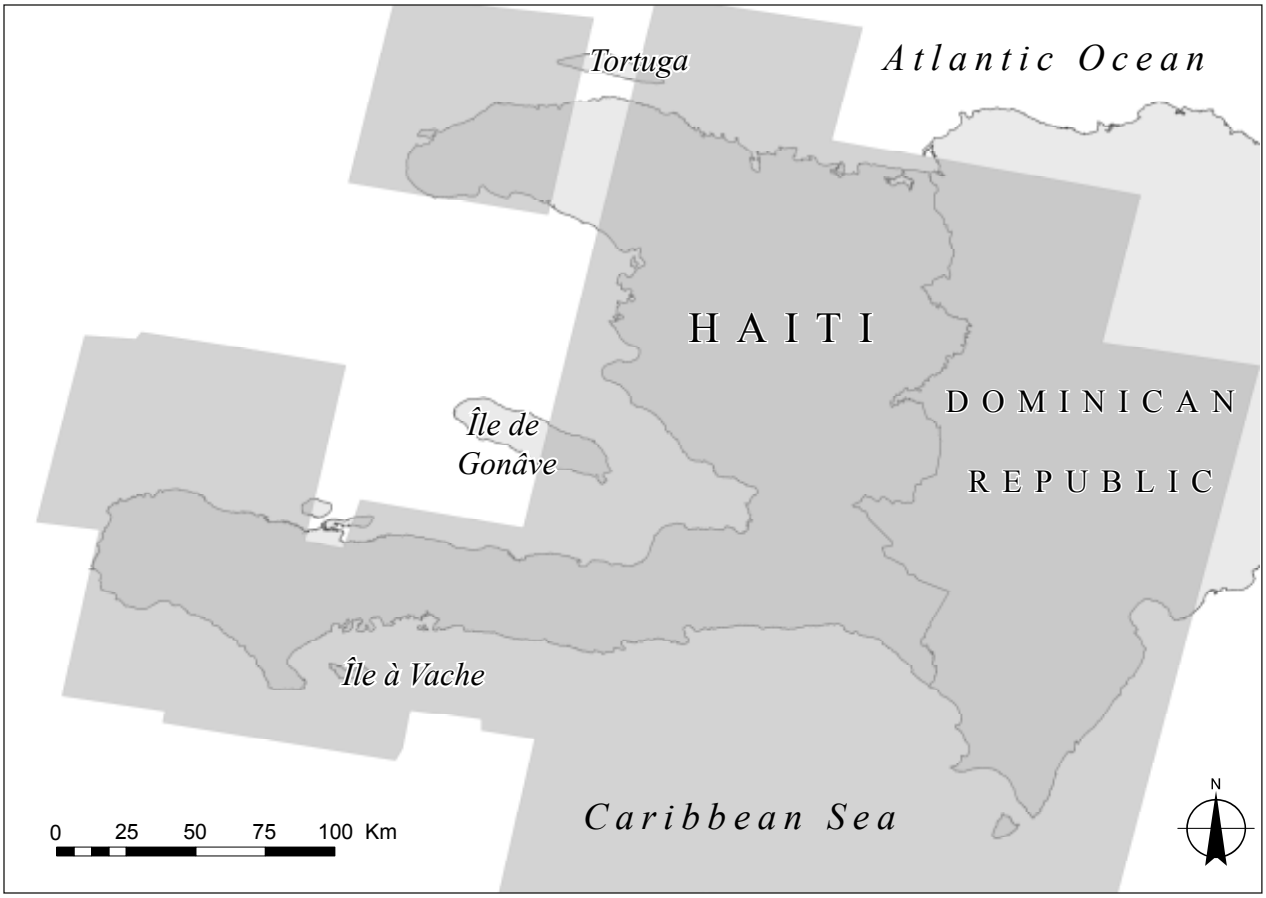

Figure 7—Archived IRS satellite images coverage (dark grey area) of Haiti on CARTERRA. Modified from CARTERRA search results map (Space Imaging 2006).

5. Digital Globe's Image Library stores images from past missions of their QuickBird satellite. Prices were not provided in Digital Globe's Web site; instead it instructed the user to contact customer service or a sales representative from an authorized reseller. Price quotes were found in the Web site for LAND INFO Worldwide Mapping, LLC, also an authorized reseller for QuickBird imagery. For a list of prices, refer to appendix 1 table 9. Images are available for most of Haiti as shown in figure 9.

6. The ORBIMAGE online archive stores images from the OrbView satellite. For a list of prices, refer to appendix 1 table 10. For Haiti, only single-band panchromatic images were available and only for a few areas of the island (fig. 10).

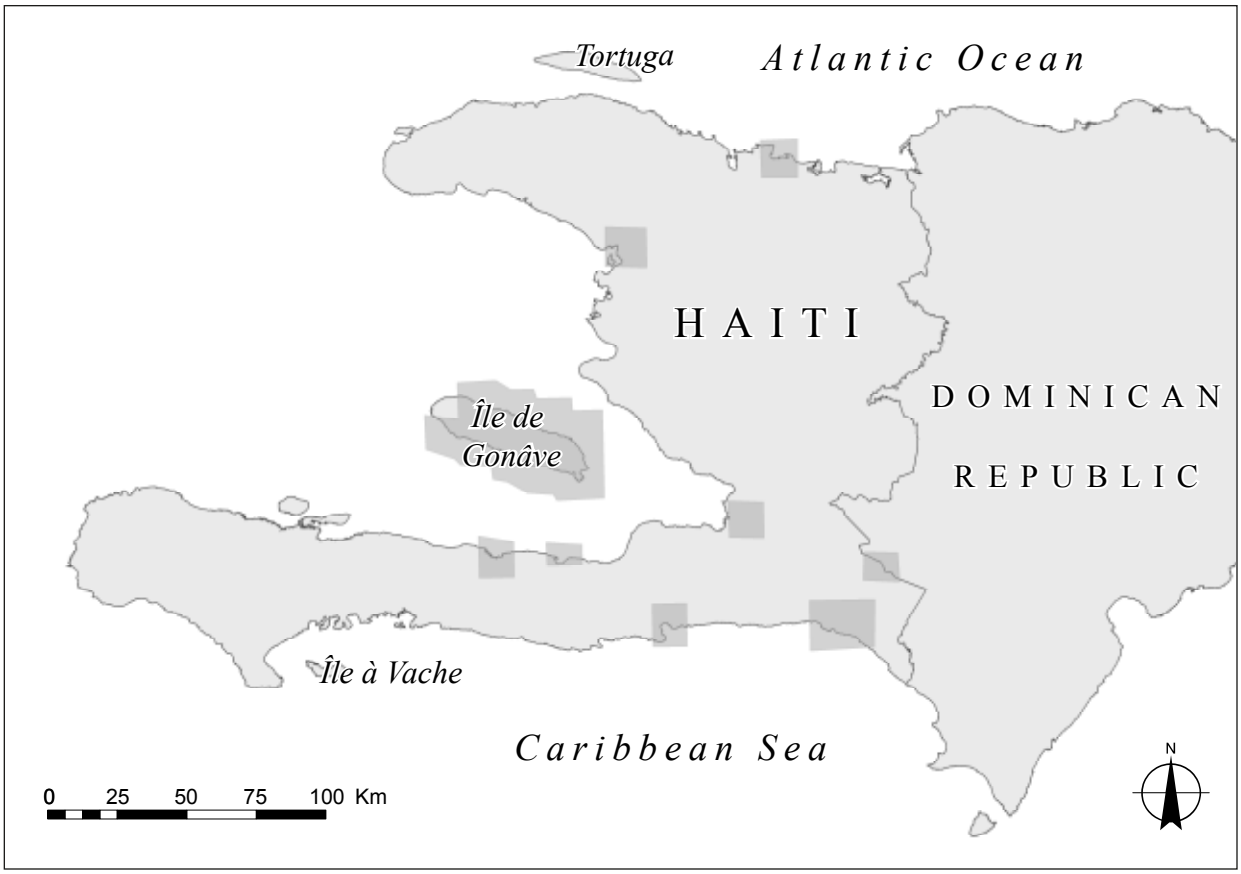

Figure 8—Archived IKONOS satellite images coverage (dark grey area) of Haiti on CARTERRA. Modified from CARTERRA search results map (Space Imaging 2005b).

7. The WARP is a system funded by the National Geospatial-Intelligence Agency to store and facilitate access and processing of U.S. government information. The portal is intended for U.S. federal agencies only, restricting its access to U.S. federal agency employees.

   The portal has four IKONOS—two panchromatic and two multispectral—and four OrbView images for Haiti. The IKONOS scenes were taken December 16, 2005, and the OrbView images were taken June 29, 2005. In addition to the Haiti images, the portal also has one Dominican Republic IKONOS multispectral and panchromatic image from August 12, 2000.

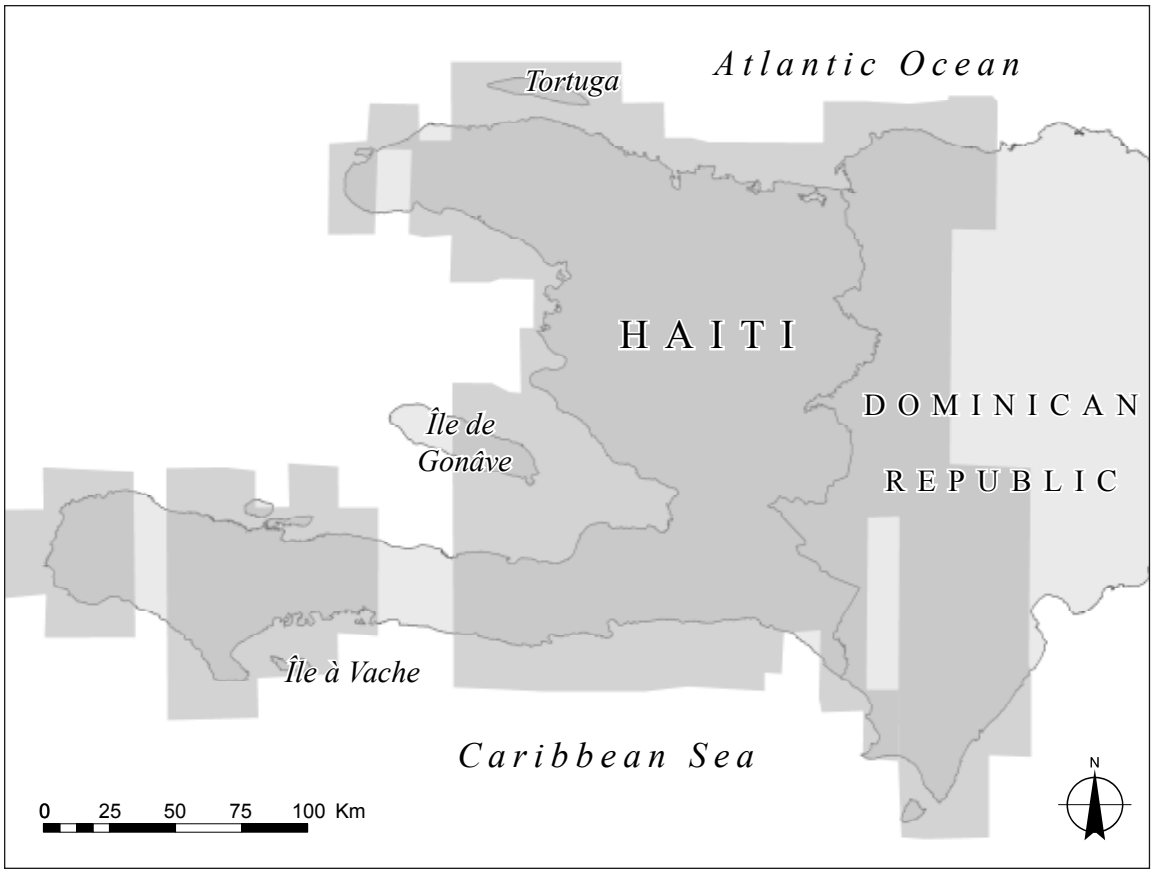

Figure 9—Archived QuickBird satellite images coverage (dark grey area) of Haiti on Digital Globe Image Library. Modified from Digital Globe Image Library search results map (Digital Globe 2005).

***Hyperspectral*—**Hyperspectral sensors follow the same principle as multispectral sensors. The main difference from multispectral sensors is that they collect hundreds of narrow ranges from the electromagnetic spectrum. This produces an image that contains hundreds of bands and millions of possible combinations. It is from these combinations that certain aspects of the Earth surface can be identified by a very specific and mostly unique grouping of bands. A specific band combination that uniquely identifies a homogenous aspect of the Earth's surface is called a spectral signature. Spectral signatures are what make hyperspectral images so useful in the remote sensing field. However, these images require a great deal of processing time and powerful and expensive computer equipment, which limits their usability within today's technological capabilities.

