Snowiest Nine Year Period in NYC History

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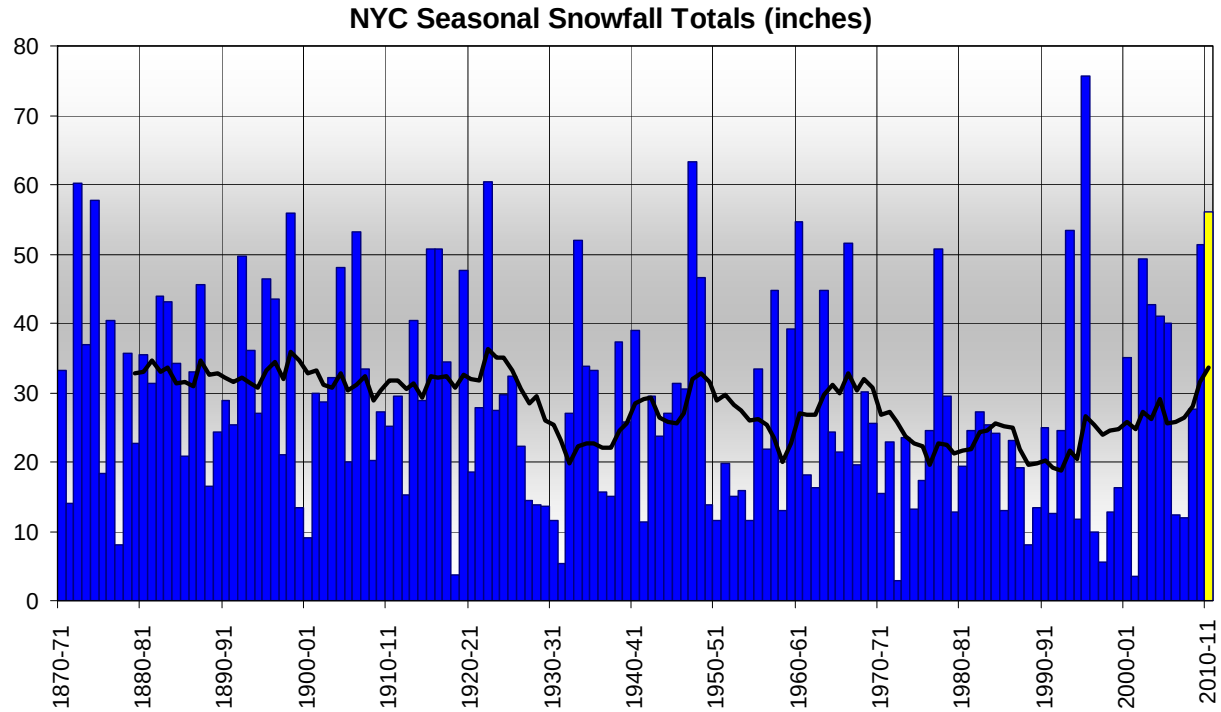
The latest in a series of winter storms dropped over 19" of snow on New York City over the past day, pushing the seasonal snowfall total to 56.1", and above the 40" mark for the sixth time in the past nine years, and over 50" for the second consecutive year. That statistic is even more impressive when it is noted that the entire 1960-2002 period only produced six winters with more than 40" of snow. In fact, the 1978-1993 period not only failed to produce a winter with 40" of snowfall, it did not produce a single winter with more than 30" of snowfall. If this winter season produces more than 57.7" of snowfall in NYC (highly likely at this point), the average snowfall over the last nine winters will be 37.1" per winter, more than any other nine year period in NYC history going all the way back to 1870.

The graph below depicts the yearly NYC snowfall since 1870. The yellow bar on the right denotes the current winter's 56.1" snowfall total through January 27, 2011.



