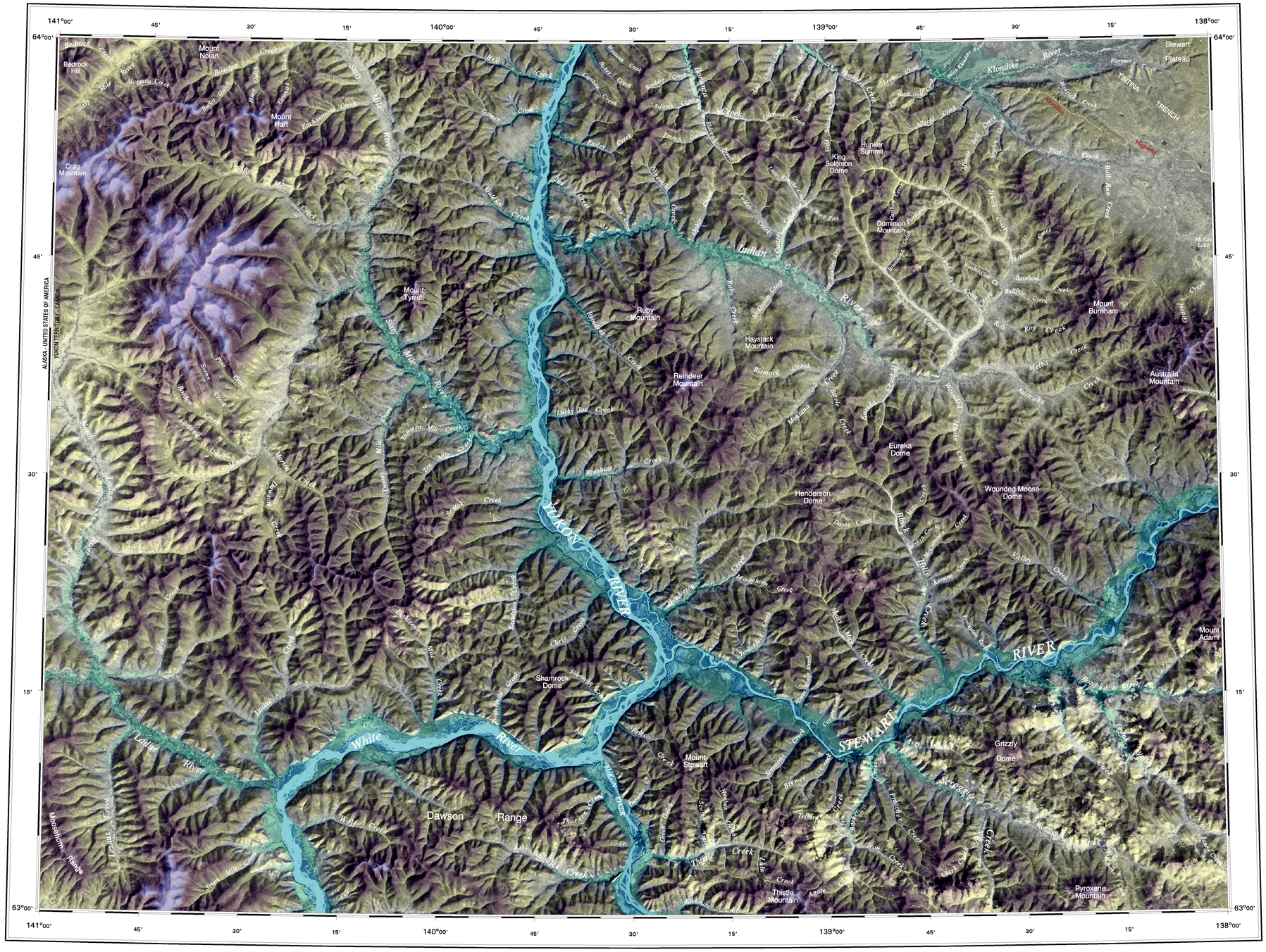
Natural Resources Canada | Ressources naturelles Canada