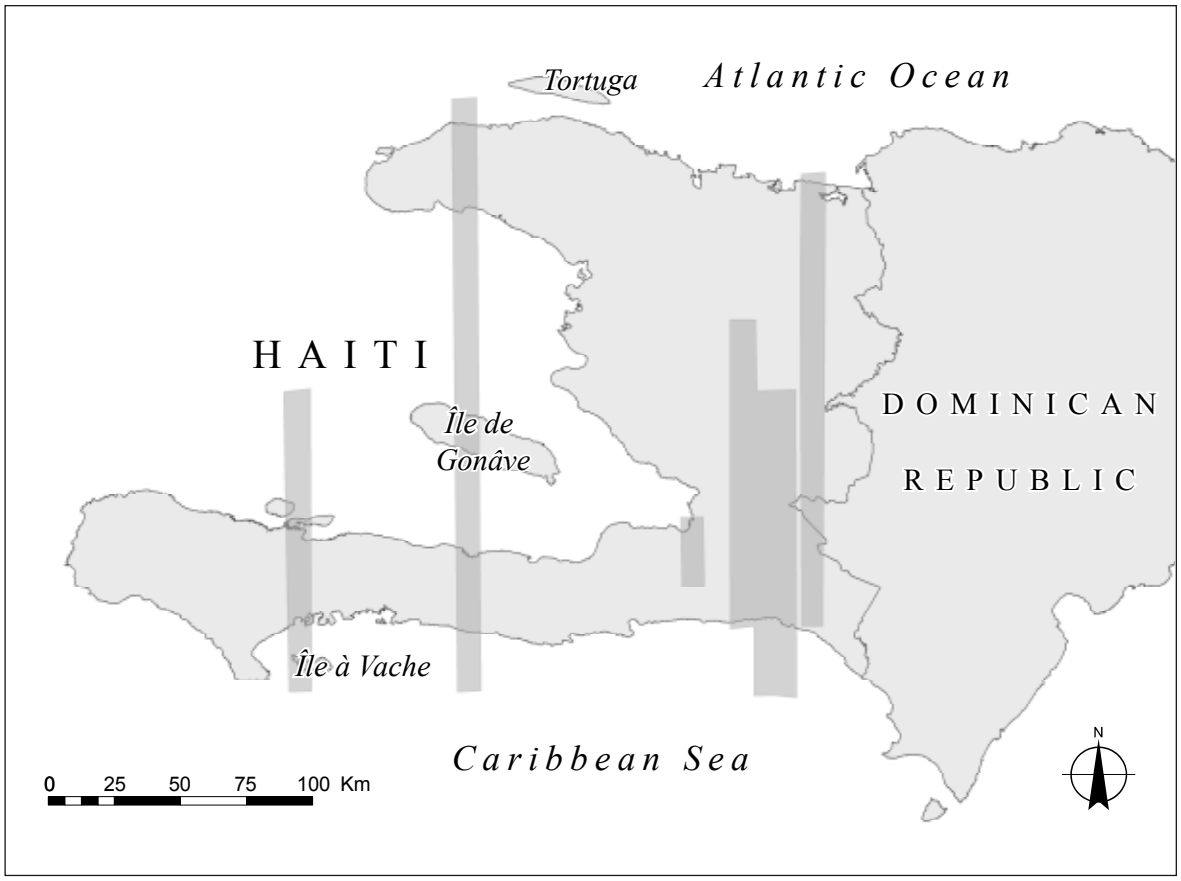

Figure 10—Archived OrbView satellite images coverage (dark grey area) of Haiti on the ORBIMAGE Online Archive Imagery Search Tool. Modified from ORBIMAGE Online Archive Imagery Search Tool search results map (ORBIMAGE 2005).

Some of the hyperspectral imagery applications include the identification of geological features and rock compositions, mineral detection and exploration for mining purposes, forestry and agriculture applications, and marine research and reef monitoring. Archived EO-1 Hyperion satellite images were found for Haiti in the USGS Earth Explorer online catalog.

1. The USGS Earth Explorer is an online catalog where different types of geospatial data can be purchased. For a full list of products available for Haiti from Earth Explorer, refer to appendix 1 table 5. For a list of prices of Hyperion scenes within the USGS Earth Explorer and as a special-order mission, also refer to appendix 1 table 5. Some archived images were found for Haiti, although they did not cover the entire country (fig. 11).

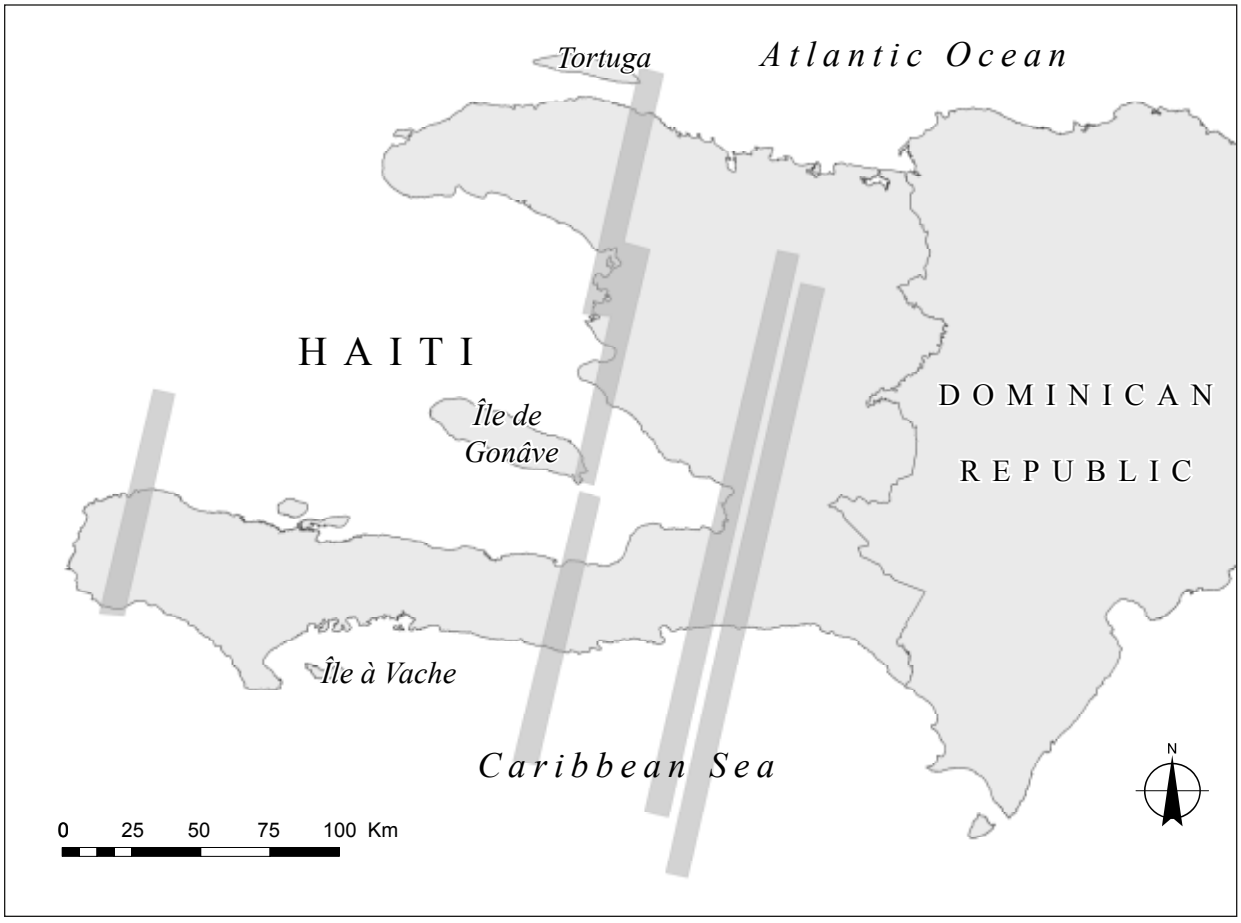

Figure 11—Archived EO-1 Hyperion satellite images coverage (dark grey area) of Haiti on the USGS Earth Explorer online archive. Modified from USGS Earth Explorer online archive search results map (U.S. Geological Survey 2005).

Radar—

Radar satellites function in the microwave region of the electromagnetic spectrum and fundamentally operate as a ranging instrument. The instrument emits pulses of microwave energy at regular intervals, which is then backscattered and recorded creating a two-dimensional image of the surface. The type of information that can be gathered from radar images depends on the type of sensor the satellite has. Radar images are primarily used for terrain mapping and have the benefit of being able to collect data through cloud coverage. Other uses for radar images include study of geology and hydrology; mineral and petroleum prospecting; detecting of surface movements, seismic activity, landslides, and subsidence; maritime applications such as surveillance of shipping and detecting of marine pollution; disaster management and mitigation of floods and forest fires; detecting changes owing to vegetation growth and variations in soil humidity; and defense and intelligence surveillance (Spot Image 2005).

Although radar images were not found for Haiti, the raster data from National Aeronautics and Space Administration's (NASA) Shuttle Radar Topography Mission (SRTM) (data available from the USGS) were created by using radar images that may be available. Also, as with satellites equipped with optical instruments, special-order missions can be made to collect images for user-specified areas, from satellites such as Radarsat, Envisat, and others.

Aerial Photography and Videography

Aerial photography had its beginnings in 1839 when the first aerial photo was taken from a balloon. Since then, aerial photos have come a long way with technologically advanced cameras and sensors that can be fitted into planes to take pictures and images of different kinds. The resolution of the photo or image depends on the height of the plane and the specifications of the camera lens or sensor used. Once taken, aerial photos can be scanned, rectified, and georeferenced for use in GIS and remote-sensing applications. Aerial photos are useful as a reference layer for image interpretation, texture analysis, urban planning, object identification, visual reference, and other uses.

Aerial videography is the recording of analog video footage from the surface. It is possible to take video footage of different regions of the spectrum (i.e., infrared) or with multiple bands. The spatial and spectral resolution depends on the type of equipment used. Global Positioning System (GPS) measurements can be recorded simultaneously during the flight to assign a location and elevation to the footage. Some of the applications of aerial videography are natural resource management, detection of forest insect and disease problems, analysis of hazardous waste sites, detection of soil conditions, water-quality studies, irrigation mapping, crop mapping, and condition assessment (Lillesand and Kiefer 1994).

No online data sources were found with these types of data for Haiti. However, there are aerial photos and videography available from the Unité de Télédétection et de Systèmes d'Information Géographique (UTSIG).

1. The UTSIG is a GIS and remote-sensing Haitian government unit under the Ministry of Planning and External Cooperation (Ministère de la Planification et de la Coopération Externe). Among UTSIG's data sets are two countrywide aerial photo sets—one taken in 1978 and the most recent in 2002—and videographic data collected in flights over Haiti protected areas: Pine Forest, Parc La Visite, and Parc Pic Macaya.

Georeferenced Vector and Additional Raster Files

Vector and raster files are two formats for representing geospatial data in digital format. In the vector format, information is provided as points, lines, or polygons. The raster format provides information in pixel values; generally this results in files larger than those in vector format. The pixel size of the image limits the resolution and amount of detail of the image. Most data can be portrayed in either raster or vector formats; however, some data are easier to work with in a specific format. Geographic information can be incorporated into both vector and raster data to be used as layers in a GIS. Applications of vector and raster files depend on the specific features they represent. For a complete list of vector files and additional raster files, refer to appendix 1 tables 11 and 12, respectively.

Five sources for vector and raster geospatial data were found including (1) Geo Community Web site, (2) Go Spatial online catalog, (3) USGS Seamless catalog, (4) TNC, and (5) GLCF ESDI.

1. The GeoCommunity Web site is a GIS online portal created for GIS, remote sensing and cartography professionals, students, and enthusiasts. The portal offers a wide range of relevant information, GIS data, and ways for users of geospatial data to interact. Among the amenities offered is an online catalog with geospatial data for the entire world that can be downloaded or ordered on CD. There are two download options for the catalog: a free-of-charge regular download and a monthly-fee premium download. Some data in the catalog are available for both types of downloads and some are only available for the premium option. For Haiti, the catalog has many vector files available from the Digital Chart of the World (DCW), Digital Terrain Elevation Data (DTED) in raster format from the National Imagery Mapping Agency (NIMA) and two Landsat TM and Landsat ETM+ satellite image mosaics for the years 1990 and 2000, respectively. For a complete list of files, refer to appendix 1 table 14.

   The DCW is an Environmental Systems Research Institute, Inc. (ESRI) product originally developed for the U.S. Defense Mapping Agency (DMA). The data were created by Environmental Systems Research Institute, Inc. (ESRI) by using DMA aeronautical charts, which emphasize important landmarks from flying altitudes. The GeoCommunity Web site distributes the DCW 1993 version at a scale of 1:1,000,000. The following topics were found for Haiti within the DCW: agricultural land cover,

transportation, hydrography, hypsography, and administrative and political boundaries. Note that at this scale, several details are lost. The metadata (GeoCommunity 2005) indicates that:

> The DMA data sources are aeronautical charts, which emphasize landmarks important from flying altitudes. This explains why there is a separate aeronautical theme with all conceivable airports, yet why on some themes small islands and lakes are simply unnamed points. ESRI, in compiling the DCW, also eliminated some detail and made some assumptions for handling tiny polygons and edge matching. Also, note that the completeness of the thematic categories present in each layer will vary.

2. The Go Spatial Ltd., Web site is an online store of geospatial data that provides vector data from different sources, satellite imagery snapshots, and DEMs. The vector files are sold in a Caribbean-wide package as compressed ESRI shape files (*.shp). The majority of the files are Vector Smart Map Level 0 (VMap0) data from the National Imagery and Mapping Agency, some point files derived from the GEOnet Names Server database, and other files from various public domain sources. The Web site also offers true color satellite imagery and shaded relief images supplied as JPEG (*.jpg) files, and 1-km DEMs in band-interleaved (*.bil) format. The raster data provided in JPEG format should only be used as visual reference and not as a data layer inside a GIS or remote sensing software, because this format does not support geographic reference tags or band layers. For a complete listing of available files and prices, refer to appendix 1 table 15.

   The VMap0 database provides low-resolution vector-based geospatial data at a 1:1,000,000 scale. The primary source for the database is the 1:1,000,000-scale Operation Navigation Chart (ONC) series co-produced by the military mapping authorities of Australia, Canada, United Kingdom, and the United States. The themes covered by the database include political boundaries, elevation, hydrography, industry, physiography, population, transportation, utilities, and vegetation. Data gaps may exist where source information is not available. VMap0 can be downloaded in its original format, vector product format (VPF), free of charge from the mapAbility Web site.

The GEOnet Names Server (GNS) is an online database of global place names from the National Geospatial-Intelligence Agency (NGA) and the U.S. Board on Geographic Names (US BGN). United States names can be found in another database and therefore are not included in this one. The GNS provides place names and their coordinates in text files, by area or search results, with a spreadsheet-like format that can be converted to point files by using GIS software. The online database is updated on a biweekly schedule, and the last modified date is included in the file for each of the names. However, it is noted in the Web site that "coordinates in the GEONet Names Server are approximate and are intended for finding purposes only" (National Geospatial-Intelligence Server 2005). There are no licensing requirements or restrictions in place for the use of the GNS data.

3. The Seamless Data Distribution System (SDDS) is an online catalog of GIS and remotely sensed data created or stored by the USGS and the Earth Resources Observation and Science (EROS) Data Center (EDC). Although the catalog is primarily aimed at the United States, it has some worldwide data. The only data found for Haiti was the SRTM 3-arc-second DEM with a 90-m resolution.