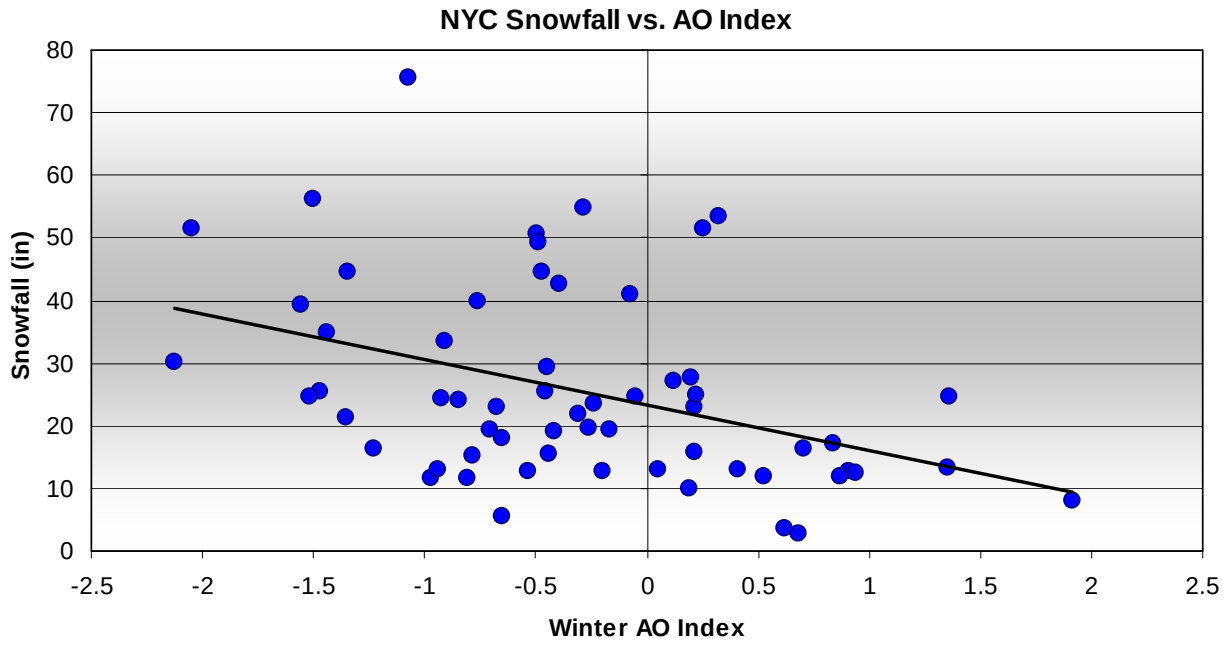
The recent increase in snowfall is largely the result of a trend towards more frequent negative Arctic Oscillation patterns during the winter season. Snowfall has correlated with the phase of the AO especially well during the last 20 years, as measured by the average AO index during the November-March period. Since 1990, average winter snowfall at Central Park in NYC breaks down as follows:

Winters with a positive AO: 18.5"
Winters with a negative AO: 39.2"

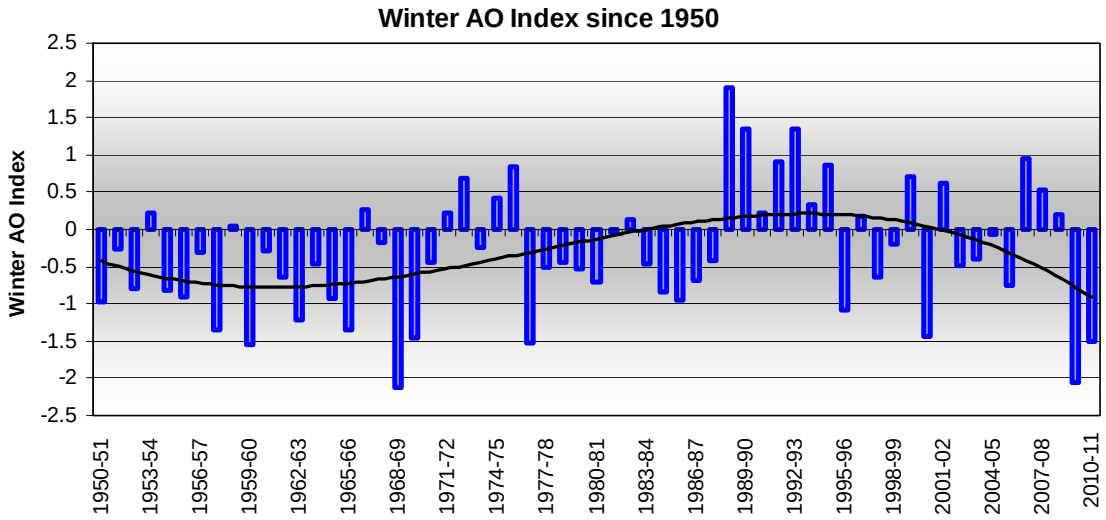
If you go back to 1950, the differences are not quite as dramatic, but still quite evident:

