

# Influence of Luge Track Sidewall Color on Ice Quality

## ABSTRACT

The purpose of our project is to determine if the sidewall color on the side of a luge track influences the quality of the ice and how long the ice lasts. The GLOBE protocols we used were air temperature and surface temperature. The results of our research are that the color of the boards along the side of the luge track makes a difference in ice quality. When the boards are a lighter color, the ice quality is better and helps the ice to last longer in the spring.

The purpose of our project is to determine if the wall color of the boards on the side of a luge track influences the quality of the ice and how long it lasts.

We experimented with a TERRA Rover and found that heat seemed to be attracted to the black pavement because it was hotter than the light-colored sidewalk. We then tested the idea that darker colors attract heat and lighter colors reflect it away.

We took pieces of cardboard and painted them different colors. We let them dry and then put them in the sun for an hour. Next, we used a handheld infrared thermometer to check the temperature of each piece of painted cardboard. We found that lighter colors were colder than the dark colors.

One of our classmates is a member of the Upper Peninsula Luge Club. They practice at Lucy Hill, in Negaunee, Michigan. Lucy Hill is the only iced natural track luge hill in North America. The UP Luge Club asked our class if there is anything that can be done to keep the ice on the track longer.

Members of the club showed us pictures of the ice next to the side wall or boards from the previous year. We noticed that the boards of the luge track are a dark brown color. During the beginning and middle of the luge season, the ice is right up against the boards, and in March there was a gap between the ice and the wall (Figure 1). It's like the ice was being pulled away from the boards, but it probably is just melting close to the board. We thought if the boards were a different color, maybe the ice wouldn't pull away so the ice would last longer.



Figure 1: (a) Early in the luge season, the ice is right next to the sidewall or boards of the track. (b) Later in the season, the ice melts next to the sidewall.

In the fall our class went to Lucy Hill to paint the luge track's boards. Some were painted light colors, others dark, and others were left unpainted. We tried to use the rover to do some readings, but it didn't have enough traction to go up the hill.

Then we waited. In March we went back to Lucy Hill to take measurements of ice quality and temperatures of the boards with an IRT three different times within 10 days (Figure 2). We followed air temperature and surface temperature protocols.

We numbered the segments of boards from the bottom up. The odd numbered boards were painted and the even numbered boards were unpainted. To rate ice quality, we measured the temperature of each sidewall board segment, air temperature, and how far away the ice was pulled away from the board. We found out that the colors matter.

This graph shows the data we collected (Figure 2). The odd numbered board segments (the ones we painted) have a smaller distance between the board and top of the ice surface than the wall gap than the even numbered boards. This means that the boards that we painted had less melting than the boards that were unpainted.

This makes sense because in our reading we found that darker colors absorb heat and lighter colors reflect heat. So the darker colors of the unpainted boards will cause the board to heat up which causes the ice to melt faster. Light colors reflect heat, so the boards wouldn't heat up as fast so the ice melts slower.

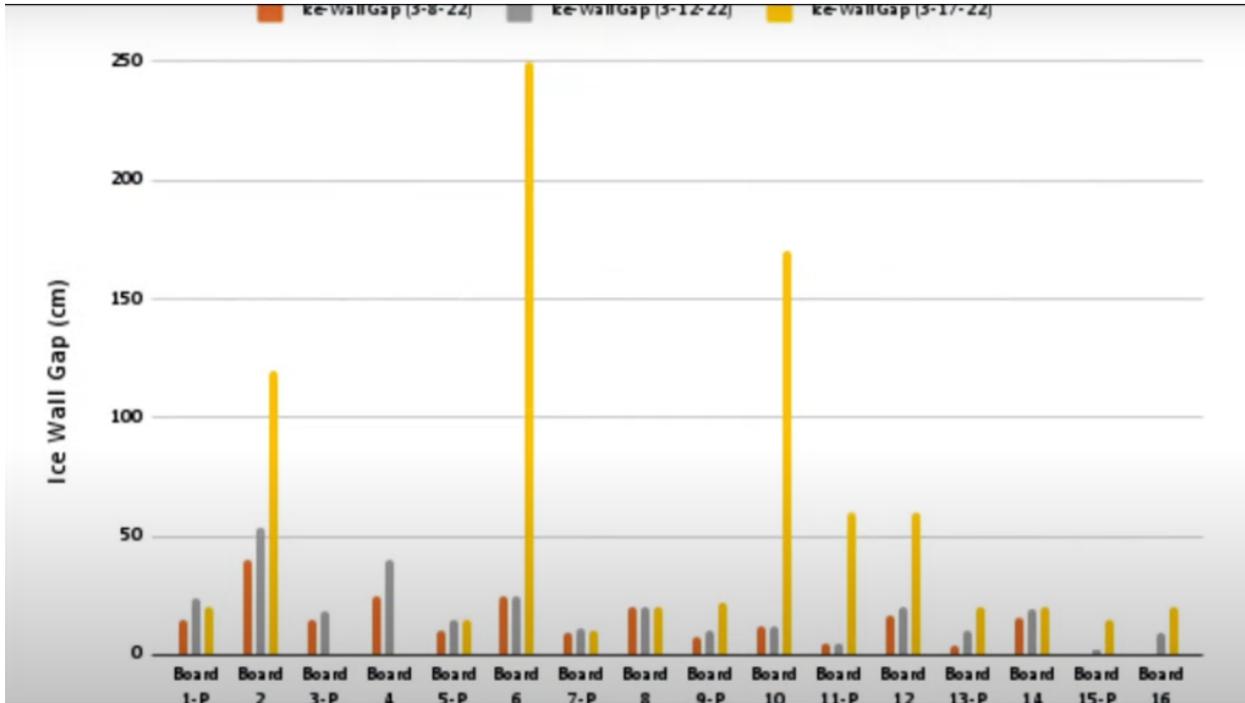


Figure 2: The ice and side wall gap is shown on the painted (odd numbered) boards and unpainted (even numbered) boards.

We suggested that the Upper Peninsula Luge Club put some lighter board colors on the boards that way the ice won't melt that fast. Or replace the brown boards with lighter color boards, perhaps use acacia or oak boards. We could also use a lot more moisture on it. When wood is green, it's got more moisture.

With our suggestions, the luge club plans to paint the lower portion of the boards along the entire ½ mile track.

We had some problems collecting and recording data. When we went to Lucy Hill in the fall, we tried to use the TERRA Rover to take some measurements, but the ROVER wouldn't go up the hill. The ROVER was just slipping and getting stuck in the grass. Next year, we could put the ROVER on a sled going down the luge hill instead of going up. It could work in the fall and the winter.

We also had a problem with data collection on one of our March visits. The handheld IRT didn't work, so we just took distance measurements.

The weather warmed up really quickly in March. By the time of our last visit, the ice had melted so much that sometimes it was hard to tell where to take distance measurements.

We appreciated doing this research for GLOBE and NASA because it is really fun and we were able to help the luge club.