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Regime Predictability in an Atmospheric Model or Analogue Prediction Revisited

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Predictability properties of atmospheric flow are diagnosed and analysed empirically using nonlinear time series analysis techniques. The notion of predictability is relaxed from accurate prediction of individual trajectories to a coarse-grained view in which only probabilities of visiting certain regions of state space or regimes are forecast. The regimes and the transition probabilities between them are determined simultaneously by fitting a hidden Markov model to data of the system. Then predictability information is refined by building a nearest neighbour or analogue model of the regime posterior. Regime predictability is examined as a function of initial condition; states with particularly high or low regime predictability are identified. The method bears the potential of improving intraseasonal or seasonal prediction by combining dynamical models with the present statistical model. The ideas are studied in the classical Lorenz system as well as in an atmospheric model with realistic climatology, variability and teleconnection patterns.