Glacier Sim

design document supplement

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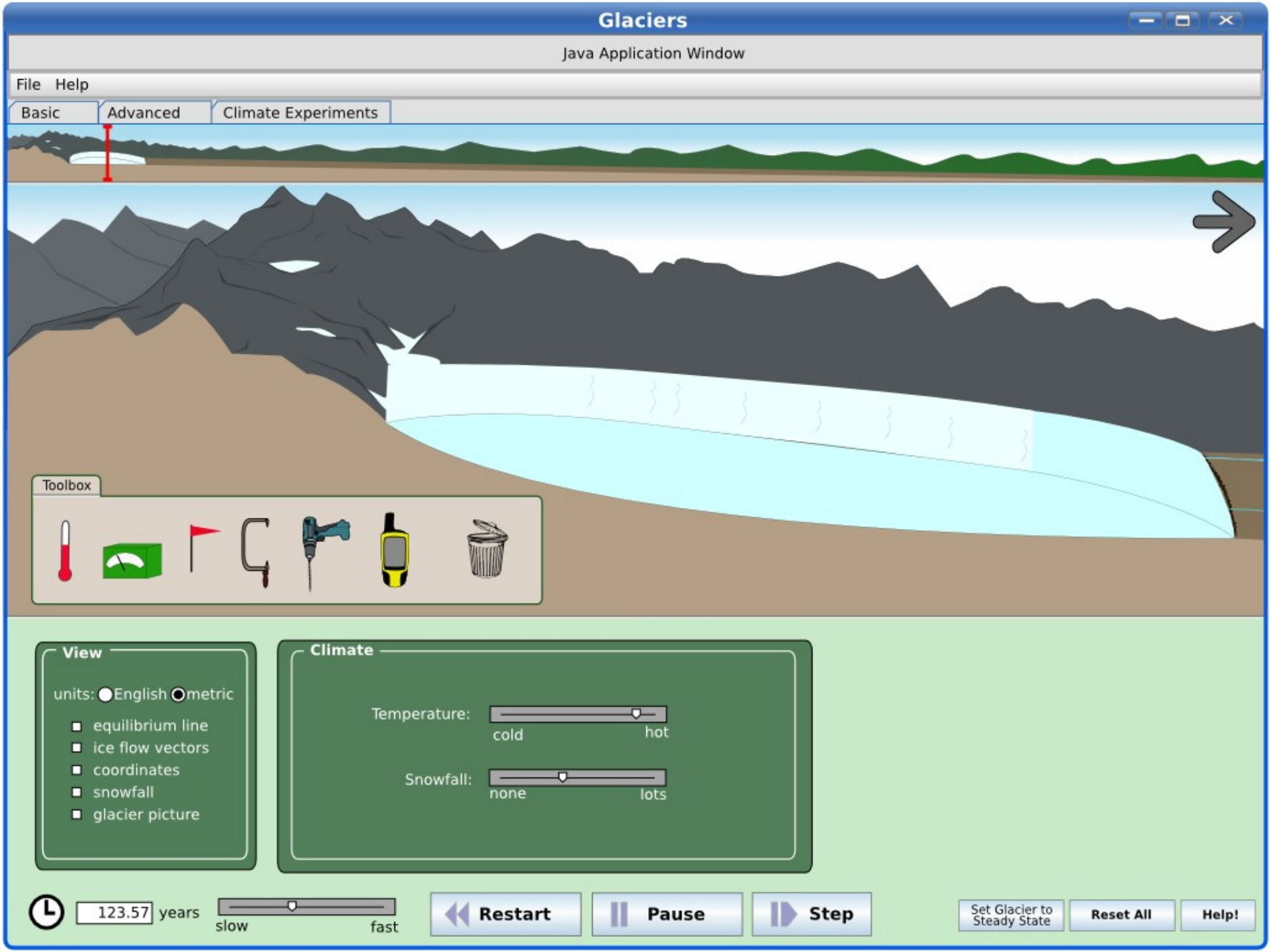
May 31, 2008

This document describes recent suggestions for the three-tab interface.

