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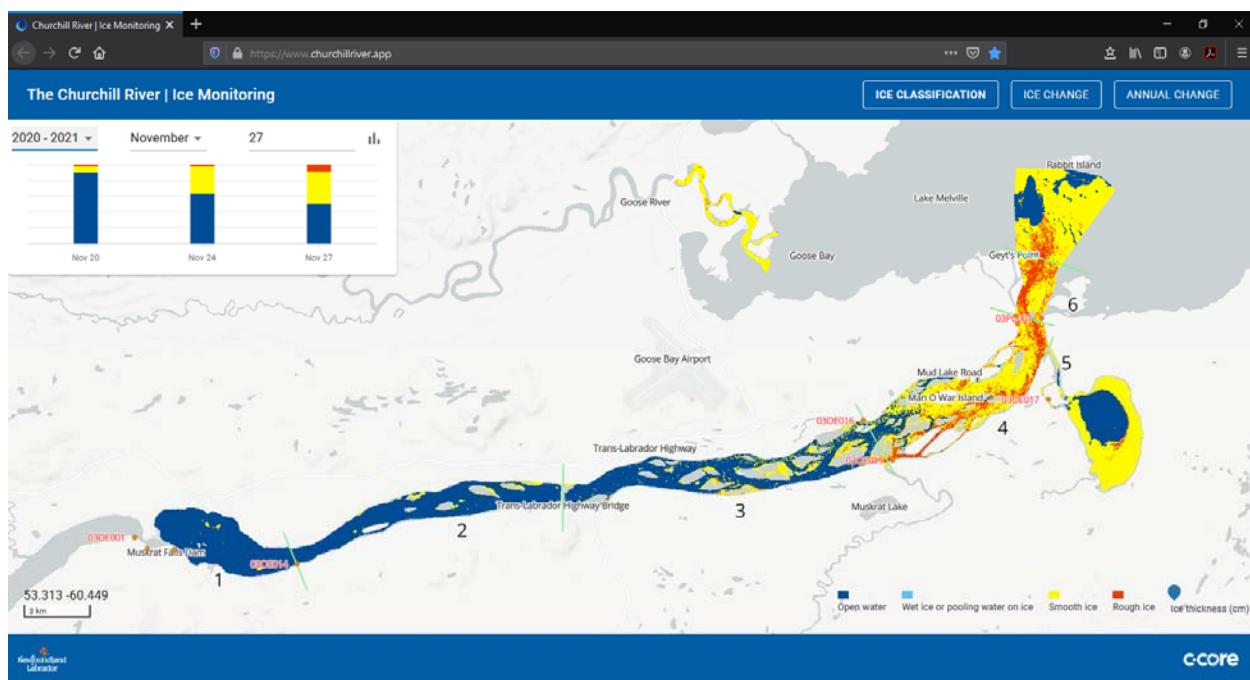
1 Introduction

This report presents documentation on how to use www.churchillriver.app for river ice monitoring on the Churchill River, Labrador. www.churchillriver.app is a web application used to house results of satellite image analysis of ice conditions on the Churchill River including ice classification and ice change detection. The application also houses ice thickness data recorded at four locations using Sea Ice Mass Balance Arrays (SIMBA) buoys up to four times per day.



2 Ice Classification

The Churchill River Ice Monitoring application (www.churchillriver.app) home page displays the most recent satellite ice classification analysis as shown in Figure 1. In this case it is November 27, 2020. The upper left graphic displays all of the image analysis dates for a particular ice season. The mouse is used to select a particular date to display on the map. The upper left graphic also displays ice cover types and area percentages. The date fields can be used to select seasons, month, and day. The bottom right area of the map shows the ice classification legend. Not all ice types will be displayed with all classification dates. Various map elements are included such as river segment numbers, place names, hydrometric and climate data stations, and scale bar. The mouse can be used to zoom in and out and the left mouse button can be used to navigate. The upper right toolbar allows the user to switch between the ice classification and the change detection layers.





3 Change Detection

The layout for ice change analysis is similar to the ice classification (Figure 2). Ice change displays the changes in ice cover between the most recent image and the previous one. The legend is displayed in the bottom right corner. By default, the most recent analysis is displayed and the user can review other dates by using the upper left graphic.

