Evaluating the impacts of atmospheric rivers on the Rillito Creek Watershed
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Introduction
An atmospheric river is a phenomenon that transports large quantities of moisture across the lower troposphere. They can lead to extreme flooding but are also responsible for recharging the Colorado River which is critical for arid climates in the Southwest. This study intends to understand the historical impacts of atmospheric rivers on the Rillito River watershed in Tucson, Arizona.

Methods
We collected daily precipitation, streamflow, and water vapor flux data from NOAA, USGS, and NASA’s MERRA dataset, respectively. Atmospheric rivers were characterized by water vapor flux criteria in duration, length, and concentration. Total days and depth of precipitation were compared between days that did and did not have an AR take place. Precipitation was categorized into the following:

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>PERCENTILE</th>
</tr>
</thead>
<tbody>
<tr>
<td>extreme</td>
<td>&gt;98%</td>
</tr>
<tr>
<td>very heavy</td>
<td>&gt;95%</td>
</tr>
<tr>
<td>heavy</td>
<td>&gt;90%</td>
</tr>
<tr>
<td>average</td>
<td>&gt;50%</td>
</tr>
</tbody>
</table>

Conclusion
Atmospheric rivers contributed 36% of rainfall from 1979 to 2009, making them a critical component of water resources in Tucson. Particularly extreme precipitation events derive more often from ARs than average events. This is even more true for flow.

Discussion
Tropical depressions found their way into the model that identified atmospheric rivers based on atmospheric vapor flux criteria. Stream gauges had not begun collecting data until after the beginning of the observation period.

References
Precipitation data acquired from NOAA
Streamflow data acquired from USGS
Water vapor flux data acquired from NASA
Map developed with data from Esri, HERE Garmin, SafeGraph, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USDA, NGA