Contents

Basic Tab

- Only two sliders for climate control, with no numerical values.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Climate
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cold
hot
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none
lots
123.57 years
slow
fast
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Set Glacier to Steady State
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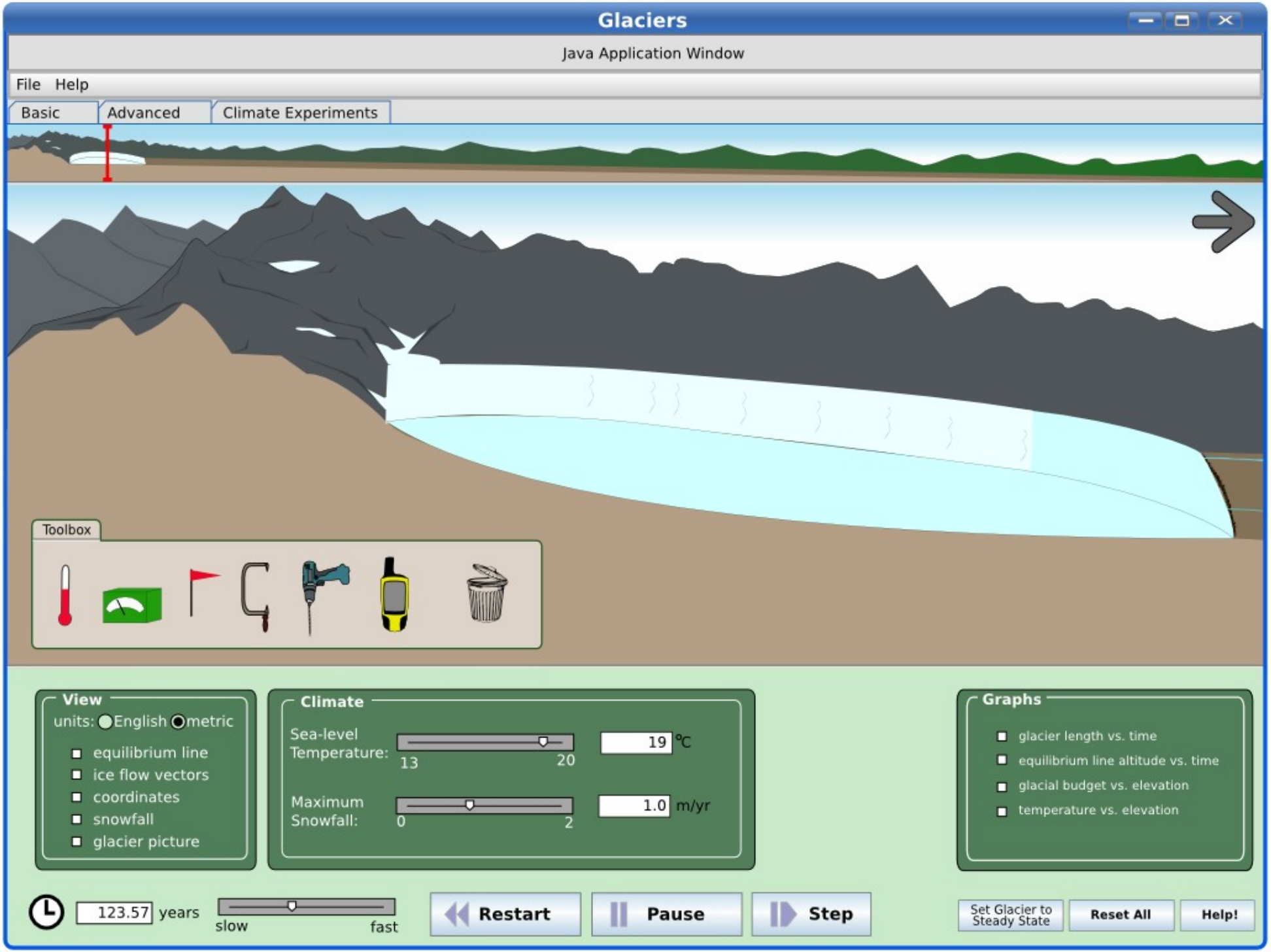
Advanced Tab