   The Shuttle Radar Topography Mission is a joint project between the NGA and NASA to produce digital topographic data for 80 percent of the Earth's land surface (all land areas between 60° north and 56° south latitude). The data for this project were collected by a satellite equipped with radar instruments. The images were collected from February 11, 2000, through February 22, 2000. Products from this mission include 1-arc-second (30-m pixel) DEMs, 3-arc-second (90-m pixel) DEMs, and 30-arc-second (1-km pixel) DEMs, with each product having different coverages (figs. 12, 13, and 14). The DEMs were generated with data points spaced every 1, 3, or 30 seconds of latitude and longitude.

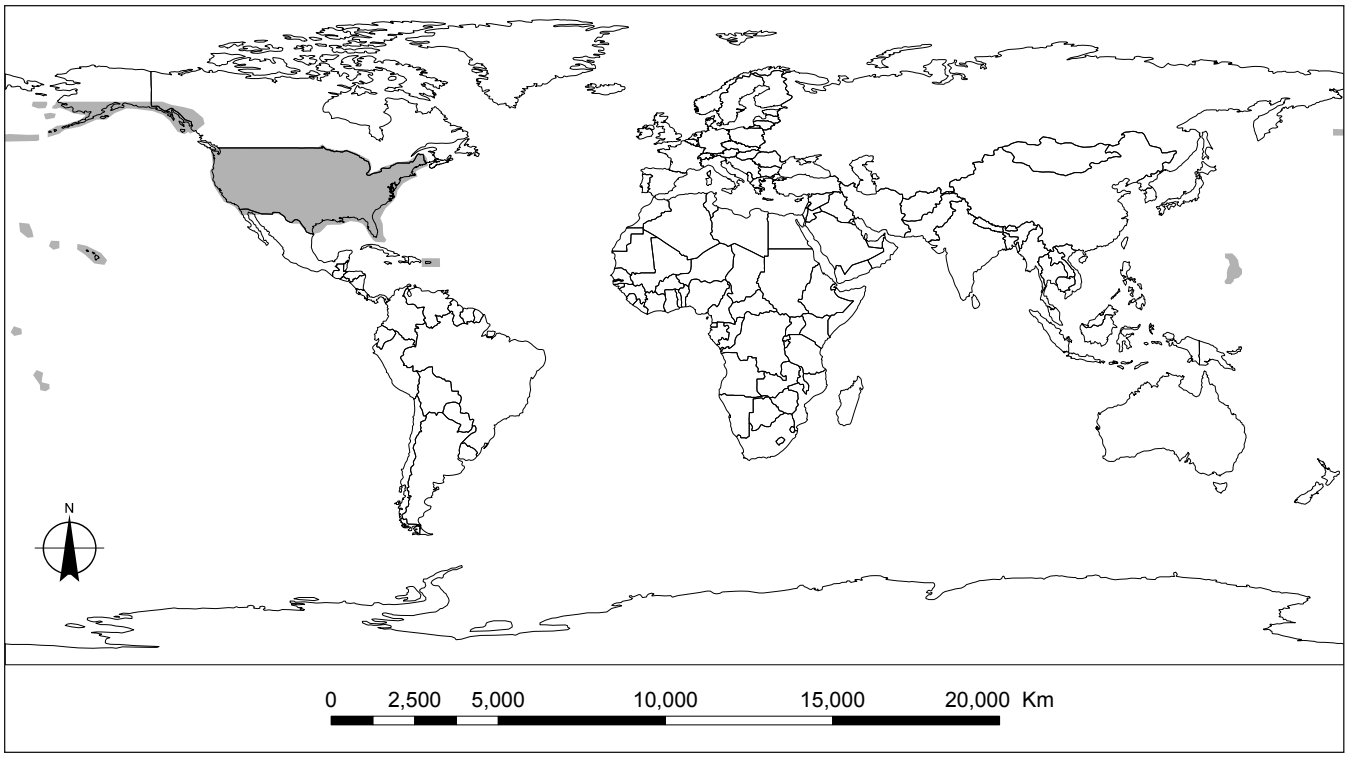

Figure 12—Shuttle Radar Topography Mission (SRTM) coverage (grey area) for 1-arc-second digital elevation models and derived products. Modified from Global Land Cover Facility SRTM figures (Global Land Cover Facility 2005).

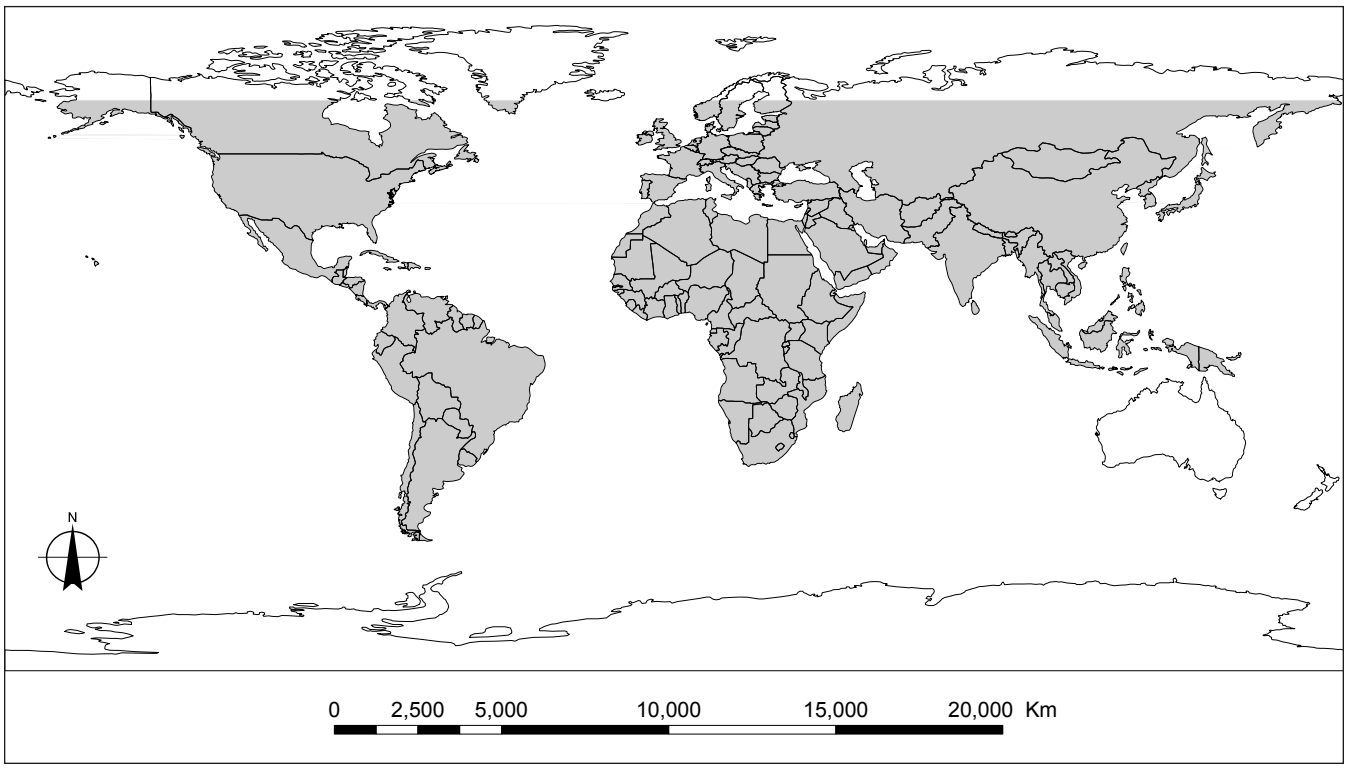

Figure 13—Shuttle Radar Topography Mission (SRTM) coverage (grey area) for 3-arc-second digital elevation models and derived products. Modified from Global Land Cover Facility SRTM figures (Global Land Cover Facility 2005).

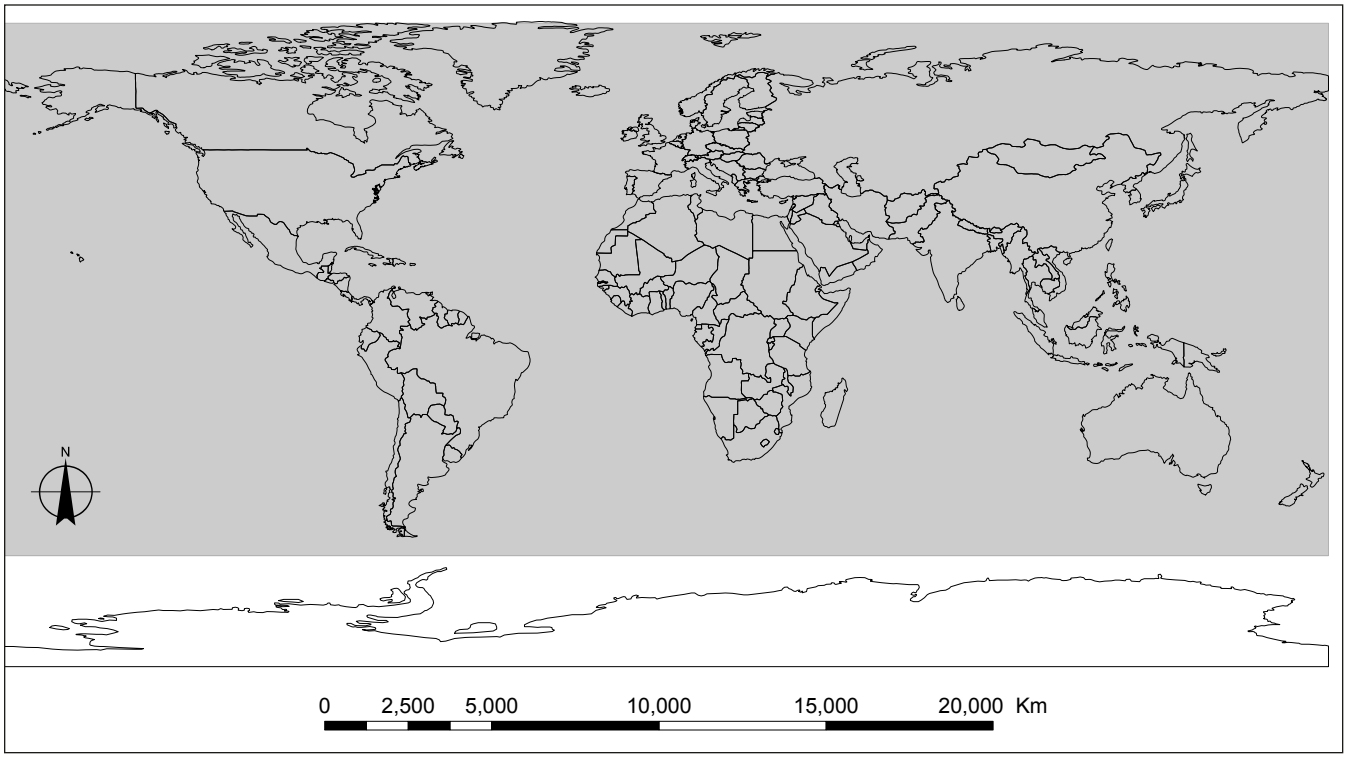

Figure 14—Shuttle Radar Topography Mission (SRTM) coverage (grey area) for 30-arc-second digital elevation models and derived products. Modified from Global Land Cover Facility SRTM figures (Global Land Cover Facility 2005).

4. The Nature Conservancy (TNC) has a range of vector and raster files available for Hispaniola Island. However, some data are only available for the Dominican Republic's side of the island, which might be useful when working with areas in the border between the countries. For a complete list of files for Haiti and the Dominican Republic, please refer to appendix 1 table 13. Geospatial data layers are most useful when accompanied by explicit metadata that indicate the sources, methods, accuracy, and date of the development of the geospatial information. Only a few TNC files had metadata, and the majority of these are for the Dominican Republic. This information is available from TNC free of charge. A TNC disclaimer form must be signed prior to download or use of this data (app. 2).

   The themes of TNC geospatial data that cover Haiti or all the Hispaniola Island include bathymetry, geoclimate, geology, SRTM products, hydrography, land cover, political divisions, and marine features.

5. The Global Land Cover Facility is a project from the University of Maryland Institute for Advanced Computer Studies that focuses on the study of land cover change in local and global scales. Through ESDI, GLCF provides free access to all their online data sets, which can be downloaded from FTP links.

   In addition to satellite images, some GLCF SRTM data were found for Haiti. The SRTM data found within ESDI were reprocessed and reprojected by GLCF. The reprocessing done to the original datasets included (1) converting all original data from SRTM raw format (*.hgt) to GeoTiff format, (2) making tiles of the 1-arc-second and 3-arc-second data to match the World Referencing System 2 (WRS2) tiling format that Landsat images are in, (3) re-projecting into UTM coordinates, and (4) creating a 30-arc-second SRTM-GTOPO30 global mosaic. Among the SRTM products found were a Caribbean 30-arc-second DEM, the global 30-arc-second DEM, and Haiti-wide coverage of 3-arc-second DEM tiles.

Maps

Hardcopy and scanned maps are a good source of information when other geospatial data are not available. Some maps have data that have not been released to the public, and others were manually produced (traditional cartography). Manually produced maps can be digitized and georeferenced to convert the data to a digital format that can be used with GIS and cartography software. In addition, some older maps have old information that can be used with recent data for land cover change detection.

The search focused on electronically available maps, but hardcopy maps and publications are available in libraries, universities, and other institutions, that have not been scanned or made publicly available via the Internet. Of the maps we found, the majority were simple maps with the coastal boundary and main cities indicated. In some cases there was topographic information, rivers, and lakes. Only a few more specialized maps were found. Four Internet map sources had specialized maps of interest: (1) Caribbean Geology and Tectonics Web site, (2) ConserveOnline, (3) Perry-Castañeda Library Map Collection, and (4) Caribbean Disaster Mitigation Project. All sites have free access to their map collections. Another source of maps and geodata is (5) UTSIG.

1. The Caribbean Geology and Tectonics Web site of Florida International University provides a place for the Caribbean geology community to share information. The Web site also aims to spread information about the geosciences in the Caribbean and adjacent areas. In their Gateway to Geological Information on the Caribbean, a Hispaniola-wide 1995 geological map was found (Draper et al. 1995).

2. ConserveOnline is a community-driven Web site with conservation as a central topic. The Web site serves as a database for members to upload information and publications about conservation. A vegetation map for Haiti was found at this site. The vegetation map was submitted by The Nature Conservancy (2001) and was developed from SPOT satellite images. No additional metadata accompany the map.

