Relationship of warm season cycles in on-shore pressure differences and temperatures in north-central California

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Cimatological data from 1999 to 2003 for the months of July and September were obtained in order to determine the mid- and late- summer relationship between the pressure difference across north-central California (using San Francisco (SFO) and Sacramento (SAC) as endpoints) and the temperature at those given locations in the late afternoon (00 UTC). The data analyses corroborated that there was a statistically significant negative correlation between the pressure gradient so defined and temperatures at San Francisco and that this correlation explained over 25% of the variance in the SFO temperature record. There was a smaller statistically significant correlation between the pressure gradient and 00 UTC temperatures at SAC that explained less than 10% of the variance in temperatures there. An examination of various synoptic charts, including those for the surface and 500 mb, for the period showed that thermal effects dominated the nature of the pressure gradient during mid-summer (July) but that these effects were strongly modulated by dynamic effects associated with migratory disturbances in the jet stream, which begins its climatological southward progression by early fall (September). Two case studies were chosen to illustrate this relationship, one on July 6, 2003 and the other on September 21, 2003.

Figure 1: Temperature Vs. Pressure SFO-SAC September 2003. One of the excel graphs created to demonstrate the negative correlation between the pressure difference from San Francisco (SFO) to Sacramento (SAC) and the temperatures at those locations.