

Arfi: Avalanche Research Forecasting Interface

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Introduction

New for this year is a program named Arfi, which is short for the Avalanche Research Forecasting Interface. It is a visual collection of resources relevant to avalanche forecasting (Figure 1). The user is able to assess at a glance the resources available for a given geographic location in southwestern Canada and instantaneously bring up the desired resource in a browser window. Arfi is written using a Google Maps interface but Arfi is more than just Google Maps. In the background, the program contains geographical data across western Alberta and almost all of British Columbia. This allows you to filter the web cams, weather stations, and so on by elevation, aspect, and slope.

Additionally, Arfi can use this geographical data to run some simple models right in the interface. The models that Arfi currently contains are: (1) SWarm, the sub-surface snow warming model developed by Laura Bakermans with ASARC in 2006; (2) GSWarm (currently limited to specific regions), a map version of SWarm, and (3) A point reader for the GEM weather model, which is one of the tools that Environment Canada uses to forecast the weather.

This type of geographical data browsing has a lot of power, and can save a lot of time. Its power is immediately and intuitively obvious to people, including us as developers.

Resources available

The majority of the resources in Arfi are publicly available. In addition to the model outputs listed above, available resources include: webcams; BC Highways weather station sites; Parks Canada and private weather dataloggers; River Forecast Centre snow pillow sites; and ski hill weather reports. Environment Canada forecasts are available for certain towns. Additionally the user may bring up the current CAC or partner avalanche bulletin.

One resource that is not publicly available (although there is a case that it should be) is the Remote Weather Information Service (RWIS) high elevation weather station data. Access to this resource is password protected by the BC Government, although the login procedure is somewhat streamlined through the Arfi interface.

With many resources available, methods for selecting desired resources are required. Layers can be selected or

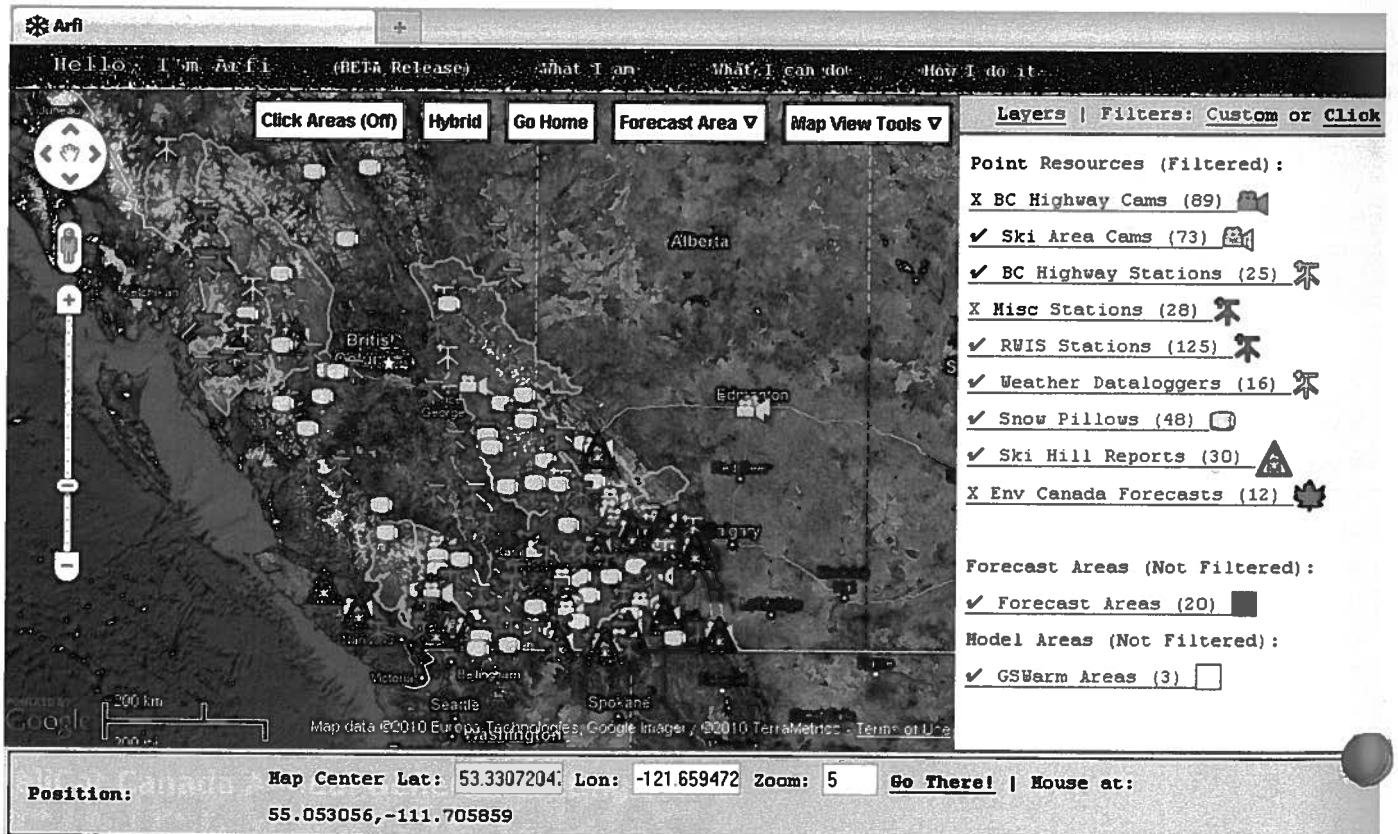


Figure 1. Arfi presents a visual collection of resources to the user. Arfi is available at: www.ucalgary.ca/asarc/arfi