3. The Perry-Castañeda Library Map Collection is part of the University of Texas Library System that stores scanned images from their physical map collection and links to maps in other Web sites. The library has a huge collection of maps from all over the world for various dates. For Haiti, we found a series of links to maps in other Web sites and maps from their own collection. The maps from the library collection were originally prepared by the U.S. Army Map Service and the U.S. Central Intelligence Agency. The U.S. Army maps are a series of orthophotos of Port-au-Prince specially prepared for military use. The U.S. Central Intelligence Agency maps include three 1984 scanned topographic maps, two 1987 and 1999 political Haiti maps, a 1999 shaded relief map, a 1970 economic activity map, a 1970 population map, and a 1970 vegetation map (University of Texas Libraries 2005).

   Most of the links, except for ReliefWeb, were to general maps showing political boundaries, main cities, some rivers, and other political departments. The ReliefWeb is a United Nations Web site for time-critical humanitarian information on complex emergencies and natural disasters. The Web site has a series of natural disaster maps for Haiti ranging from Caribbean-wide hurricane warnings to maps of flooded areas.

4. The Caribbean Disaster Mitigation Project (2002) was a joint effort between the Organization of American States (OAS) and the U.S. Agency for International Development (USAID) to assess potential storm phenomena in the Caribbean region. The project started in 1993 and was finished in 1999, producing an atlas with Caribbean-wide and countrywide maps of storm probability estimates of winds, surges, and waves for four return periods: 10, 25, 50, and 100 years. These maps are the result of complex modeling techniques and statistical analysis. The input data used to create the maps was 1 km in resolution (30 arc seconds).

5. Unité de Télédétection et de Systèmes d'Information Géographique is the GIS and remote sensing unit of the Haiti Ministry of Planning and External Cooperation. In cooperation with IGN France International-Aquater S.p.A., Ministere de la Planification de la Cooperation Externe (2002) developed the project, Projet Utilisation de l'imagerie satellitaire pour l'aménagement du territoire. Under the project, a land use map, "Carte de couverture du sol," was created and published in 2002. The map was developed from SPOT satellite images, aerial photographs, and topographic maps in addition to numeric models. Under the same project, erosion real-risk maps (Carte du risque réel d'érosion) were also published. The erosion maps were developed by using mathematical models, taking into account topography, climate, ground properties, and vegetation cover. In addition to the land use and erosion hazard maps, the UTSIG made available "Notes explicatives des cartes thématiques," a document explaining the methodology used to create the maps.

Assessment of Data Gaps and Needs

The available geospatial data that were found for Haiti are quite substantial. The data gaps include (1) detailed and high-resolution information on land use and land cover, specifically local ground cover species and growth forms and soil conditions; (2) information on land ownership and stewardship; and (3) detailed and high-resolution information on hazards such as flooding, landslides, fire, erosion, and loss of habitat, and detailed climate information. Some of this information may exist in less accessible forms such as local universities and research publications. Much of the thematic GIS information available does not have accompanying metadata, which lessens the use of that information.

Conclusion

The information documented here provides a resource to initiate a GIS-based natural resource assessment of Haiti to guide conservation efforts. More information will likely come to light as more specific needs are identified for specific regions of Haiti and local experts and data sources are queried.

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English Equivalents

When you know:	Multiply by:	To find:
Centimeters (cm)	0.394	Inches
Meters (m)	3.28	Feet
Kilometers (km)	0.621	Miles
Square kilometers (km^2)	0.386	Square miles

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Glossary

AVHRR—Advanced very-high-resolution radiometer; multispectral low-resolution satellite sensor.

Band—Portion of the electromagnetic spectrum sampled by a remote sensing instrument and available as a remotely sensed image.

Band interleaved—Raster file format.

Bathymetry—The description of elevation and slope characteristics of underwater terrain. Bathymetric data are used in navigational charts but are also useful for marine investigations, coastal studies, tectonic research, and sea floor mapping.

CARTERRA—Space Imaging's online archive.

Digital Elevation Model (DEM)—Raster images in which each pixel represents an elevation value in the surface. DEMs come in different resolutions giving the user more or less detail about the terrain. DEMs are used for a very wide range of applications including water flow and habitat modeling, terrain features extraction, and three-dimensional mapping, among others.

EDC—Earth Resources Observation and Science (EROS) Data Center of the United States Geological Survey (USGS).

Elevation contours—A set of lines with each line representing one elevation value.

EO-1 ALI—Earth Observing Advanced Land Imager; multispectral medium-resolution sensor onboard the EO-1 satellite.

EO-1 Hyperion—Hyperspectral high-spatial-resolution sensor onboard the EO-1 satellite.

Extent—Spatial area covered by a map or other geospatial product.

Geoclimate—Combination of climatic zones and geological features whereby the landscape can be devided into geoclimatic zones. Geoclimatic zones assist in the identification of vegetation types. Geoclimate data is a useful resource for climate change research, vegetation mapping, and environmental studies and assessment.

Georeferenced—Digital spatial information that is internally referenced to a known coordinate system such as latitude and longitude or the Universal Transverse Mercator system (UTM).

GeoTiff—Geographic tagged image-file format; spatially referenced raster file format.

GLCF—Global Land Cover Facility, University of Maryland.

Hydrography—The mapping and description of surface water bodies such as rivers, lakes, lagoons, watersheds, and basins.

Hyperspectral—Sensors with the ability to resolve small differences in electromagnetic wavelength, typically with a spectral resolution of several hundred bands.

Hypsography—The representation and description of elevation characteristics by using elevation contours. They are mainly found in topographic maps and serve as a base to create DEMs. Elevation contours are often developed by ground surveying, although they can be extracted from DEMs.

IKONOS—High-spatial-resolution satellite-based remote sensing instrument.

IRS—Indian Remote Sensing satellite system equipped with multispectral medium- to high-spatial-resolution sensors.

Land use/land cover—Data describing the surface of the landscape in terms of its general use or superficial cover. Applications for such data include habitat modeling, environmental assessment, urban change, vegetation change, urban planning, natural disaster risk assessment, and others.

Landsat ETM+—Landsat Enhanced Thematic Mapper Plus; multispectral medium-spatial-resolution, satellite-based instrument.

Landsat MSS—Landsat Multispectral Scanner; multispectral medium-spatial-resolution, satellite-based instrument.

Landsat TM—Landsat Thematic Mapper; multispectral medium-spatial-resolution, satellite-based instrument.

MODIS—Moderate Resolution Imaging Spectroradiometer; multispectral low- to medium-spatial-resolution satellite-based remote sensing instrument.

Multispectral—Typically 5- to 15-band remote sensing instrument.

NASA—National Aeronautics and Space Administration.

NGA—National Geospatial-Intelligence Agency.

OrbView— Multispectral high-spatial-resolution satellite-based instrument.

Orthophoto—Terrain-corrected overhead (downlooking) aerial photos.

Pixel—Minimum unit of a raster image.

QuickBird—Multispectral high-spatial-resolution satellite-based remote-sensing instrument.

Raster—Image file format composed of pixels.

SDDS—Seamless Data Distribution System; online catalog of GIS and remote-sensing data created by the United States Geological Survey (USGS)

Signature—A specific band combination within hyperspectral images that uniquely identifies a homogenous aspect of the Earth's surface.

SIRIUS—Spot Image's online archive.

SPOT—Satellite series that specializes in multispectral medium-spatial-resolution remote-sensing instruments.

SRTM—Shuttle Radar Topography Mission. A joint project by NGA and NASA, the project collected radar images that were used to create digital topographic data for 80 percent of the Earth's surface at different resolutions.

UTSIG—Unité de Télédétection et de Systèmes d'Information Géographique (Haiti remote sensing and GIS unit).

Vector—File format composed of points, lines, and polygons.

Appendix 1: Tables and Ancillary Information

Table 1—Online sources and corresponding Web site addresses for Haiti geospatial data

Name	Web site	Date last visited
Topographic maps:		
The Nature Conservancy	ftp address*	—
Omni Map	http://www.omnimap.com/	Jan. 13, 2006
East View Cartographic	http://www.cartographic.com/index.asp	Jan. 12, 2006
Satellite imagery:		
Earth Explorer	http://edcsns17.cr.usgs.gov/EarthExplorer/	Jan. 13, 2006
Global Land Cover Facility—Earth Science Data Interface	http://glcfapp.umiacs.umd.edu:8080/esdi/index.jsp	Jan. 13, 2006
Space Imaging—CARTERRA	http://carterraonline.spaceimaging.com/cgi-bin/Carterra/phtml/login.phtml	Jan. 13, 2006
Digital Globe Image Library	http://archivetool.digitalglobe.com/	Jan. 13, 2006
Spot Imaging—SIRIUS	http://sirius.spotimage.fr/anglais/welcome.htm	Jan. 13, 2006
LANDinfo World Mapping, LLC	http://www.landinfo.com/	Jan. 13, 2006
ORBIMAGE online archive	http://orbimage.datadoors.net/DataDoorsWeb/Intro.aspx	Jan. 13, 2006
Georeferenced vector and additional raster geospatial data:		
The Nature Conservancy	ftp address*	—
GeoCommunity	http://data.geocomm.com/	Jan. 12, 2006
Go Spatial	http://www.go spatial.com/	Jan. 12, 2006
MapAbility	http://www.mapability.com/	Dec. 15, 2005
Global Land Cover Facility—Earth Science Data Interface	http://glcfapp.umiacs.umd.edu:8080/esdi/index.jsp	Jan. 13, 2006
Maps:		
The Caribbean Geology and Tectonics Web site	http://www.fiu.edu/orgs/caribgeol/	Jan. 12, 2006
ConserveOnline	http://conserveonline.org/	Jan. 12, 2006
Perry-Castañeda Library map collection	http://www.lib.utexas.edu/maps/	Jan. 12, 2006
ReliefWeb	http://www.reliefweb.int/	Dec. 16, 2005
Caribbean Disaster Mitigation Project	http://www.oas.org/CDMP/	Jan. 09, 2006

* For TNC ftp address, contact Steven R. Schill, Ph.D., at sschill@tnc.org. TNC disclaimer form must be signed prior to download and use of the data (app. 2).

Table 2—Haiti topographic maps and reference numbers (see fig. 4) available from Omni Resources map catalog as of January 13, 2006

Map number	Map description
66-33793-53701	Haiti 1:50,000 georeferenced topo, #5370-1.
66-33793-53704	Haiti 1:50,000 georeferenced topo, #5370-4.
66-33793-53711	Haiti 1:50,000 georeferenced topo, #5371-1.
66-33793-53712	Haiti 1:50,000 georeferenced topo, #5371-2.
66-33793-53713	Haiti 1:50,000 georeferenced topo, #5371-3.
66-33793-53714	Haiti 1:50,000 georeferenced topo, #5371-4.
66-33793-54701	Haiti 1:50,000 georeferenced topo, #5470-1.
66-33793-53702	Haiti 1:50,000 georeferenced topo, #5370-2.
66-33793-53703	Haiti 1:50,000 georeferenced topo, #5370-3.
66-33793-54704	Haiti 1:50,000 georeferenced topo, #5470-4.
66-33793-54711	Haiti 1:50,000 georeferenced topo, #5471-1.
66-33793-54712	Haiti 1:50,000 georeferenced topo, #5471-2.
66-33793-54713	Haiti 1:50,000 georeferenced topo, #5471-3.
66-33793-54714	Haiti 1:50,000 georeferenced topo, #5471-4.
66-33793-55701	Haiti 1:50,000 georeferenced topo, #5570-1.
66-33793-55704	Haiti 1:50,000 georeferenced topo, #5570-4.
66-33793-55713	Haiti 1:50,000 georeferenced topo, #5571-3.
66-33793-55711	Haiti 1:50,000 georeferenced topo, #5571-1.
66-33793-55712	Haiti 1:50,000 georeferenced topo, #5571-2.
66-33793-55714	Haiti 1:50,000 georeferenced topo, #5571-4.
66-33793-55721	Haiti 1:50,000 georeferenced topo, #5572-1.
66-33793-55722	Haiti 1:50,000 georeferenced topo, #5572-2.
66-33793-55724	Haiti 1:50,000 georeferenced topo, #5572-4.
66-33793-55751	Haiti 1:50,000 georeferenced topo, #5575-1.
66-33793-55753	Haiti 1:50,000 georeferenced topo, #5575-3.
66-33793-55752	Haiti 1:50,000 georeferenced topo, #5575-2.
66-33793-55754	Haiti 1:50,000 georeferenced topo, #5575-4.
66-33793-56701	Haiti 1:50,000 georeferenced topo, #5670-1.
66-33793-56704	Haiti 1:50,000 georeferenced topo, #5670-4.
66-33793-56712	Haiti 1:50,000 georeferenced topo, #5671-2.
66-33793-56713	Haiti 1:50,000 georeferenced topo, #5671-3.
66-33793-56711	Haiti 1:50,000 georeferenced topo, #5671-1.
66-33793-56721	Haiti 1:50,000 georeferenced topo, #5672-1.
66-33793-56722	Haiti 1:50,000 georeferenced topo, #5672-2.
66-33793-56723	Haiti 1:50,000 georeferenced topo, #5672-3.
66-33793-56724	Haiti 1:50,000 georeferenced topo, #5672-4.
66-33793-56733	Haiti 1:50,000 georeferenced topo, #5673-3.
66-33793-56731	Haiti 1:50,000 georeferenced topo, #5673-1.
66-33793-56732	Haiti 1:50,000 georeferenced topo, #5673-2.
66-33793-56734	Haiti 1:50,000 georeferenced topo, #5673-4.
66-33793-56741	Haiti 1:50,000 georeferenced topo, #5674-1.
66-33793-56744	Haiti 1:50,000 georeferenced topo, #5674-4.
66-33793-56751	Haiti 1:50,000 georeferenced topo, #5656-1.
66-33793-56752	Haiti 1:50,000 georeferenced topo, #5675-2.
66-33793-56753	Haiti 1:50,000 georeferenced topo, #5675-3.
66-33793-56754	Haiti 1:50,000 georeferenced topo, #5675-4.
66-33793-56761	Haiti 1:50,000 georeferenced topo, #5676-1.
66-33793-56762	Haiti 1:50,000 georeferenced topo, #5676-2.
66-33793-56763	Haiti 1:50,000 georeferenced topo, #5676-3.
66-33793-56764	Haiti 1:50,000 georeferenced topo, #5676-4.
66-33793-57704	Haiti 1:50,000 georeferenced topo, #5770-4.
66-33793-57701	Haiti 1:50,000 georeferenced topo, #5770-1.

