Quick Study: Cold-Weather Effects on Velocity

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Last week, the Astros' Dallas Keuchel and the Yankees' Masahiro Tanaka faced off on Opening Day in New York. The first Opening Day was pushed back a day because of wintry weather. This day was no different, with a 36-degree first-pitch temperature and 18 mph wind. The next day, I ran my daily velocity report and both of the above names were on the list of starters who'd exhibited huge velocity drops. Keuchel was down 2.5 mph and Tanaka was down 2.3 mph. By running a quick study, I found that colder weather does have a fairly dramatic effect on pitcher velocity.

To find the data, I ran a query using the PITCHf/x database. For the years 2008 to 2015, I compared average velocity from a game which started at 40 degrees or less and the average from the rest of their games. The average change in velocity was -0.95 mph, with a median value of -0.92 mph. A pitcher throwing in a cold game should expect some velocity decline.

> Note: Reader yaboynate quickly pointed out that the drop because it is early in the season. I change the query around a bit, and found the average and median change to -0.58 mph. Now the rest of April would be colder and the whole month is lower to start with.

Here are how the velocity changes were distributed.

Cold-Weather Effects, 2008-15

Velocity Change	# of Pitchers	% Change
> 2 mph	3	0.7%
1 to 2 mph	17	3.7%
-1 to 1 mph	221	48.3%
-2 to -1 mph	136	30.0%
< -2 mph	81	17.7%
Total	**458**	**100%**

Well, the cold weather definitely limits any upside and almost half the pitchers in the sample experienced a 1 mph loss — with one in every eight experiencing a 2 mph loss relative to the rest of the season. The differences shrink as the games warm up. From 40 to 50 degrees, the gap is around -0.6 mph; from 50 to 60 degrees, around -0.4 mph.

So, it's simple: when looking at early season velocity declines, look at game temperatures. Part of the reason for the decline could be attributed to the cold weather.