Seminários Contínuos do Programa de Pós-Graduação em Matemática

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Mathematics applied to Meteorology: the example of the Influence Functions

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ABSTRACT

Climatic variations in a region are very frequently produced through teleconnections remotely forced by tropical convection anomalies associated with ocean-atmosphere climate oscillations. The impact of El Niño-Southern Oscillation on southern Brazil is a famous example of such teleconnections. Another less known example is the impact of the Madden Julian Oscillation on Southeast Brazil. It is of interest for subseasonal and seasonal forecast to know which of the multiple anomalies of tropical convection produced by important climate oscillations is responsible for disturbances that cause rainfall above or below normal in a certain target region of interest.

There are several possible approaches to this problem, but they have some disadvantages. Here we present a different approach, the Influence Functions, based on the concept of Green's Functions. Considering that an important mechanism for the teleconnections are the so-called atmospheric Rossby waves, a simple equation for the atmospheric circulation capable of reproducing these waves is used: the extended barotropic vorticity equation. Influence functions obtained with this equation disclose the locations in which the tropical anomalous convection is more efficient in producing perturbations in a target region of interest. These locations should be monitored for prediction purposes. The comparison of the results with observations show that the Influence Functions are a very useful tool.