National Occupational Standard

NOS Unit: Using Geospatial Data in Environmental Surveys

Overview

This standard is about the knowledge, understanding and skills required to use digital systems for both mapping and spatial data analysis during environmental surveys. Field location uses satellite- based measuring systems. Satellite and aircraft-mounted imaging systems can remotely sense the characteristics of the Earth's surface in a spatially continuous manner. Manipulation and interpretation of spatial data relies on Computer Aided Design (CAD) or Geographical Information System (GIS) software. This standard requires an appreciation of the technologies involved, field skills in the use of satellite-based location systems, sources of imagery and use of appropriate software to process and interpret both imagery and field survey location data. These skills need not be regarded as the realm of specialists: the techniques can be effectively applied at relatively simple levels to provide everyday tools for an environmental scientist. They should be regarded as normal aids to study, inside the toolbox alongside skills such as photography, word-processing or spreadsheet-based data analysis.

To achieve the standards specified in this unit you will require knowledge and understanding of models of the Earth's ellipsoid (datums), how angular position measurements are converted to Cartesian coordinates (xyz) using map projection systems, the international satellite positioning systems that are available and how they work, sources of land and sea surface imagery and the principles of digital data mapping systems and interpretation of this type of data. In terms of field skills you will need to be able to set up a survey during which points, transects and polygons are mapped to appropriate levels of accuracy, demonstrating suitable data safety and quality control procedures. Data processing competence will involve working with a standard dataset (containing field data you have collected, satellite imagery, current published maps and historical maps) using a CAD or GIS system that you have selected to generate specified interpretive outputs. You will also need understanding of how this information is commonly used in environmental management practices.

Performance Criteria

P1 Plan surveys of an environment using **Satellite-based Positioning Equipment**, including risk assessment, based on a survey brief to meet specific objectives. The brief and environment should be such that they allow you to demonstrate effectively your surveying skills. It should also be an area for where public maps, historical maps, satellite images and aerial photographs are available to you.

P2 Prepare and deploy appropriate **Satellite-based Positioning Equipment** to meet specific survey requirements in terms of precision, data density and quality assurance. Establish temporary bench marks for re-survey.

P3 Report and archive data sets you have acquired as latitude and longitude and Cartesian coordinates to two different datums.

P4 Acquire raster imagery that will inform your survey maps. This may be satellite or aerial imagery, published or historical maps, or any combination, that will help you demonstrate your cartographic skills in interpreting aspects of the geospatial data you have collected.

P5 Enter all your vector and raster datasets into a suitable GIS or CAD software and prepare layered maps at effective scales, extension and orientation, with supporting metadata files that adequately describe the data.

P6 Generate new map layers based on 1) manual methods (drawing lines, polygons, text) 2) querying and 3) gridding and contouring.

P7 Generate output maps for a range of presentation formats that meet the requirements of your survey specification.

P8 Contribute to discussions on the value of the information you have generated in as an environmental management and/or interpretation tool.

Knowledge and Understanding

K1 **Datums** that are in common usage.

K2 **Map projections** and their differing applicability's to mapping tasks.

K3 Deployment of **Satellite-based Positioning Equipment**

K4 Good practice and quality assurance routines for surveys using **Satellite-based Positioning Equipment** for position fixing and/or guidance.

K5 Factors that can affect field data **precision**: effects of satellite geometry, differences between commercially available satellite fleets, stand-alone, differential and RTK methods.

K6 Specification and acquisition of **Satellite and aerial images**: orbit types/overpass frequency, resolution, optical bands, radar,

K7 Processing spatial data using **GIS or CAD software**: data input routines (metadata, point data, image geo-referencing, import and export between systems)

K8 Processing spatial data using **GIS or CAD software**: creating maps (using layers, drawing and tracing, text)

K9 Processing spatial data using **GIS or CAD software**: data manipulation and interpretation (gridding, contouring, querying, thematic mapping)

K11 Limitations and advantages of specific map styles and formats to effectively communicate geospatial information.

Scope

A. **Datums** WGS84, OSGB, one European system two non-European systems
B. **Map projections** UTM, OSGB, one conic and one plane

C. **Satellite-based Positioning Equipment Types:** Hand-held, back-pack, vehicle/vessel-mounted, micro (tracking systems), simple guidance methods, electronic-map- based guidance systems.
D. **Satellite-based position/height measurement precision.** Stand-alone, Differential and RTK methods**,** real-time and post-processing
E. **Satellite and aerial images.** Optical Band, infra-red, radar,
F. **Digital spatial data types.** Vector and raster. Metadata.
G. **Mapping software.** GIS (one commonly used proprietary, one free-ware), CAD (one commonly used proprietary, one free-ware).
H. **Map presentation formats.** Paper publication, public presentations, web-usage.