- The same two sliders for climate control, this time with numerical values.
- Graphing capabilities.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13
20
19 ℃
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0
2
1.0 m/yr
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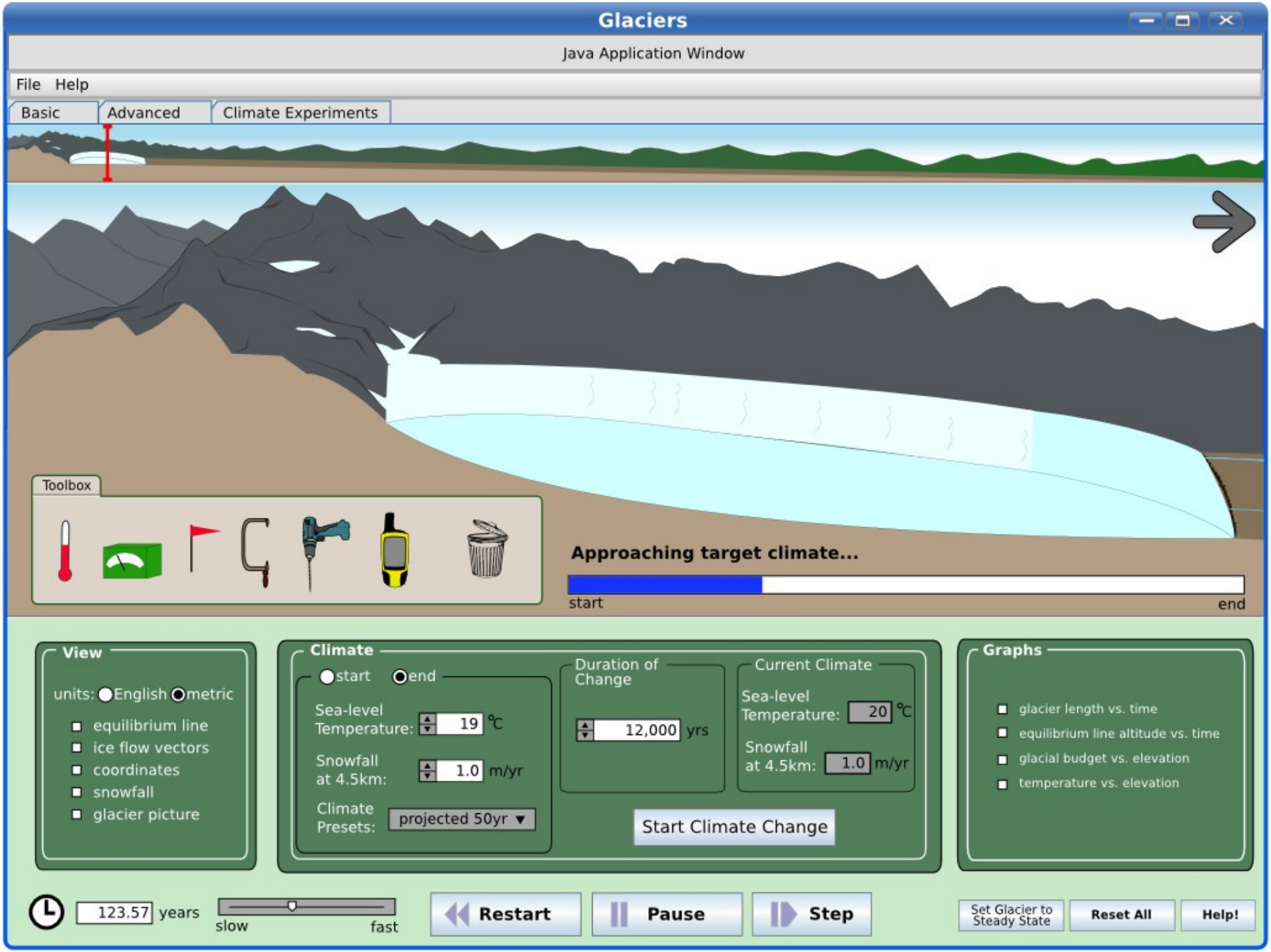
Climate Experiment Tab

