Geophysical Research Abstracts,
Vol. 11, EGU2009-14011, 2009
EGU General Assembly 2009

Extra-tropical cyclone and climate (Alfred Wegener Medal lecture)

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Extra-tropical cyclones play a key role in the climate system in effectively transporting heat, water vapour and momentum towards higher latitudes. The main energy source of extra-tropical cyclones is the available potential energy of the atmosphere first recognized by Max Margules in the beginning of the last century but clarified much later in a series of papers by Edward Lorenz. With the assumption that the initial state is well determined present weather prediction models are able to predict the development of extra-tropical systems several days in advance and this is one of the reasons to the large improvement in weather forecasting in recent years.
Whilst our knowledge of extra-tropical cyclones has continued to improve several questions requires a better scientific understanding. One of these is the mutual interaction between transient cyclones and the large-scale quasi-stationary pattern of the atmospheric circulation such as blocking.
Another important issue is the possible change in extra-tropical cyclones in a warmer climate. This might come about through changes in the storm tracks or in changes in extreme cyclones.
In my presentation I will present some recent results based on the assessment of storm tracks and the evolution of cyclones in high–resolution global models in the present and future climate using a Lagrangean approach.