Winters with a positive AO: 18.8”
Winters with a negative AO: 28.5”

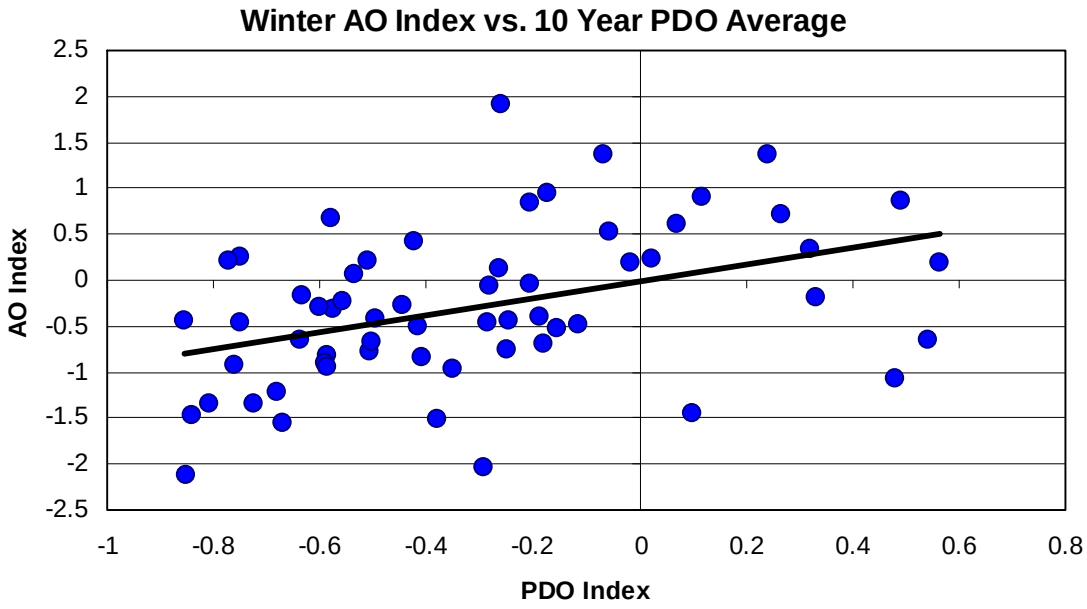
The trend between snowfall and the AO index can be seen graphically in the chart below.



Clearly, not all winters with a negative AO see above average snowfall, but most winters with a positive AO see below average snowfall. If the trend towards more frequent winters with a negative AO continues (as illustrated in the chart below), then winters with above normal snowfall in NYC, and the Northeast in general, are likely to outnumber the winters with below normal snowfall during the next decade.



Many climate indices tend to move in tandem with other indices, and the AO also shows a correlation with the PDO index. The average winter AO index (since 1950) when the 10 year mean PDO average is negative is -0.43, but when the 10 year mean PDO phase is positive the AO averages +0.15.



The 10 year average of the PDO index itself turned negative during 2002. Since then, six winters have featured a negative AO, and three winters a positive AO, with all six of the negative AO winters seeing more than 40" of snow in NYC. Since the long-term negative phase of the PDO is likely to continue for another decade or more, this adds more confidence to the expectations for increased –AO frequency and as a result, continued above average snowfall in the Northeast megalopolis during the next decade or so.

Of course, the combination of a negative PDO phase, more frequent negative AO winters, and expectations for continued weaker than average solar activity during the coming decade will also increase the odds for colder than normal winters along with the increased snowfall. Some mild winters and winters with little snowfall are still likely during the coming decade but such winters will likely be outnumbered by colder, snowier ones.

Sources:

AO Index: http://www.cpc.ncep.noaa.gov/products/precip/CWlink/daily_ao_index/ao.shtml

PDO Index:
http://jisao.washington.edu/pdo/PDO.latest

NYC Snowfall:
http://www.erh.noaa.gov/okx/climate/records/monthseasonsnowfall.html