- "View" and "Graphs" are the same as in the Advanced Tab.
- "Climate" box
  - this box enables the user to select a beginning and ending climate, and the duration of time between these endpoints
  - "start" and "end" are radio buttons; when one is selected the controls below it alter the climate settings for the endpoints
  - the temperature and snowfall controls work the same as in the other panels, but are spinners instead of sliders
  - Under the two climate spinner there are "Climate Presets" in a drop-down menu
    - presets are "modern", "projected 50yr", "glacial maximum", "custom" (initial default)
    - if a climate preset is selected, the two climate sliders jump to their corresponding values
    - if the climate sliders are moved, the drop-down goes to "custom"
  - "Duration of Change" allows users to set the time interval between starting and ending climates (minimum time allowed is one sim timestep)
  - "Current Climate" is a readout of the current temperature and snowfall (not editable)
  - "Start Climate Change" button
    - when clicked, the experiment begins by setting the glacier to the steady state of the start climate; the climate then changes linearly in time to the end-state
    - when the experiment is running, the button text changes to "Stop Climate Change"
    - while the experiment is running, the start and end climate controls cannot be changed
- additional information in the play area, to the right of the toolbox
  - text message reports one of the following: "No climate experiment running.", "Approaching target climate...", or "Target climate achieved."
  - when a climate experiment is running, a progress bar shows the relative time remaining
- default start and end climates are "modern" and "projected 50yr", respectively
- other issues suggested by Chris
  - putting marks on the graphs to see when the experiment begins, ends, or is aborted; this seems like a good idea
  - while the experiment is not running, the clock controls are disabled and the sim is paused; this is acceptable to me, too.
  - When you start a new experiment, any open graphs are cleared; ok by me.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end
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snowfall
glacier picture
Climate
start end
Sea-level Temperature: 19 ℃
Snowfall at 4.5km: 1.0 m/yr
Climate Presets: projected 50yr
Duration of Change
12,000 yrs
Current Climate
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Snowfall at 4.5km: 1.0 m/yr
Start Climate Change
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Climate Experiment Usage Scenarios

1. Ashley is using the Advanced Tab. She wants the glacier to grow longer, but does not want it to surge forward at top speed, as it would in the other two tabs. She knows, from playing in the Advanced tab, which climate values provide the initial and final glacier steady states. She goes to the third tab and sets up the start climate and end climate accordingly. She then chooses an experiment duration a bit longer than what she found it took in the Advanced tab (where the climate changes immediately). She clicks "start climate change," and the glacier jumps to the steady state appropriate for the starting climate. She then waits until the progress bar is complete. If she gets impatient, she can increase the clock speed. She knows it's finished when the progress bar gets to the end and a message appears. She then investigates the time-dependent graphs to see what happened, and how it differed from the immediate climate change.
2. Bob is doing homework that asks how the glacier length changes from the Last Glacial Maximum (LGM) to the present. He knows that the LGM occurred 12,000 years ago. He goes to the third tab, and uses the "climate presets" to set the starting climate to "glacial maximum" and the end climate to "modern". He sets the duration to 12kyrs and clicks "start climate change." He sees the glacier's length change slowly. At the fastest sim speed, he may still have to wait a large fraction of a minute for the experiment to complete.
3. Bob is re-running the experiment in scenario 2. He changes values in the start and end climate settings, but the experiment continues as before. He sees that button that used to say "start climate change" now says "stop climate change", and he clicks it. The climate stops changing, and the glacier continues to change until it is in the steady state for the (mid-way) climate settings. The progress bar has disappeared and the text says "no climate experiment running". He hits the "start climate change" button again and the glacier jumps to the steady state of the "start" climate and again begins to change. When he later sees his graphs, he notices the times at which he started, aborted, and re-started the experiment.
4. Chuck doesn't know what the third tab is for. He goes there and sees that nothing is happening. He may notice the message that says "no climate experiment running". He clicks the "start climate change" button and sees that the glacier begins to recede. He also notices that the climate is warming. There is now a message saying the we are "approaching target climate", so he waits, watching as the glacier disappears. He fiddles with the controls as the climate warms, but is unable to change the start and end climates until the experiment completes.
5. Chuck is a little underwhelmed by the climate change experiment (scenario 4). He clicks the "start climate change" button again but sees that it's just going to repeat itself. So he finds the start and end climate controls, and again cannot move them. He clicks "stop climate change", and now the controls are changeable. He puts the end climate to "glacial maximum" because that sounds extreme. He set the duration to 1 year, since that's the lowest it will go. He clicks "start climate change", and sees that the glacier is growing just as it was in the previous tabs, even though he sees that the climate changed almost immediately and the experiment has already achieved its target climate. He's not too impressed, but at least he learned that you can't make the glacier change any faster.