NTNU – Trondheim
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Department of Geography

Examination paper for GEOG3523 - GIS Data Capture and Mapping

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Permitted examination support material:	**None**

Language:	**English**
Number of pages:	**5**
Number of pages enclosed:	**0**

Informasjon om trykking av eksamensoppgave
Originalen er:

1-sidig ☐ **2-sidig** ☐

sort/hvit ☐ **farger** ☐

skal ha flervalgskjema ☐

Checked by:

Date Signature

Examination GEOG3523 - GIS Data Capture and Mapping – Autumn 2016

The exam is made up of three parts and you should answer all of them. The weighting is given in the parentheses.

<u>Question 1.</u> Give short and concise answers. (20%)

1a) Give brief explanations of *spatial resolution, spectral resolution, radiometric resolution* and *temporal resolution*. How does spatial resolution and spectral resolution differ between for example a Landsat image and an aerial photograph?

1b) What data format is usually acquired by a LiDAR scanner?

1c) What is a choropleth map? What type of data is typically symbolised using a choropleth map?

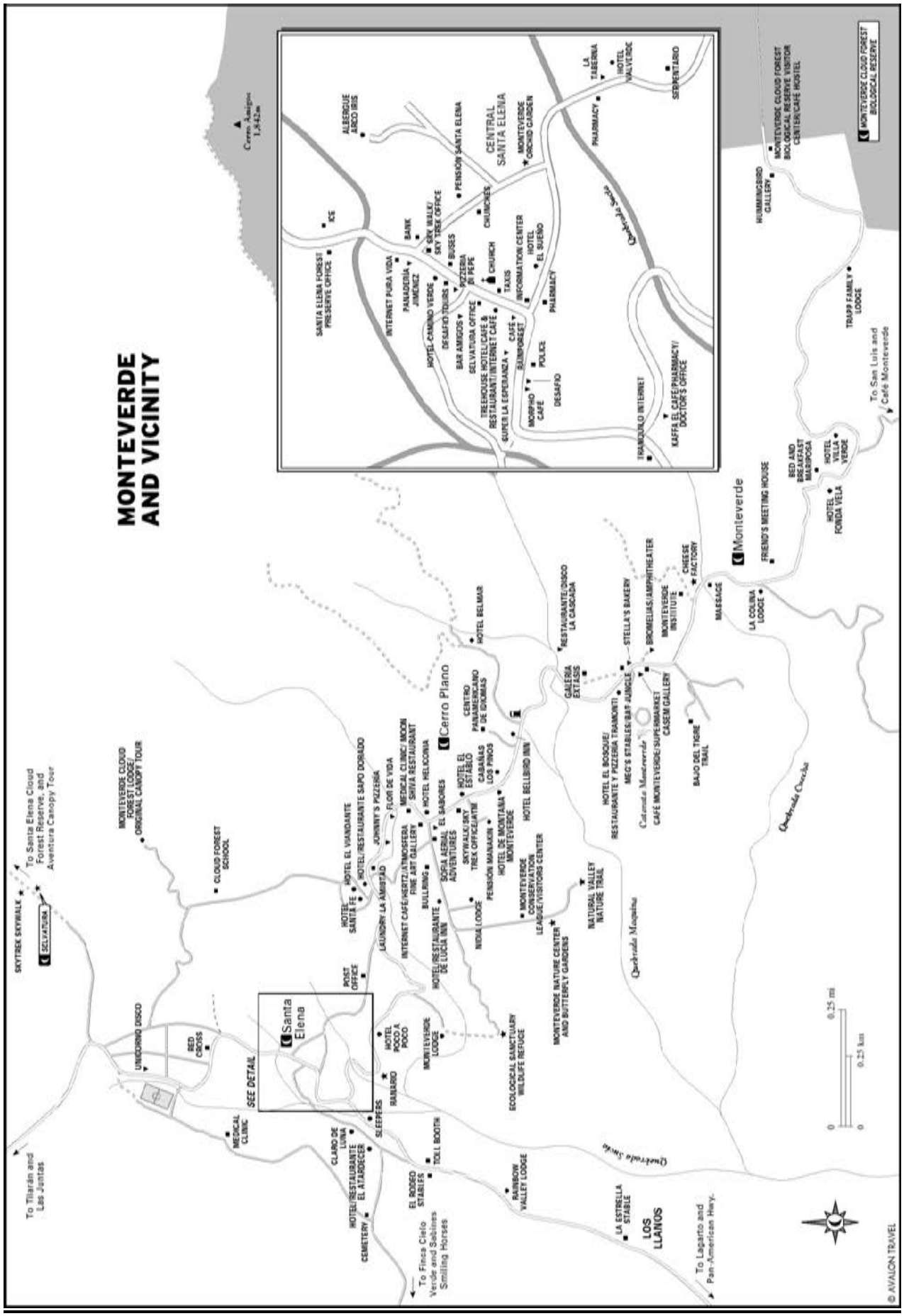
1d) Shortly define visual hierarchy. Why is visual hierarchy such an important concept in cartography?

<u>Question 2. Cartography (40%)</u>

Provide a cartographic assessment of the map shown on the next page. The map shows the small town Monteverde in Costa Rica and is aimed at tourists.