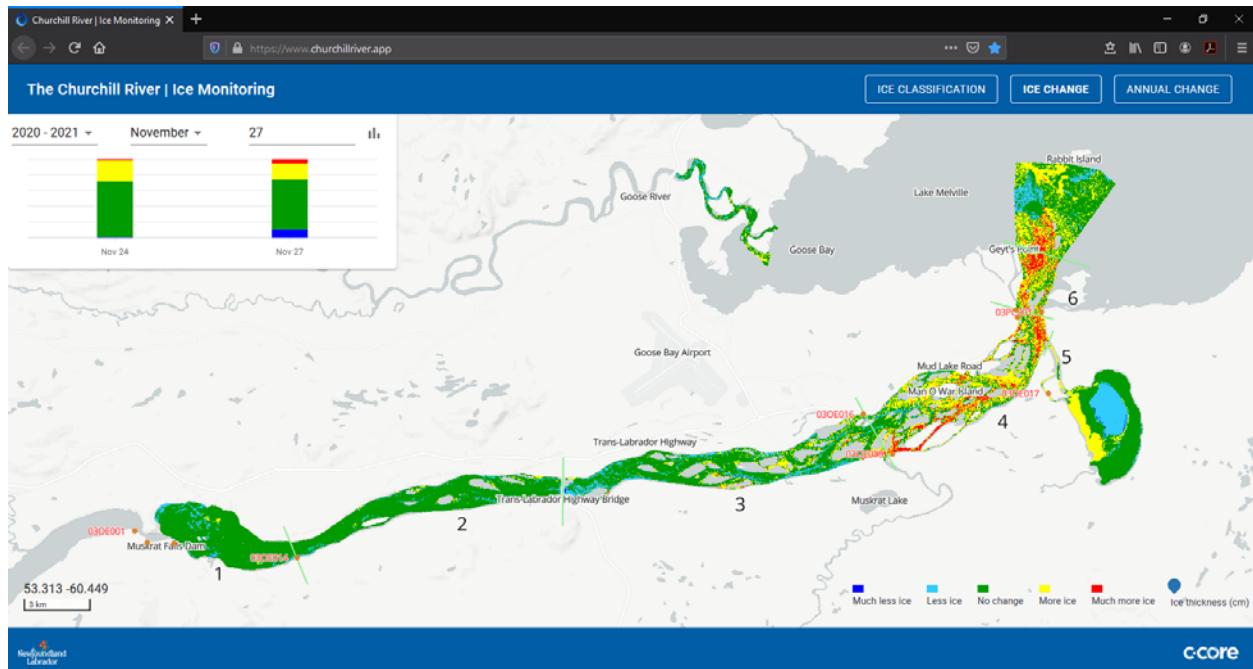


Figure 2. Churchill River Ice Monitoring application (www.churchillriver.app) change detection page



4 Annual Change Detection

The layout for the annual ice change analysis is similar to the ice change analysis (Figure 3). Annual change displays the changes in ice cover annually, once per month. The legend is displayed in the bottom right corner. By default, the most recent analysis is displayed and the user can review other dates by using the upper left graphic.

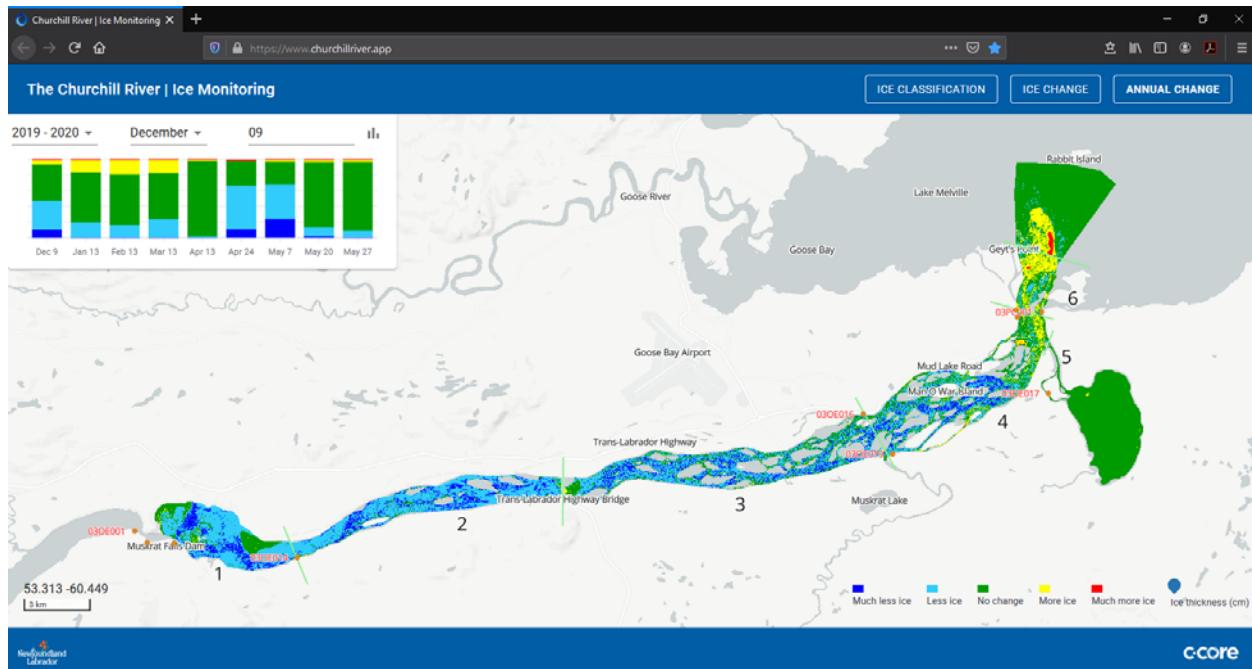


Figure 3. Churchill River Ice Monitoring application (www.churchillriver.app) annual ice change detection page

5 River Ice Thickness

Beginning with the 2019-2020 ice season, approximately between mid-January and the end of April, ice thickness measurements are displayed on the application. These data come from four locations on the ice cover where ice thickness is being measured and are identified by the blue markers (Figure 4). The numbers within each marker represent the ice thickness measured in centimeters at the time of the ice classification or change. Use the left mouse button to display all of the ice thickness data available for a particular ice season (Figure 5). Use the mouse to hover over a point on the line and the ice thickness for that time will be displayed. These measurements are only available during the season when there is a solid ice cover. This information is not available during freeze-up or break-up. The measurements come from equipment installed on the ice, which measures, records, and transmits temperature data autonomously.

