

## 初始误差和参数误差对混沌系统可预报性影响的比较

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**摘要** 利用非线性误差增长理论,以Lorenz系统为例比较研究了初始误差和参数误差对混沌系统可预报性的影响.结果表明:在初始误差和参数误差单独存在时,系统的可预报期限随误差大小的变化规律基本上相同;对于相同的误差大小,初始误差和参数误差对系统可预报期限的影响几乎相同,这一结果基本上不随参数范围的变化而变化.当初始误差和参数误差同时存在时,两者对可预报期限影响所起的作用大小主要取决于初始误差和参数误差的相对大小.当初始误差远大于参数误差时,Lorenz系统的可预报期限主要由初始误差决定,可以不用考虑参数误差对预报模式可预报性的影响;反之,当参数误差远大于初始误差时,Lorenz系统的可预报期限主要由参数误差决定;当初始误差和参数误差大小相当时,两者都对系统的可预报期限起重要作用.在后两种情况下,在考虑初始误差对可预报性影响的同时还必须考虑参数误差的作用.这提醒我们在作实际数值天气预报的时候,不仅要重视初值的确定,也要重视数值模式控制参数的确定.

**关键词** [数值天气预报](#) [可预报性](#) [初始误差](#) [参数误差](#) [Lorenz系统](#)

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## Comparison of the influences of initial error and model parameter error on the predictability of numerical forecast

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**Abstract** Based on the nonlinear error growth dynamics introduced by the authors recently, the influences of initial error and model parameter error on the Lorenz system's predictability are studied. The major results are summarized as follows: (i) When there is initial error only or model parameter error only in the Lorenz system, the error growth and predictability limit are comparable between two kinds of error problems. This result holds basically for the wide range of parameter space of Lorenz system. (ii) When initial error and model parameter error coexist in the Lorenz system, the influences of initial error and model parameter error on the predictability of Lorenz system depend on their relative sizes. When the size of initial error is far greater than that of model parameter error, the predictability limit of Lorenz system is mainly determined by initial error. On the contrary, when the size of model parameter error is far greater than that of initial error, the predictability limit of Lorenz system is mainly determined by model parameter error. When the size of initial error is close to that of model parameter error, they both contribute to the predictability limit of Lorenz system. These results indicate that when numerical weather forecast is made, we should pay great attention to the determination of model parameter, not just the determination of initial condition.

**Key words** [Numerical weather forecast](#); [Predictability](#); [Initial error](#); [Parameter error](#); [Lorenz system](#)

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