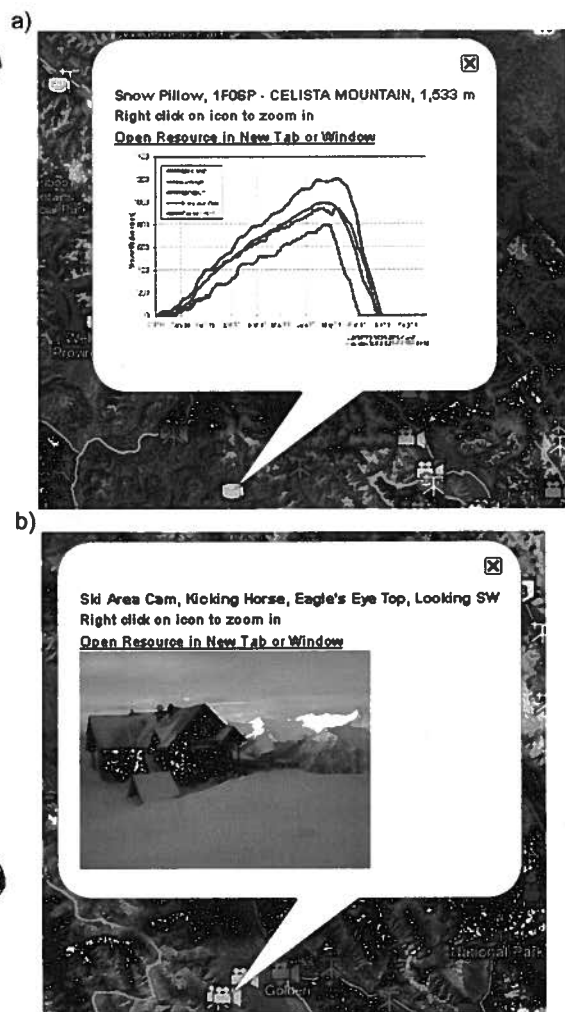


Figure 2. Preview pane for a specific resource: a) Celista Mountain snow pillow site and b) Kicking Horse ski area webcam.

unselected. Mouse-over text and a preview box (Figure 2) further help the user identify the correct resource.

CAC uptake and use

Arfi has been integrated with the Canadian Avalanche Centre (CAC) forecaster workflow. It is particularly useful during the data gathering phase of forecast production. Arfi offers time saving over previous ad-hoc collections of resources (usually stored as favourites in a forecaster's browser) as everything is available in one single location. Arfi still runs within a browser, and so it needs no special software other than Firefox or Chrome. Quality of information for the public bulletins is assured, as the forecaster can readily assess the data sources available for a given forecast region.

Uptake amongst the forecasters has been universal and initial response has been extremely positive. New forecasters particularly like Arfi as it instantaneously provides them with knowledge of the resources available for a given forecast area. Even more experienced

forecasters are finding there are resources available they either didn't know about, had forgotten about, or simply were not using due to the effort required to track down the link to that particular resource.

The use of the warming models in Arfi (SWarm and GSwarm) has yet to be fully assessed, since knowledge of how the model information relates to avalanche stability is not currently well developed. Initial response for the GEM point reader is that it is useful for more remote regions (such as Bighorn country) where the forecaster's knowledge of weather patterns for that region may not be as honed compared with, for example, the Columbias. As a general statement, it is exciting to have a place where research models can be assessed as part of the forecasters' daily data stream. Future possibilities include modeled snowpack profiles and surface hoar coverage overlays. Ready access to these models can only help to strengthen links between forecasters and university researchers.

Future development

There are many things we'd like to do with Arfi. Right now, some of those things raise more questions than we have answers for. For example, we would like to keep much of Arfi publicly available, but in the future we would also like to include some protected and private data, like selected snow observations. One of the challenges will be figuring out how we can design Arfi to have the public and private pieces work side by side.

We would also like to display polygons of snow layers, but organizing, maintaining, and displaying this kind of data is quite complex. Once we start drawing lines on a map to indicate snowpack conditions, those lines should have meaning and be drawn with care. Furthermore, the sheer amount of data now accessible through Arfi raises additional philosophical questions about filtering, selecting, and keeping these resources current.

It is great that the CAC has agreed to adopt Arfi for use in avalanche forecasting this winter. Many of these development questions can probably be answered by some extensive practical use and figuring out where additional development time will come from. And even now, Arfi provides a useful geographic resource tool to forecasters and backcountry users alike. Try it yourself: www.ucalgary.ca/asarc/arfi

Acknowledgements

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