Table 2—Haiti topographic maps and reference numbers (see fig. 4) available from Omni Resources map catalog as of January 13, 2006 (continued)

Map number	Map description
66-33793-57711	Haiti 1:50,000 georeferenced topo, #5771-1.
66-33793-57712	Haiti 1:50,000 georeferenced topo, #5771-2.
66-33793-57713	Haiti 1:50,000 georeferenced topo, #5771-3.
66-33793-57714	Haiti 1:50,000 georeferenced topo, #5771-4 Port au Prince.
66-33793-57722	Haiti 1:50,000 georeferenced topo, #5772-2.
66-33793-57721	Haiti 1:50,000 georeferenced topo, #5772-1.
66-33793-57723	Haiti 1:50,000 georeferenced topo, #5772-3.
66-33793-57724	Haiti 1:50,000 georeferenced topo, #5772-4.
66-33793-57731	Haiti 1:50,000 georeferenced topo, #5773-1.
66-33793-57732	Haiti 1:50,000 georeferenced topo, #5773-2.
66-33793-57733	Haiti 1:50,000 georeferenced topo, #5773-3.
66-33793-57734	Haiti 1:50,000 georeferenced topo, #5773-4.
66-33793-57741	Haiti 1:50,000 georeferenced topo, #5741-1.
66-33793-57742	Haiti 1:50,000 georeferenced topo, #5774-2.
66-33793-57743	Haiti 1:50,000 georeferenced topo, #5774-3.
66-33793-57744	Haiti 1:50,000 georeferenced topo, #5774-4.
66-33793-57751	Haiti 1:50,000 georeferenced topo, #5775-1.
66-33793-57752	Haiti 1:50,000 georeferenced topo, #5775-2.
66-33793-57753	Haiti 1:50,000 georeferenced topo, #5775-3.
66-33793-57754	Haiti 1:50,000 georeferenced topo, #5775-4.
66-337262-58701	Haiti/Dominican Republic 1:50,000 georeferenced topo, #5870-1.
66-337262-58702	Haiti/Dominican Republic 1:50,000 georeferenced topo, #5870-2.
66-33793-58703	Haiti/Dominican Republic 1:50,000 georeferenced topo, #5870-3.
66-33793-58704	Haiti/Dominican Republic 1:50,000 georeferenced topo, #5870-4.
66-33793-58713	Haiti 1:50,000 georeferenced topo, #5871-3.
66-33793-58714	Haiti 1:50,000 georeferenced topo, #5871-4.
66-33793-58721	Haiti/Dominican Republic 1:50,000 georeferenced topo, #5872-1.
66-33793-58722	Haiti/Dominican Republic 1:50,000 georeferenced topo, #5872-2.
66-33793-58723	Haiti/Dominican Republic 1:50,000 georeferenced topo, #5872-3.
66-33793-58724	Haiti/Dominican Republic 1:50,000 georeferenced topo, #5872-4.
66-337262-58731	Haiti/Dominican Republic 1:50,000 georeferenced topo, #5873-1.
66-337262-58732	Haiti/Dominican Republic 1:50,000 georeferenced topo, #5873-2.
66-33793-58733	Haiti/Dominican Republic 1:50,000 georeferenced topo, #5873-3.
66-33793-58734	Haiti/Dominican Republic 1:50,000 georeferenced topo, #5873-4.
66-337262-58741	Haiti/Dominican Republic 1:50,000 georeferenced topo, #5874-1.
66-337262-58742	Haiti/Dominican Republic 1:50,000 georeferenced topo, #5874-2.
66-33793-58743	Haiti 1:50,000 georeferenced topo, #5874-3.
66-33793-58744	Haiti 1:50,000 georeferenced topo, #5874-4.
66-33793-58753	Haiti 1:50,000 georeferenced topo, #5875-3.

Note: Prices for all maps are US$20 for paper, $25 for digital format, and $50 for georeferenced digital format.
Source: Omni Resources, n.d.

Table 3—East View Cartographic topographic maps and prices

	1:1,000,000	1:500,000	1:250,000	1:200,000	1:50,000	1:12,500	1:10,000	1:10,000
Producer	MTDGS[a]	MTDGS[a]	NGIA[b]	MTDGS[a]	NGIA[b]	NGIA[b]	NGIA[b]	MTDGS[a]
Vintage	1975–1981	1980–1981	Varies	Varies	Varies	1987–1994	1988	1983
Projection	Gauss-Kruger	Gauss-Kruger	UTM/ WGS84	Gauss-Kruger	Transverse Mercator Everest	Transverse Mercator/ WGS84	Transverse Mercator/ WGS84	Gauss-Kruger/ Pulkovo 1942 Krassovsky
Language	Russian	Russian	English	Russian	English	English	English	Russian
Size	6 × 4 degrees	3 × 2 minutes	90 × 60 minutes	60×40 minutes	15 × 15 minutes	120 × 65 cm	120 × 65 cm	—
Contours	50–100 m	50 m	330 feet	40 m	5–12 m	10–5 m	20 m	—
Sheet count	2	3	5	11	91	7	2	1
Coverage	Haiti	Haiti	Haiti	Haiti	Haiti	Cap Haitien Fort Liberte Gonaives Jacmel Jeremie Port de Paix Saint Marc	Aquin Petit Goave	Port-au-Prince
Prices[c]								
Paper	44.00	44.00	79.00	79.00	44.00	54.00	54.00	249.00
Digital	54.00	44.00	79.00	79.00	44.00	54.00	54.00	199.00
GeoRef	89.00	69.00	104.00	104.00	69.00	79.00	79.00	224.00

[a] MTDGS stands for Military Topography Directorate of the General Staff.
[b] NGIA stands for National Geospatial-Intelligence Agency.
[c] Prices quoted here are per sheet as of December 14, 2005, in U.S. dollars.
Source: East View Cartographic, Inc. 2005

Table 4—Optical satellite sensors general specifications

Satellite	Number of bands	Spatial resolution	Swath width	Archived images Haiti cover	Online catalog(s)
Multispectral:					
AVHRR	4–6	1.1 km	2700 km	All	Earth Explorer GLCF ESDI
MODIS	36	250 m (bands 1–2) 500 m (bands 3–7) 1000 m (bands 8–36)	2330 km	All	GLCF ESDI
Landsat MSS	4	80 m	185 km	All	Earth Explorer GLCF ESDI
Landsat TM	7	30 m multispectral 120 m thermal band	185 km	All	Earth Explorer GLCF ESDI
Landsat ETM+	7 + 1 pan	30 m multispectral 60 m thermal 15 m panchromatic	183 km	All	Earth Explorer GLCF ESDI
EO-1 ALI	9 + 1 pan	30 m multispectral 10 m panchromatic	37 km	Partial	Earth Explorer
SPOT	3 + 1 pan (SPOT 2)	SPOT 2&4 20 m multispectral 10 m panchromatic	60 km	Partial	SIRIUS
	4 + 1 pan (SPOT 4&5)	SPOT 5 10 m multispectral 5 m panchromatic			
IRS	1 pan	5 m panchromatic	70 km	Partial	CARTERRA
IKONOS	4 + 1 pan	4 m multispectral 1m panchromatic	13 km	Partial	CARTERRA
OrbView3	4 + 1 pan	4 m multispectral 1 m panchromatic	8 km	Partial	ORBIMAGE
QuickBird	4 + 1 pan	2.44 m–2.88 m multispectral 61 cm - 72 cm panchromatic	16.5 km	Partial	Digital Globe
Hyperspectral:					
EO-1 Hyperion	220	30 m	7.5 km	Partial	Earth Explorer

Note: AVHRR = Advanced Very-High-Resolution Radiometer.
EO-1 = Earth Observing One.
GLCF = Global Landcover Facility.
ESDI = Earth Science Data Interface.
IRS = Indian Remote Sensing satellite system.

Table 5–Earth Explorer satellite imagery products and prices as of December 14, 2005

Product	Price[a]
	U.S. dollars
AVHRR:	
Raw (level 1b) single scene[b]	50
Raw (level 1b) stitched orbital segments	No charge
Georegistered (level 1b) single scene	190
EO-1[c]	
Radiometrically corrected Hyperion (level 1R)	250
Radiometrically corrected ALI (level 1R)	250
Geometrically corrected ALI (level 1Gs)	500
Terrain corrected ALI (level 1Gst)	500
Landsat MSS:	
Systematic correction (level 1G)	200 + 100 each additional scene
Precision correction (level 1P)[b]	300 + 150 each additional scene
Terrain correction (level 1T)[b]	375 + 190 each additional scene
Landsat TM:	
Systematic correction (level 1G)	425 + 200 each additional scene
Precision correction (level 1P)[b]	550 + 225 each additional scene
Terrain correction (level 1T)[b]	625 + 310 each additional scene
TM orthorectified mosaics	30 per mosaic, 60 per DVD
Landsat ETM+ SLC-on:	
Raw uncorrected (level 0Rp)	475 + 200 each additional scene
Systematic correction (level 1G)	600 + 250 each additional scene
Precision correction (level 1P)[b]	725 + 400 each additional scene
Terrain correction (level 1T)[b]	800 + 425 each additional scene
Landsat ETM+ SLC-off:	
Raw uncorrected (level 0Rp)	200 + 90 each additional scene
Systematic correction (level 1G)	250 + 110 each additional scene
Systematic (level 1G) Gap-filled SLC-on to SLC-off data merge	275
Systematic (level 1G) Gap-filled SLC-off to SLC-off data merge	300
Precision correction (level 1P)[b]	310 + 180 each additional scene
Terrain correction (level 1T)[b]	340 + 190 each additional scene
Orthorectified ETM+	30 per scene, 60 per DVD
Orthorectified ETM+ Pan sharpened	30 per scene, 60 per DVD

[a] All prices quoted here are in U.S. dollars per scene unless otherwise stated in the product description.

[b] Under current U.S. Geological Survey policy, this data can only be distributed to USGS-approved users.

[c] EO-1 data have a $750 service fee for tasking the sensor to collect customer request. This fee does not apply if ordering an archived image.

Source: U.S. Geological Survey 2005.

Additional charges: all USGS orders have a $5 handling charge.

Preprocessing levels (taken from Earth Explorer product descriptions):

Raw (Level 1b)—AVHRR data with radiometric calibration coefficients and Earth location data appended but not applied.

Georegistered (Level 1b)—Single-Scene AVHRR is radiometrically and geometrically corrected single-scene AVHRR data that are processed according to user-specified parameters such as projection, resampling method, and pixel size. The data are available in binary (8- or 10-bit) format, and are distributed on CD-ROM or DVD.

Level 1R—Radiometrically corrected with no geometric correction applied. The image data are provided in 16-bit radiance values. The data are available in hierarchical data format (HDF) and are distributed on CD-ROM, DVD, and via file transfer protocol (FTP).

Level 1Gs—Geometrically corrected and provided as a single "stitched" file. The image data are provided in 16-bit radiance values. The data are available in HDF or geographic tagged image-file format (GeoTIFF) and are distributed on DVD and via FTP.

Level 1Gst—Terrain corrected and provided as a single "stitched" file. The image data are provided in 16-bit radiance values. The data are available in HDF and are distributed on DVD and via FTP.

Raw uncorrected (Level 0Rp)—No radiometric or geometric correction applied. Scan lines are reversed and nominally aligned. Image data are provided in 8-bit unsigned integer (DN) values.

Systematic correction (Level 1G)—Includes both radiometric and geometric correction. The scene will be rotated and aligned to a user-defined map projection. For Landsat TM products, absolute geometric accuracy of the systematically corrected TM product can vary, depending upon the accuracy of the predicted ephemeris that is used for processing. Users should be aware that subsequent image geocorrection and/or coregistration to known ground control points (GCPs) may be necessary with a TM product. For Landsat ETM+ products, geometric accuracy of the systematically corrected product should be within 250 m (1 sigma) for low-relief areas at sea level. If the image was acquired in SLC-off mode, a scan gap mask will be included with the final product. Level 1G products can be processed by either the Level 1 Product Generation System (LPGS) or the National Land Archive Production System (NLAPS).

Systematic correction (Level 1G) gap-filled (SLC-off only)—Includes radiometric correction, geometric correction, and replacement of all missing image pixels within the SLC-off (primary) scene with estimated values based on histogram-matched data from one or more user-defined "fill" scenes acquired on a separate date. The image will be rotated and aligned to a user-specified projection. A scan gap mask is included with the final product. All Level 1G SLC-off gap-filled products are processed by the LPGS.

Precision correction (Level 1P)—Includes radiometric and geometric correction, as well as the use of GCPs to improve accuracy. For locations outside the United States, the availability of a precision-corrected product will depend on the availability of local GCPs.

Terrain correction (Level 1T)—Includes radiometric, geometric, and precision correction, as well as the use of a digital elevation model (DEM) to correct parallax error owing to local terrain elevation. For locations outside the United States, the availability of a terrain-corrected product will depend on the availability of local GCPs, as well as the resolution of the best available DEM.