GEOLOGICAL SURVEY OF CANADA | COMMISSION GÉOLOGIQUE DU CANADA

NATMAP
CARTNAT
Canada's National Geoscience Mapping Program
Le Programme national de cartographie géoscientifique du Canada



LOCATION MAP

Digital cartography K. Shimamura and R. Cocking, Geological Survey of Canada

Satellite image enhancements by C.L. Wagner, Geological Survey of Canada

Any revisions or additional information known to the user would be welcomed by the Geological Survey of Canada

OPEN FILE 4156

COMPOSITE RELIEF MAP

STEWART RIVER

YUKON TERRITORY

Scale 1:250 000/Échelle 1/250 000

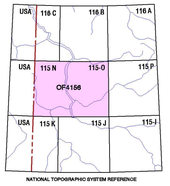
Kilometres 5 0 5 10 15 20 kilometres

Transverse Mercator Projection	Projection transverse de Mercator
Central meridian 139°30'W, Scale Factor 0.9994	Méridien central 139° 30' W, facteur d'échelle 0.9994
North American Datum 1983	Système de référence géodésique nord-américain, 1983
? Her Majesty the Queen in Right of Canada, 2001	? Sa Majesté la Reine du chef du Canada, 2001

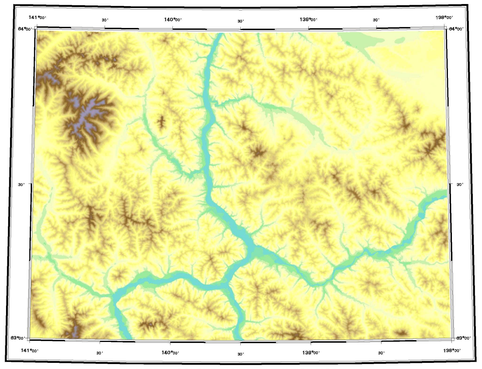
Digital base map from data compiled by Geomatics Canada, modified by the Terrain Sciences Division

Mean magnetic declination 2001, 26°47'E, decreasing 18.9'W annually. Readings vary from 26°05'E in the southwest corner to 27°25'E in the northeast corner of the map

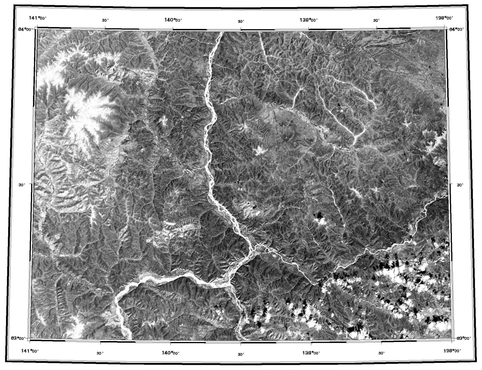
*Elevations in feet above mean sea level



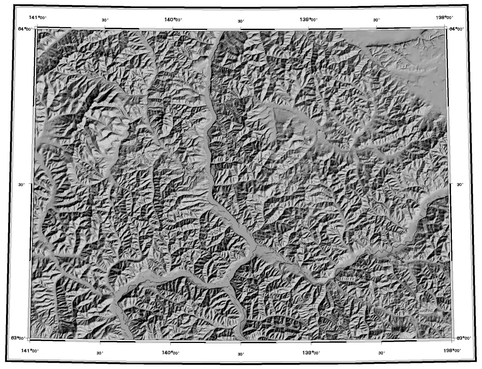
NATIONAL TOPOGRAPHIC SYSTEM REFERENCE



LAYER 1 - COLOUR DIGITAL ELEVATION MODEL



LAYER 2 - LANDSAT 5 SATELLITE IMAGE



LAYER 3 - HILLSHADE MODEL

DESCRIPTIVE NOTES

INTRODUCTION

This composite relief map of Stewart River, Yukon (115-O/N), was created at a scale of 1:250,000 for the Ancient Pacific Margin NATMAP using a Geographic Information System (GIS). The main map (to the left) is a composite overlay of three layers.