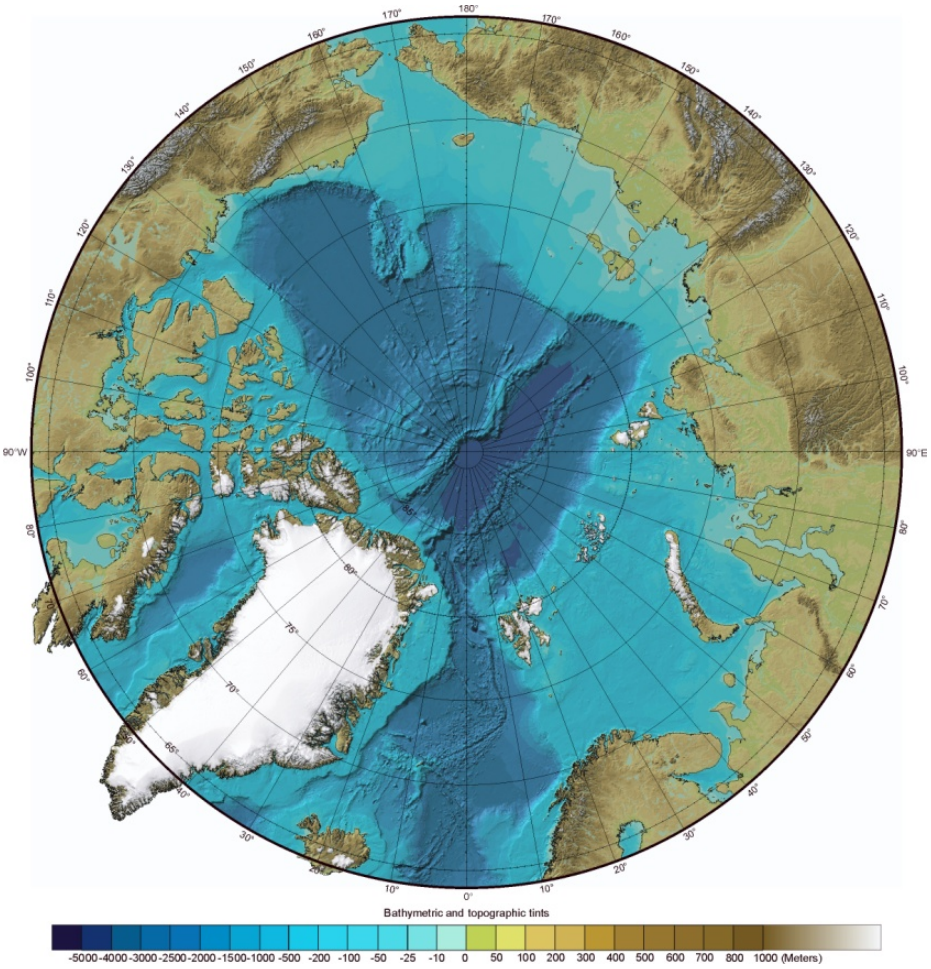
Is the map easy to read and is the content clear? Does the map "stand on its own", or is explanatory text needed? Are all important map elements present or are some missing? If you think the map could be improved, suggest ways on how. Ground your answers on how these changes would improve the map.

Map for question 2.



Question 3. Short essay (40%)

As you know from the news there is an alarming loss of sea ice in the Arctic probably as a response to global warming. You have been hired as a PhD student in a large international research project on sea ice distribution of the Arctic ocean together with dozens of colleagues worldwide. The map from IBCAO shows the Arctic ocean that covers about 14 million km^2.



Your main task as PhD student is to map change in sea ice distribution of the Arctic ocean every spring and fall the last 30 years using optical satellite data. Due to cloud cover and variable access to satellite data you mostly have MODIS scenes (250-500 m spatial resolution, almost daily cover), but also some Landsat scenes (30 m resolution, only some good scenes 1996-2001) and even a few WorldView-2 data (1 m resolution, but only a few snapshots in time at specific places) for spring and fall. You must also assess and map sea ice thickness. This data comes as point observations in Excel-spreadsheets from colleagues on scientific ship cruises and consists of GPS Latitude/Longitude coordinate, date, and ice thickness. The table on the next page can look like this.

Date	Lat N (WGS84)	Long E (WGS84)	Sea ice thickness (m)
12.05.2012	74,5873	34,1274	1,84
12.05.2012	75,0126	34,1387	1,77
14.09.2012	78,6642	54,3314	0,10
05.05.2011	74,5582	34,0981	2,05
...	...	...	...

Your supervisors in the project tells you that it is more important to have consistent mapping on a fixed date each spring and fall for the last 30 years instead of mapping with very high spatial resolution.

Describe how you would tackle the problem. Describe shortly your thoughts on simplifying the real world complexity to something that can be mapped ("Real world → Real world model → Data model → Database → Map"). How would you use the different datasets with different spatial resolution in relation to temporal resolution? How would you deal with, and cartographically represent the GPS data with sea ice thickness?

Please draw a simple dummy map (or several maps) on how you would cartographically represent change in sea ice cover and sea ice thickness over the last 30 years. Think about layout and smart ways to represent change over time.