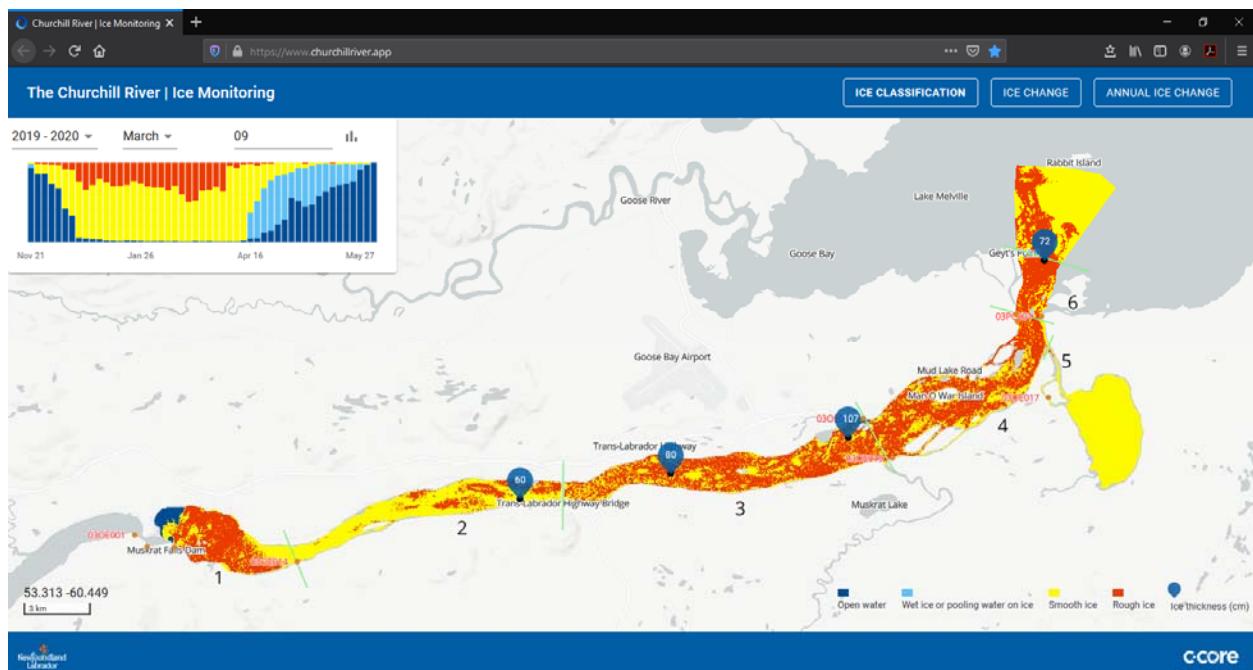
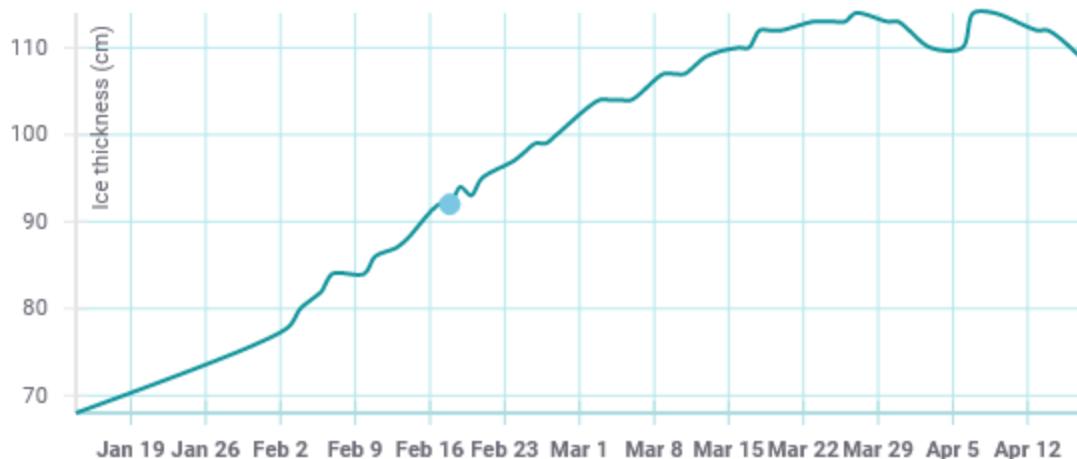


Figure 4. Churchill River Ice Monitoring application (www.churchillriver.app) ice thickness page



SIMBA real time ice thickness monitoring buoys

Location: HVGB



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Figure 5. Ice thickness measurements for one season



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