Table 6–SPOT Image products and prices for international users as of December 14, 2005

Product	SPOT Scene—standard images—preprocessing levels 1A, 1B or 2A				
	Full scene	½ scene	¼ scene	⅛ scene	Full scene old archive[a]
			Euros		
Archived products:					
20-m colour	1,900	—	—	—	1,200
10-m pan	1,900	—	—	—	1,200
10-m colour	2,700	2,025	1,350	1,020	1,200
5-m pan	2,700	2,025	1,350	1,020	1,200
5-m colour[b]	5,400	—	—	—	1,200
2.5-m pan	5,400	4,050	2,700	2,040	1,200
2.5-m colour[b]	8,100	—	—	—	1,200
Programmed products[c]:					
20-m colour	2,700	—	—	—	—
10-m pan	2,700	—	—	—	—
10-m colour	3,500	2,825	2,150	1,820	—
5-m pan	3,500	2,825	2,150	1,820	—
5-m colour[b]	6,200	—	—	—	—
2.5-m pan	6,200	4,850	3,500	2,840	—
2.5-m colour[b]	8,900	—	—	—	—

Product	SPOTView Precision—Level 2B			
	30′ by 30′ (full scene)	15′ by 15′	7′30″ by 7′30″	Full scene Old archive[a]
		Euros		
Archived products:				
20-m colour	2,440	1,190	640	—
10-m pan	2,440	1,190	640	—
10-m colour	3,240	1,600	930	—
5-m pan	3,240	1,600	930	—
5-m colour	5,940	2,680	1,420	—
2.5-m pan	5,940	2,680	1,420	—
2.5-m colour	9,180	4,300	2,370	—
Programmed products[c]:				
20-m colour	3,240	1,990	1,440	—
10-m pan	3,240	1,990	1,440	—
10-m colour	4,040	2,400	1,730	—
5-m pan	4,040	2,400	1,730	—
5-m colour	6,740	3,480	2,220	—
2.5-m pan	6,740	3,480	2,220	—
2.5-m colour	9,980	5,100	3,170	—

Table 6–SPOT Image products and prices for international users as of December 14, 2005 (continued)

Product	SpotView Ortho—Level 3			
	30′ frame (full scene)	15′ frame	7′30″ frame	Full scene old archive[a]
			Euros	
Archived products:				
20-m colour	2,620	1,300	700	—
10-m pan	2,620	1,300	700	—
10-m colour	3,420	1,710	1,000	—
5-m pan	3,420	1,710	1,000	—
5-m colour	6,120	2,800	1,500	—
2.5-m pan	6,120	2,800	1,500	—
2.5-m colour	9,400	4,500	2,500	—
Programmed products[c]:				
20-m colour	3,420	2,100	1,500	—
10-m pan	3,420	2,100	1,500	—
10-m colour	4,220	2,510	1,800	—
5-m pan	4,220	2,510	1,800	—
5-m colour	6,920	3,600	2,300	—
2.5-m pan	6,920	3,600	2,300	—
2.5-m colour	10,200	5,300	3,300	—

[a] Old archive scenes range between the years 1986 and 2003.

[b] Available as full scene products only.

[c] Programming service subject to feasibility study.

Note: All price quotes are stated in euros as this is the currency used by SPOT Image, and exchange rates may vary on a daily basis. All price quotes are for the standard license of one user. For multiuser licenses of two to three users add 30 percent of total. For 4 to 10 users add 40 percent. For more than 10 users, contact SPOT Image. All multiuser licenses are subject to prior agreement from SPOT Image. More information at http://www.spotimage.com/licensing.htm.

Source: Spot Image 2005.

Image sizes:

For Spot Scene standard images, full scenes cover an area of 60 by 60 km depending on the viewing angle. Scene extracts cover a floating area within a Spot scene. A ½ scene covers an area of 40 by 40 km, a ¼ scene is 30 by 30 km, and a 1/8 scene is 20 by 20 km, depending on the viewing angle.

For SPOTView products, a full scene covers an area of about 60 by 60 km minimum depending on viewing angle. A frame 30′ by 30′ covers an area of 54 by 54 km at the equator, frames 15′ by 15′ cover 27 by 27 km, and frames 7′30″ by 7′30″ cover 13 by 13 km. The area decreases as the latitude increases.

Preprocessing levels descriptions from the SPOT Image Web site:

SPOT Scene:

Level 1A: Radiometric correction of distortions owing to differences in sensitivity of the elementary detectors of the viewing instrument. Intended for users who wish to do their own geometric image processing.

Level 1B: Radiometric correction identical to that of level 1A. Geometric correction of systematic effects (panoramic effect, Earth curvature, and rotation). Internal distortions of the image are corrected for measuring distances, angles, and surface areas. Specially designed product for photointerpreting and thematic studies.

Level 2A: Radiometric correction identical to that of level 1A. Geometric correction done in a standard cartographic projection (UTM WGS84 by default) not tied to ground control points. Allowing for possible differences in location, this product is used to combine the image with geographic information of various types (vectors, raster maps, and other satellite images).

SPOTView:

Level 2B (Precision): This product comes in a map projection with ground control points taken on maps or from GPS-type measurements taken in the field. The image is corrected for a mean elevation in a projection and a standard map frame. This product is used when deformations owing to relief are not important (flat ground, etc.).

Level 3A (Ortho): Map projection based on ground control points and a digital elevation model based on Reference3D data to eliminate distortions owing to relief.

Table 7—IKONOS satellite imagery products and prices as of December 14, 2005

Product type	1-m panchromatic	1-m pan-sharpened multispectral	4-m multispectral	1-m/4-m bundle
		U.S. dollars per km²		
Geo	18.00	19.80	18.00	25.20
Geo archive[a]	7.00	7.70	7.00	9.80
PRO	29.00	31.90	29.00	38.00
Precision	45.00	49.50	45.00	63.00
Precision stereo	48.00	52.80	—	—
Precision plus	Pricing by custom quote only			
Geo ortho kit[b]	20.00	22.00	20.00	28.00
Geo ortho kit archive[a b]	12.00	13.20	12.00	16.80
Reference[c]	25.00	27.50	25.00	35.00
Reference stereo[c]	36.00	39.60	—	—

[a] Only available for imagery already in archive 6 months or older.
[b] Geo ortho kit: includes IGM (imagery geometry model), elevation angle >60° (>72° for an additional $2 per km²).
[c] Reference orders outside of the United States require a feasibility analysis prior to order acceptance to determine availability of source materials for digital elevation model generation.
Source: LAND INFO Worldwide Mapping, LLC 2004.

Products overview:

The IKONOS products available differentiate from each other in their positional accuracy.

The IKONOS satellite collects four multispectral bands and a panchromatic band. Image prices depend not only on the type of product preferred, but also on the amount of bands wanted. One-meter panchromatic images only include the 1-m resolution panchromatic (black and white) band. One-meter pan-sharpened multispectral (PSM) products include a choice of three of the four spectral bands in one true (natural) or false (infrared) color image. Four-meter multispectral images include the four multispectral bands. The 1-m/4-m bundle includes all bands including the panchromatic 1-m band.

Image product categories from the Space Imaging Web site:

Space Imaging imagery products are categorized by positional accuracy. Accuracy is determined by the reliability of an object in the image matching its actual location on the ground. This reliability is defined in meters as circular error with 90 percent confidence (CE90). Corresponding root mean square error (RMSE) and U.S. National Map Accuracy Standards (NMAS) values are shown for reference.

Name	CE90	RMS	US NMAS
	Meters		
Geo	15[a]	NA	NA
Reference	25	11.8	1:50,000
Pro	10	4.8	1:12,000
Precision	4	1.9	1:4,800
Precision Plus	2	0.9	1:2,400

[a] Not including effects of terrain.

Product description from LANDinfo Worldwide Mapping:

Geo: No orthorectification, tonal balancing, or mosaicking, 60 to 90° elevation angle, 15-m CE90 (As the product is not orthorectified, the Geo accuracy specifications do not include the effects of terrain).

Reference: Includes orthorectification, tonal balancing, and mosaicking, 60 to 90° elevation angle, 25-m CE 90, 11.8-m RMS. Reference orders outside of the United States require a feasibility analysis prior to order acceptance to determine availability of source materials for digital elevation model generation.

Pro: Includes orthorectification, tonal balancing, and mosaicking, 66 to 90° elevation angle, 10-m CE 90, 4.8-m RMS.

Precision: Includes orthorectification, tonal balancing, and mosaicing, 72 to 90° elevation angle, 4-m CE 90, 1.9-m RMS.

Precision plus: Includes orthorectification, tonal balancing, and mosaicking, 75 to 90° elevation angle, 2-m CE 90, 0.9-m RMS.

Table 8—Indian Remote Sensing 1C and 1D satellite products and prices as of December 14, 2005

Product	Price per scene
	U.S. dollars
Geo 5-m pan	1,500
Reference 5-m pan	Custom quote

Source: LAND INFO Worldwide Mapping, LLC 2004.

Product descriptions from LANDinfo Worldwide Mapping LLC:

Geo: Five-meter resolution panchromatic band system-corrected 70 by 70 km scene.

Reference: Five-meter resolution orthorectified 70 by 70 km scene, panchromatic or color.

Table 9—QuickBird products and prices as of December 14, 2005

Product	Archived product price	Programmed product price
	U.S. dollars per km^2	
60-cm pan	16	22
2.44-m multispectral	16	22
60-cm 3-band PSM	16	22
60-cm 4-band PSM	17	28
Bundle	17	28

Source: LAND INFO Worldwide Mapping, LLC 2004.

Product description from LANDinfo Worldwide Mapping LLC:

60-cm pan—single-band image of 60-cm resolution panchromatic (black and white) band.

2.44-m multispectral—single four-band image of 2.44-m resolution. Includes all multispectral bands (visible and near infrared).

60-cm 3-band pan-sharpened multispectral (PSM)—single three-band image (true [natural] or false [infrared] color) of 60-cm resolution.

60-cm 4-band PSM—four individual images of multispectral bands at 60-cm resolution.

Bundle–all bands, panchromatic and multispectral.

Table 10—OrbView products and prices for U.S. and International customers as of January 13, 2006

Product name	Spectral bands	Price
		U.S. dollars per km^2
OrbView BASIC express	Panchromatic	10
	Multispectral	10
	Stereo (pan)	34
OrbView BASIC enhanced	Panchromatic	10
	Multispectral	10
	Stereo (pan)	34
OrbView BASIC 1:50k	Panchromatic	17
	Multispectral	17
	Stereo (pan)	43
OrbView BASIC 1:24k	Panchromatic	19
	Multispectral	19
	Stereo (pan)	48
OrbView GEO express	Panchromatic	10
	Multispectral	10
	Stereo (pan)	34
OrbView GEO enhanced	Panchromatic	10
	Multispectral	10
	Stereo (pan)	34
OrbView GEO 1:50k	Panchromatic	17
	Multispectral	17
	Stereo (pan)	43
OrbView GEO 1:24k	Panchromatic	19
	Multispectral	19
	Stereo (pan)	48
OrbView ORTHO 1:50k	Panchromatic	20
	Multispectral	20
OrbView ORTHO 1:24k	Panchromatic	24
	Multispectral	24

Source: ORBIMAGE 2006.

Product description from ORBIMAGE:

OrbView BASIC—All OrbView BASIC imagery products are radiometrically corrected and include satellite projection information. The OrbView BASIC options are:

OrbView BASIC Express—Includes real-time down-linked satellite telemetry data (orbit and attitude data) and rational function coefficients. This product is designed for customers who have imagery needs with quick delivery times and less accurate geometric requirements.

OrbView BASIC Enhanced—Includes postprocessed satellite telemetry data (orbit and attitude data) and rational function coefficients. This product serves as a baseline product for higher level products (e.g., orthorectified images) and includes sufficient metadata to allow customers to perform a rigorous photogrammetric triangulation.

OrbView BASIC 1:50k—Accuracy equivalent to 1:50,000-scale map product (25-m CE 90 percent for pan product). Includes satellite and attitude ancillary data, and rational functions. The rational functions have been updated as a result of a geopositioning process with the full satellite model. The geopositioning is performed by measuring common points between two or more strips of imagery.

OrbView BASIC 1:24k—Accuracy equivalent to 1:24,000-scale map product (12-m CE 90 percent for pan product). Includes satellite and attitude ancillary data, and rational function coefficients. The rational functions have been updated as a result of a geopositioning process. In this case, the bundle adjustment is performed by measuring common points between two or more strips of imagery and registering the imagery to ground control points. For image products outside the United States and Canada, required ground control points are to be provided by the customer.

OrbView GEO—All GEO image products are delivered in a nominal map (north up) geometry and are referenced to the WGS-84 ellipsoid and datum. The image undergoes the same radiometric corrections as the BASIC products. In addition, the image is resampled to a local geographic projection at a nominal geodetic elevation. The GEO image products are single-image products that are primarily differentiated by the accuracy that is attained when geopositioning by using the supplied rational function projection models. The OrbView GEO options are:

OrbView GEO Express—Intended to support users who have an immediate need for current imagery mainly for interpretation applications. These images are shipped with rational function coefficiencts (RFC) derived from the unrefined orbits of the satellite and therefore have less precise positioning accuracy. These images may also be used for geospatial product generation, especially by customers with access to ground control points and geopositioning capability.

OrbView GEO Enhanced—Includes improved positioning capability derived from the refined GPS ephemeris and postprocessed attitude data. The enhanced RFCs allow significant improvement in geolocation accuracy for geospatial production, especially when no ground control information is available. This data set is primarily designed for customers with geopositioning capability based on RFC sensor modeling.

OrbView GEO 1:50k—Accuracy equivalent to 1:50,000-scale map product (25-m CE 90 percent for pan product; 30-m CE 90 percent for multispectral image [MSI] product), when using the supplied RFCs. Image sets include RFCs that have been derived from the results of a block triangulation using tie points between strips of adjacent images. The availability of this product is dependent on adjacent image availability.

OrbView GEO 1:24k—Accuracy equivalent to 1:24,000-scale map product (12-m CE 90 percent for pan product; 15-m CE 90 percent for MSI product), when using the supplied RFCs. Includes RFCs that have been derived from the results of a block triangulation with a priori parameter weighting and ground control points.

OrbView ORTHO—All OrbView ORTHO™ products are radiometrically and geometrically corrected, and have been corrected for the effects of systematic distortions, Earth rotation and curvature effects, variations in orbital altitude, and variations in the Earth's surface. OrbView ORTHO products are delivered in the UTM projection as the default, but can be provided in other projections as required by the customer. For image products outside the United States and Canada, required ground control points and elevation models are to be provided by the customer. The OrbView ORTHO options are:

OrbView ORTHO 1:50k—Radiometrically and geometrically corrected. One or more OrbView-3 images that have been orthorectified, radiometrically balanced, and mosaicked together. As part of the production process, the imagery undergoes a geopositioning process. The geopositioning is performed by measuring common points between two or more strips of imagery. This product is derived from OrbView BASIC 1:50k products.

OrbView ORTHO 1:24k—Radiometrically and geometrically corrected. One or more OrbView-3 images that have been orthorectified, radiometrically balanced, and mosaicked together. As part of the production process, the imagery undergoes a geopositioning process. In this case, the geopositioning is performed by measuring common points between two or more strips of imagery, and by registering the imagery to ground control points. This product is derived from OrbView BASIC 1:24k products.