GIS professionals are using new visualization techniques for displaying topography due to easier software and faster computers. Traditionally, contour lines are used to represent topography for most paper maps. Contours are series of parallel lines (isolines) that measure elevation relative to some datum, e.g. a contour line can be drawn as an imaginary line that joins points of equal elevation every 100 feet relative to mean sea level. Contours are very useful for the trained map-user to interpolate elevations and to determine slope. On the other hand, shaded relief maps are visually more intuitive than contour lines. Utilizing a GIS to integrate different spatial data sets creates a more realistic view of the relief.

METHOD AND DATA

A GIS software package called ArcInfo (Version 8.0.2), a product of Environmental Systems Research Institute, Inc (ESRI), was used to process and integrate spatial data layers. GIS is used for integrating different kinds of spatial data as is described below.

The composite relief map was created and compiled with ArcMAP, a module included with ArcInfo. Layer 1 (shown above) is a digital elevation model (DEM) generated from 24 1:50,000 scale contour data (100 feet intervals) from the National Topographic Data Base (NTDB) of Geomatics Canada. A DEM was created from transforming digital contour line data to an equally spaced grid of elevation data points using ArcInfo TOPOGRID command. TOPOGRID creates a DEM that preserves drainage structures by eliminating anomalous sinks while allowing for local complexities in relief like streams and ridges. TOPOGRID is based upon the ANUDEM program developed by Michael F. Hutchinson (1993). The DEM is composed of multiple rows of cells that contain elevation values. The cell resolution was set to 50 metres and the vertical scale is 1:1 with the horizontal scale, that is, no vertical exaggeration was used.

A satellite image (layer 2) was used to exhibit land cover, as well as roads and rivers. The satellite image is from LANDSAT 5 Thematic Mapper (TM) sensor with a ground resolution of 30 m x 30 m, recorded on 14 June 1986. The TM sensor is a multispectral sensor that records spectral reflectance within specific ranges in the electromagnetic spectrum. Bands 1 (blue), 2 (green), and 3 (red) were used for the satellite image in this study. The image bands were combined and enhanced by using ER Mapper, an image analysis software package. Enhancements involve reassigning a range of digital values to a new range that improves the viable contrast of an image. The satellite image is georeferenced to the same projection as the DEM. Some scattered clouds are visible on the southeast portion of the image (see layer 2) around Thistle Creek to Roeboat Creek, thus obscuring the land cover.

The hillshade model (layer 3) was created using the DEM (layer 1) by specifying an artificial light source to create shadows and shades of the surface relief. No vertical exaggeration was used to create the hillshade model as well. The artificial light source was matched to the same sun angle (45°) and azimuth (135°) as the satellite image.

The LANDSAT image (layer 2) was overlaid on the hillshade model (layer 3) with layer 2 set to a transparency of 45%, thus enabling the view of the hillshade model. Overlaying the LANDSAT image on the hillshade model visually enhances the relief. Finally, the coloured elevation tint, with transparency set to 45%, was overlaid on layers 2 and 3. The coloured elevation tint is helpful to give the map-user a sense of relative height difference between mountainous areas. As well, a colour scale is included on layer 1 for determining approximate height above mean sea level (in feet).

REFERENCE

Hutchinson, M. F.

1993: Development of a continent-wide DEM with applications to terrain and climate analysis. In: M.F. Goodchild et al (eds), Environmental Modeling with GIS. New York, Oxford University Press: 392-399.

TRADEMARKS

OPEN FILE
DOSSIER PUBLIC
4156
GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA
2001

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Les dossiers publics sont des produits qui n'ont pas été soumis au processus officiel de publication de la CGC.

Canada

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2001: Composite Relief Map, Stewart River, Yukon Territory (105ON); Geological Survey of Canada, Open File 4156, scale 1:250 000.