Table 11—Vector files

File description	File name[a]	Resolution	Vector type	Metadata	Source	Catalog
Bathymetry:						
Hispaniola-wide polygon of surface above -200 m under sea level	Hisp_bathymetry_200m	1 km	Poly		—	TNC
Geoclimate:						
Hispaniola-wide geoclimate	Hisp_geoclimate_040817	—	Poly		—	TNC
Haiti-wide geoclimate	Haiti-geoclimate	—	Poly		—	TNC
Geology						
Hispaniola-wide geology	Hisp_geology_class-dissolved_050216	—	Poly		—	TNC
Rocks	—	1:1,000,000	Point	X	VMAP0	Go Spatial
Hydrography:						
Hispaniola-wide basins	Dr_basins	30 m	Poly	X	SRTM	TNC
Hispaniola-wide primary basins	Dr_primary_basins	30 m	Poly	X	SRTM	TNC
Hispaniola-wide synthetic streams	Dr_synthetic_streams	30 m	Line	X	SRTM	TNC
Hispaniola-wide artificial lakes	Hisp_artificial-lakes_040803	—	Poly		—	TNC
Hispaniola-wide coastal lagoons	Hisp_coastal-lagoons_040803	—	Poly		—	TNC
Hispaniola-wide natural lakes	Hisp_natural-lakes_040803	—	Poly		—	TNC
Hispaniola-wide water bodies	Hisp_water_bodies_gclc	—	Poly		—	TNC
Hispaniola-wide wetlands	Hisp_wetland_040803	—	Poly		—	TNC
Hispaniola-wide areas over 600 m and under 1800 m in elevation	Hisp_04-over-600-under-1800-msnm_040524	—	Poly		—	TNC
Hispaniola-wide areas under 600 m in elevation	Hisp_04-under-600-msnm_040524	—	Poly		—	TNC
Hispaniola-wide basins	Hisp_rt-07-08-basins_040525	—	Poly		—	TNC
Hispaniola-wide stream orders 4 through 6	Hisp_rt-stream-order-4-6_040406	—	Line		—	TNC
Hispaniola-wide stream orders 7 and 8	Hisp_rt-stream-order-7-8_040406	—	Line		—	TNC
Hispaniola-wide water bodies	Hisp_water-bodies-gclc_040226	—	Poly		—	TNC
Hispaniola-wide watersheds	Hisp_watersheds_040414	—	Poly		—	TNC
Drainage network	DNNET	1:1,000,000	Poly	X	DCW	GeoCommunity
Drainage points	DNPOINT	1:1,000,000	Point	X	DCW	GeoCommunity
Drainage supplemental points	DSPOINT	1:1,000,000	Point	X	DCW	GeoCommunity
Inland water areas, perennial	—	1:1,000,000	Poly	X	VMAP0	Go Spatial
Nonperennial inland water areas and flood-prone areas	—	1:1,000,000	Poly	X	VMAP0	Go Spatial
Canals	—		Point	X	GNS	Go Spatial
Dams and weirs	—	1:1,000,000	Point	X	VMAP0	Go Spatial
Locks	—	1:1,000,000	Point	X	VMAP0	Go Spatial
Rapids	—	1:1,000,000	Point	X	VMAP0	Go Spatial
Reservoirs	—		Point	X	GNS	Go Spatial
Text annotation for inland water areas and watercourses	—	1:1,000,000	Point	X	VMAP0	Go Spatial
Wells	—	1:1,000,000	Point	X	VMAP0	Go Spatial

Table 11—Vector files (continued)

File description	File name[a]	Resolution	Vector type	Metadata	Source	Catalog
Aqueducts, canals, and flumes	—	1:1,000,000	Line	X	VMAP0	Go Spatial
Streams and watercourses	—	1:1,000,000	Line	X	VMAP0	Go Spatial
Hypsography:						
Hypsography network	HYNET	1:1,000,000	Poly	X	DCW	GeoCommunity
Hypsography points	HYPOINT	1:1,000,000	Point	X	DCW	GeoCommunity
Hypsography supplemental lines	HSLINE	1:1,000,000	Line	X	DCW	GeoCommunity
Hypsography supplemental points	HSPOINT	1:1,000,000	Point	X	DCW	GeoCommunity
Spot elevations	—	1:1,000,000	Point	X	VMAP0	Go Spatial
Elevation contours	—	-	Line	X	SRTM	Go Spatial
Land use/land cover:						
Haiti-wide natural vegetation	Haiti_natural_vegetation_jun04	—	Poly		—	TNC
Haiti vegetation patches by geoclimate	Haiti_terr_targets_jun04	—	Poly		—	TNC
Land cover polygon	LCPOLY	1:1,000,000	Poly	X	DCW	GeoCommunity
Built-up areas	—	1:1,000,000	Poly	X	VMAP0	Go Spatial
Extraction and mining areas	—	1:1,000,000	Poly	X	VMAP0	Go Spatial
Ground surface types	—	1:1,000,000	Poly	X	VMAP0	Go Spatial
Forests	—	-	Point	X	GNS	Go Spatial
Sugar cane plantations	—	-	Point	X	GNS	Go Spatial
Swamp point locations	—	-	Point	X	GNS	Go Spatial
Marine:						
Hispaniola-wide coastal systems	Dr_coastal_systems	—	Poly		—	TNC
Hispaniola-wide watersheds	Hisp_xsheds_050216	—	Poly		—	TNC
Hispaniola-wide watersheds	Hisp_xsheds_clip_050216	—	Poly		—	TNC
Hispaniola-wide beaches	Hisp_beaches_050216	—	Poly		—	TNC
Hispaniola-wide coral reefs	Hisp_coral-reefs-andrefouet_050216	—	Poly		—	TNC
Hispaniola-wide estuarine mangrove forests	Hisp_mangrove-estuaries_050216	—	Poly		—	TNC
Hispaniola-wide nonestuarine mangrove forests	Hisp_non-estuarine-mangroves_050216	—	Poly		—	TNC
Hispaniola-wide rocky shores	Hisp_rocky-shores_050216	—	Poly		—	TNC
Caribbean-wide seagrass areas	Hisp_seagrass_050216	—	Poly		—	TNC
Ocean features lines	OFLINE	1:1,000,000	Line	X	DCW	GeoCommunity
Ocean features points	OFPOINT	1:1,000,000	Point	X	DCW	GeoCommunity
Political and socioeconomic:						
Hispaniola oceanic political boundary	Hisp_eez_031202	—	Poly		—	TNC
Haiti/Dominican Republic political boundary	Hisp_haiti-dr-boundary_031202	—	Line		—	TNC
Hispaniola-wide major cities	Hisp_major-cities_040218	—	Point		—	TNC
Hispaniola political boundary	Hisp_outline_040205	—	Poly		—	TNC
Haiti political boundary	Haiti-outline-poly-utm19	—	poly		—	TNC
Aeronautical points	AEPOINT	1:1,000,000	Point	X	DCW	GeoCommunity
Railroad lines	RRLINE	1:1,000,000	Line	X	DCW	GeoCommunity
Road lines	RDLINE	1:1,000,000	Line	X	DCW	GeoCommunity

Table 11—Vector files (continued)

File description	File name[a]	Resolution	Vector type	Metadata	Source	Catalog
Cultural landmarks lines	CLLINE	1:1,000,000	Line	X	DCW	GeoCommunity
Cultural landmarks points	CLPOINT	1:1,000,000	Point	X	DCW	GeoCommunity
Political/ocean network	PONET	1:1,000,000	Poly	X	DCW	GeoCommunity
Political/ocean points	POPOINT	1:1,000,000	Point	X	DCW	GeoCommunity
Populated places points	PPPOINT	1:1,000,000	Point	X	DCW	GeoCommunity
Populated places polygons	PPPOLY	1:1,000,000	Poly	X	DCW	GeoCommunity
State and provincial boundaries	—	—	Poly		Various public domain sources	Go Spatial
Airports	—	—	Point	X	GNS	Go Spatial
Ancient sites	—	—	Point	X	GNS	Go Spatial
Capitol cities	—	—	Point	X	GNS	Go Spatial
Estates	—	—	Point	X	GNS	Go Spatial
Farms	—	—	Point	X	GNS	Go Spatial
Lighthouses	—	—	Point	X	GNS	Go Spatial
Islands	—	1:1,000,000	Point	X	VMAP0	Go Spatial
Mines	—	—	Point		GMLD	Go Spatial
Miscellaneous populated places	—	—	Point	X	GNS	Go Spatial
Named populated places	—	1:1,000,000	Point	X	VMAP0	Go Spatial
Railroad stations	—	—	Point	X	GNS	Go Spatial
Ranches	—	—	Point	X	GNS	Go Spatial
Ruins	—	—	Point	X	GNS	Go Spatial
Storage tanks	—	1:1,000,000	Point	X	VMAP0	Go Spatial
Unnamed populated places and assigned names from low-resolution data sources from USGS NIMA	—	—	Point	X	GNS	Go Spatial
Various types of towers	—	—	Point	X	GNS	Go Spatial
Cable car and ski-lift lines	—	1:1,000,000	Line	X	VMAP0	Go Spatial
Pipelines	—	1:1,000,000	Line	X	VMAP0	Go Spatial
Political boundaries	—	1:1,000,000	Line	X	VMAP0	Go Spatial
Powerlines	—	1:1,000,000	Line	X	VMAP0	Go Spatial
Railroads	—	1:1,000,000	Line	X	VMAP0	Go Spatial
Roads	—	1:1,000,000	Line	X	VMAP0	Go Spatial
Transportation structures	—	1:1,000,000	Line	X	VMAP0	Go Spatial

[a] The Go Spatial Web site did not have the actual file name but a brief description of what the file contained. Therefore the file name section in this table was omitted for the Go Spatial products.

Note: TNC = The Nature Conservancy.
VMAP0 = Vector Map Level 0.
SRTM = Shuttle radar topography mission.
DCW = Digital chart of the world.
GNS = Geo names server.
NIMA=National Imagery and Mapping Agency.

Table 12—Additional raster files found for Haiti

File description	Resolution File name	(pixel size)	Format	Metadata	Source	Catalog
Bathymetry:						
Hispaniola-wide bathymetry	hispbathy	1 km	GRID		—	TNC
Hispaniola-wide bathymetry hill shade	hispbathyhs	1 km	GRID		—	TNC
Digital elevation models:						
Dominican Republic and east part of Haiti DEM—hillshade	Dr30mhs	30 m	GRID	X	SRTM	TNC
Digital terrain elevation data (level 0). Multiple files.	W070_n10 to W079_n27	1 km	DTED	X	NIMA	Geocomm
Caribbean-wide 1-km DEM in band-interleaved format (.bil)	—	1 km	.bil		—	Go Spatial
SRTM 3-arc- second DEM	—	90 m	—	X	SRTM	SDDS
SRTM 3-arc-second DEM reprocessed by GLCF	—	90 m	GeoTiff	X	SRTM	GLCF
SRTM 30-arc-second DEM reprocessed by GLCF	—	1 km	GeoTiff	X	SRTM	GLCF
Hydrography:						
Stream-line data layer derived from 30-m DEM	Dr_strord2	30 m	GRID	X	SRTM	TNC
Stream-line data layer derived from 30-m DEM in UTM projection	Dr_strordutm	30 m	GRID		—	TNC
Marine:						
Coral reef threats model research	Wri_cd	1 km	GRID	X[a]	—	TNC
Coral reef threats model research	Wri_mbp	1 km	GRID	X[a]	—	TNC
Coral reef threats model research	Wri_ovf	1 km	GRID	X[a]	—	TNC
Coral reef threats model research	Wri_sed	1 km	GRID	X[a]	—	TNC
Political and socioeconomic:						
Hispaniola-wide population density	hispopden	1 km	GRID		—	TNC
Hispaniola-wide human influence footprint	wcshfoot	1 km	GRID	X[a]	—	TNC

[a] No traditional metadata or metadata information within the file was found. Instead articles that do not refer directly to the specific file mentioned here were available.

Note: DEM = Digital elevation model.
DTED = Digital terrain elevation data.
GLCF = Global Landcover Facility.
GRID = raster format of Environmental Systems Research Institute ArcGIS software.
NIMA = National Imagery and Mapping Agency.
SDDS = Seamless Data Distribution System.
SRTM = Shuttle Radar Topographic Mission.
TNC = The Nature Conservancy.
UTM = Universal Transverse Mercator.
X = yes.

Table 13—The Nature Conservancy public vector and raster files for Haiti and Dominican Republic as of December 14, 2005

File description	File name	Data type
Haiti-wide files:		
Geoclimate	Haiti-geoclimate	Vector
Land use/land cover:		
Natural vegetation	Haiti natural vegetation	Vector
Vegetation patches by geoclimate	Haiti terrestrial targets	Vector
Political boundary	Haiti-outline-poly-utm19	Vector
	Haiti outline poly	Vector
Hispaniola-wide files:		
Bathymetry:		
Polygon of surface above -200 m under sea level	Hisp_bathymetry_200m	Vector
Bathymetry	hispbathy	Raster
Bathymetry hill shade	hispbathyhs	Raster
Geoclimate	Hisp_geoclimate_040817	Vector
Geology	Hisp_geology_class-dissolved_050216	Vector
Hydrography:		
Basins	Dr_basins	Vector
Primary basins	Dr_primary_basins	Vector
Synthetic streams	Dr_synthetic_streams	Vector
Stream-line data layer derived from 30-m DEM	Dr_strord2	Raster
Stream-line data layer derived from 30-m DEM in UTM projection	Dr_strordutm	Raster
Artificial lakes	Hisp_artificial-lakes_040803	Vector
Coastal lagoons	Hisp_coastal-lagoons_040803	Vector
Natural lakes	Hisp_natural-lakes_040803	Vector
Water bodies	Hisp_water_bodies_gclc	Vector
Wetland areas	Hisp_wetland_040803	Vector
Areas over 600 m and under 1800 m in elevation	Hisp_04-over-600-under-1800-msnm_040524	Vector
Areas under 600 m in elevation	Hisp_04-under-600-msnm_040524	Vector
Selected basins	Hisp_rt-07-08-basins_040525	Vector
Stream orders 4 through 6	Hisp_rt-stream-order-4-6_040406	Vector
Stream orders 7 and 8	Hisp_rt-stream-order-7-8_040406	Vector
Water bodies	Hisp_water-bodies-gclc_040226	Vector
Watersheds	Hisp_watersheds_040414	Vector
Marine:		
Coral reef threats model research	Wri_cd	Raster
Coral reef threats model research	Wri_mbp	Raster
Coral reef threats model research	Wri_ovf	Raster
Coral reef threats model research	Wri_sed	Raster
Coastal systems	Dr_coastal_systems	Vector
Watersheds	Hisp_xsheds_050216	Vector
Watersheds	Hisp_xsheds_clip_050216	Vector
Beaches	Hisp_beaches_050216	Vector
Coral reefs	Hisp_coral-reefs-andrefouet_050216	Vector
Estuarine mangrove forests	Hisp_mangrove-estuaries_050216	Vector
Nonestuarine mangrove forests	Hisp_non-estuarine-mangroves_050216	Vector
Rocky shores	Hisp_rocky-shores_050216	Vector
Caribbean-wide seagrass areas	Hisp_seagrass_050216	Vector

Table 13—The Nature Conservancy public vector and raster files for Haiti and Dominican Republic as of December 14, 2005 (continued)

File description	File name	Data type
Political and socioeconomic:		
Population density	hispopden	Raster
Human influence footprint	wcshfoot	Raster
Hispaniola oceanic political boundary	Hisp_eez_031202	Vector
Haiti/Dominican Republic political boundary	Hisp_haiti-dr-boundary_031202	Vector
Major cities	Hisp_major-cities_040218	Vector
Hispaniola political boundary	Hisp_outline_040205	Vector
Dominican Republic-wide files		
Digital elevation model:		
30-m DEM hillshade covers all Dominican Republic and east of Haiti	dr30mhs	Raster
Geoclimate:		
Life zones	dr_lifezones_040817	Vector
Geology	dr_geology_050216	Vector
Hydrography:		
Channels	Dr_channels	Vector
Dammed lakes	Dr_dammed_lakes	Vector
Freshwater systems	Dr_freshwater_systems	Vector
Hydrogeographic regions boundaries	Dr_hydrogeographic-regions-boundaries	Vector
Hydrogeographic regions	Dr_hydrogeographic-regions	Vector
Main rivers	Dr_main-rivers	Vector
Rivers	Dr_rivers	Vector
Hydro features from USGS topographic maps	Dr_usgs_topo_map_hydro_features	Vector
Watersheds	Dr_watersheds	Vector
Dams	dr_dams_041216	Vector
Lakes	Dr_lakes	Vector
Land use/land cover:		
Land cover 30-m resolution	Dr_30m-landcover-04	Vector
Land cover 90-m resolution	Dr_90m-landcover-04	Vector
Features from USGS topographic maps	Hisp_usgs_topo_features	Vector
Vegetation patches by geoclimate	Dr terrestrial targets	Vector
Mangrove areas	dr_mangroves04_30m.shp	Vector
Marine:		
Inshore intensity	Insh_intens	Raster
Inshore area	Inshore_area	Raster
Pelagic intensity	Pelag_intens	Raster
Pelagic areas	Pelagic_area	Raster
Reef areas	Reef_area	Raster
Reef intensity	Reef_intens	Raster
Marine protected areas	Dr_marine protected areas	Vector

Table 13—The Nature Conservancy public vector and raster files for Haiti and Dominican Republic as of December 14, 2005 (continued)

File description	File name	Data type
Political:		
Main roads	Dr_main-roads	Vector
All roads	Dr_roads	Vector
Secondary roads	Dr_secondary-roads	Vector
Municipalities	Dr_municipals	Vector
Municipal lines	Dr municipals_lines	Vector
Country outline	Dr outline	Vector
Hispaniola outline cropped with straight line through Haiti	Dr outline lc90m	Vector
Provinces	Dr provinces	Vector
Province lines	Dr provinces lines	Vector
Towns	Dr towns	Vector
Cities as from USGS topographic maps	Dr usgs cities	Vector
Protected-area polygons	Dr_protected area system	Vector
Agriculture types	Dr-lc96-agtypes-031208	Vector
Cocoa plantations	dr_ag_cacao_expert	Vector
Coffee plantations	dr_ag_cafe_expert	Vector
Intensive agriculture	dr_ag_cultivos_intensivos	Vector
Agriculture types	dr_ag_types_expert	Vector
Irrigation areas	dr_current-irrigation-areas_041216	Vector
Golf courses	dr_golfcourses	Vector
Hotels	dr_hotels	Vector
Sugar cane plantations	dr_lc04_cane_30m	Vector
Citrus plantations	dr_lc04_citrus_30m	Vector
Cocoa plantations	dr_lc04_cocoa_30m	Vector
Coconut plantations	dr_lc04_coconut_30m	Vector
Coffee plantations	dr_lc04_coffee_30m	Vector
Intensive agriculture	dr_lc04_intensive_cultivation_30m	Vector
Mines	dr_lc04_mines_30m	Vector
Mixed agriculture	dr_lc04_mixed_agriculture_30m	Vector
Pasture areas	dr_lc04_pasture_30m	Vector
Rice plantations	dr_lc04_rice_30m	Vector
Urban areas	dr_lc04_urban_30m	Vector
Marinas	dr_marinas	Vector
Tourist polo	dr_polo_turistico	Vector
Potential irrigation areas	dr_potential-irrigation-areas_041216	Vector
Tourism zones	dr_tourism_zones	Vector
Soils	dr_soils	Vector

TNC public data is accessible for free from their FTP server. A disclaimer form needs to be signed prior to download or use of this data (app. 2).

Note: DEM = Digital elevation model.
TNC = The Nature Conservancy.
UTM = Universal Transverse Mercator.
USGS = U.S. Geological Survey.

Table 14—GeoCommunity products available for Haiti as of December 14, 2005

Product description	File size	CD write fee	Format	Download type[a]
		U.S. dollars		
Landsat mosaics—1990/2000:				
ETM+, 2000–N Hemi, UTM Zone 18, Lat 15 to 20	83.01 MB	13.06	MrSid	Premium
ETM+, 2000–N Hemi, UTM Zone 18, Lat 20 to 25	108.26 MB	17.03	MrSid	Premium
ETM+, 2000–N Hemi, UTM Zone 19, Lat 15 to 20	70.73 MB	11.12	MrSid	Premium
TM, 1990	16.71 MB	2.62	MrSid	Premium
Digital terrain elevation data (DTED) Level 0:				
10 Deg Grid Cell: N10, W70	1.87 MB	1.07	DTED	Normal and premium
10 Deg Grid Cell: N20, W70	791.98 KB	0.45	DTED	Normal and premium
Landuse/land cover—1 m	5.93 KB	0.15	E00	Normal and premium
Hydrography:				
Drainage—network	40.19KB	0.15	E00	Normal and premium
Drainage—points	0.60KB	0.15	E00	Normal and premium
Drainage supplemental points	1.14KB	0.15	E00	Normal and premium
Ocean features—lines	15.59 KB	0.15	E00	Normal and premium
Ocean features—points	2.01 KB	0.15	E00	Normal and premium
Hypsography:				
Hypsography—network	158.37 KB	0.15	E00	Normal and premium
Hypsography—points	2.19 KB	0.15	E00	Normal and premium
Hypsography supplemental—lines	19.10 KB	0.15	E00	Normal and premium
Hypsography supplemental—points	6.93 KB	0.15	E00	Normal and premium
Transportation:				
Aeronautical—points	0.83 KB	0.15	E00	Normal and premium
Railroads—lines	3.77 KB	0.15	E00	Normal and premium
Roads—lines	36.93 KB	0.15	E00	Normal and premium
Administrative/political boundaries:				
Cultural landmarks—lines	0.79 KB	0.15	E00	Normal and premium
Cultural landmarks—points	0.98 KB	0.15	E00	Normal and premium
Political/ocean—network	24.64 KB	0.15	E00	Normal and premium
Political/ocean—points	0.78 KB	0.15	E00	Normal and premium
Populated places—Points	5.87 KB	0.15	E00	Normal and premium
Populated places—Polygons	3.79 KB	0.15	E00	Normal and premium

[a] Normal downloads are free for everyone. Premium service has fees involved.

Source: GeoCommunity 2005.

The Premium service allows users to obtain data not available to regular users and the use of a high-speed download link. Once the premium service account is opened, data blocks need to be bought in order to download premium data. The data blocks available are: Starter Block 150 MB for US$24.95, 1 GB for US$109.95, 4 GB for US$299.95 and 8 GB for US$499.95.

ETM+ = enhanced thematic mapper.

TM = thematic mapper.

UTM = Universal Transverse Mercator coordinate system.

Table 15—Go Spatial products for Haiti as of December 14, 2005

Product[a]	Resolution	Format[b]	Price[c]
			U.S. dollars
Digital elevation model	1 km	.bil	20
Vector base map	1:1,000,000	.shp	29

[a] All products sold at Go Spatial are packaged by geographic region. The products mentioned here are for Central America and the Caribbean.

[b] Formats: .bil = band interleaved, .shp = shape file.

[c] Orders under US$20 will incur an additional US$3 charge.

Map layers included in vector base map

Description	Type	Features	Source
Built-up areas	Polygon	423	NIMA VMAP level 0 vector base map
Extraction and mining areas	Polygon	5	NIMA VMAP level 0 vector base map
First-order administrative areas	Polygon	1,074	NIMA VMAP level 0 vector base map
Ground surface types	Polygon	137	NIMA VMAP level 0 vector base map
Inland water areas, perennial	Polygon	1,006	NIMA VMAP level 0 vector base map
Nonperennial inland water areas and flood-prone areas	Polygon	134	NIMA VMAP level 0 vector base map
State and provincial boundaries	Polygon	1,073	Various public domain sources
Swampy areas (North America and Europe only)	Polygon	416	NIMA VMAP level 0 vector base map
Airports	Point	174	NIMA GEOnet Names Server
Ancient sites	Point	200	NIMA GEOnet Names Server
Canals	Point	62	NIMA GEOnet Names Server
Capitol cities	Point	24	NIMA GEOnet Names Server
Dams and weirs	Point	69	NIMA VMAP Level 0 vector base map
Estates	Point	991	NIMA GEOnet Names Server
Farms	Point	2,078	NIMA GEOnet Names Server
Forests	Point	13	NIMA GEOnet Names Server
Islands	Point	220	NIMA VMAP level 0 vector base map
Lighthouses	Point	7	NIMA GEOnet Names Server
Locks	Point	3	NIMA VMAP level 0 vector base map
Mines	Point	1,749	Global mine location database
Miscellaneous populated places	Point	102	NIMA GEOnet Names Server
Mountains	Point	5,204	NIMA GEOnet Names Server
Named populated places	Point	986	NIMA VMAP level 0 vector base map
Railroad stations	Point	229	NIMA GEOnet Names Server
Ranches	Point	504	NIMA GEOnet Names Server
Rapids	Point	14	NIMA VMAP level 0 vector base map
Reservoirs	Point	91	NIMA GEOnet Names Server
Rocks	Point	3	NIMA VMAP level 0 vector base map
Ruins	Point	33	NIMA GEOnet Names Server
Spot elevations	Point	7,710	NIMA VMAP level 0 vector base map
Storage tanks	Point	60	NIMA VMAP level 0 vector base map
Sugar cane plantations	Point	17	NIMA GEOnet Names Server
Swamp point locations	Point	65	NIMA GEOnet Names Server
Text annotation for inland water areas and watercourses	Point	249	NIMA VMAP level 0 vector base map
Unnamed populated places and assigned names from low-resolution data sources from the USGS and NIMA	Point	2,268	NIMA GEOnet Names Server
Various types of towers	Point	9	NIMA VMAP level 0 vector base map
Wells	Point	2	NIMA VMAP level 0 vector base map
Aqueducts, canals, and flumes	Line	4	NIMA VMAP level 0 vector base map
Cable car and ski-lift lines	Line	12	NIMA VMAP level 0 vector base map
Coastlines	Line	1,212	NIMA VMAP level 0 vector base map
Elevation contours	Line	5,455	USGS GTOPO30 30-arc-second digital elevation model
Pipelines	Line	3	NIMA VMAP level 0 vector base map
Political boundaries	Line	161	NIMA VMAP level 0 vector base map
Powerlines	Line	454	NIMA VMAP level 0 vector base map
Railroads	Line	1,223	NIMA VMAP level 0 vector base map
Roads	Line	6,625	NIMA VMAP level 0 vector base map
Streams and watercourses	Line	5,488	NIMA VMAP level 0 vector base map
Transportation structures	Line	13	NIMA VMAP level 0 vector base map

Source: Go Spatial Ltd., 2004.

Note: NIMA = National Geospatial-Intelligence Agency.
VMAP = Vector Smart Map.
USGS = U.S. Geological Survey.

Appendix 2: The Nature Conservancy GIS Data Disclaimer Acknowledgment and Release Form

GIS Data Disclaimer Acknowledgment and Release:

Acceptance of Stipulations Concerning Preliminary Mapping and Database Products from The Nature Conservancy's Mesoamerica & Caribbean Region

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When such information is used the following disclaimer and waiver of liability shall be included and displayed prominently so as to alert any person viewing or utilizing this information:

NOTICE: It is understood that, while The Nature Conservancy and its partners of information have no indication or reason to believe that there are inaccuracies or defects in information incorporated in the base map, The Nature Conservancy and its data partners make NO REPRESENTATIONS OF ANY KIND, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE, NOR ARE ANY SUCH WARRANTIES TO BE IMPLIED, WITH RESPECT TO THE INFORMATION OR DATA, FURNISHED HEREIN.

Acceptance:

_____ _____

Signature Date

THE NATURE CONSERVANCY
GEOGRAPHIC INFORMATION SYSTEMS DATA USER INFORMATION FORM
MESOAMERICA & CARIBBEAN REGION

The Nature Conservancy is compiling information about the users of our digital data so we can better serve you in the future. Please complete the user information form below and return it to Steven R. Schill, Ph.D. (Mesoamerica & Caribbean Senior Geospatial Scientist)
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Please enter the primary business activity of your organization:

Please provide a brief explanation of what your reasons for using the data:

Comments or suggestions for our data:

☐ I would like to be notified of future data availability or changes.

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