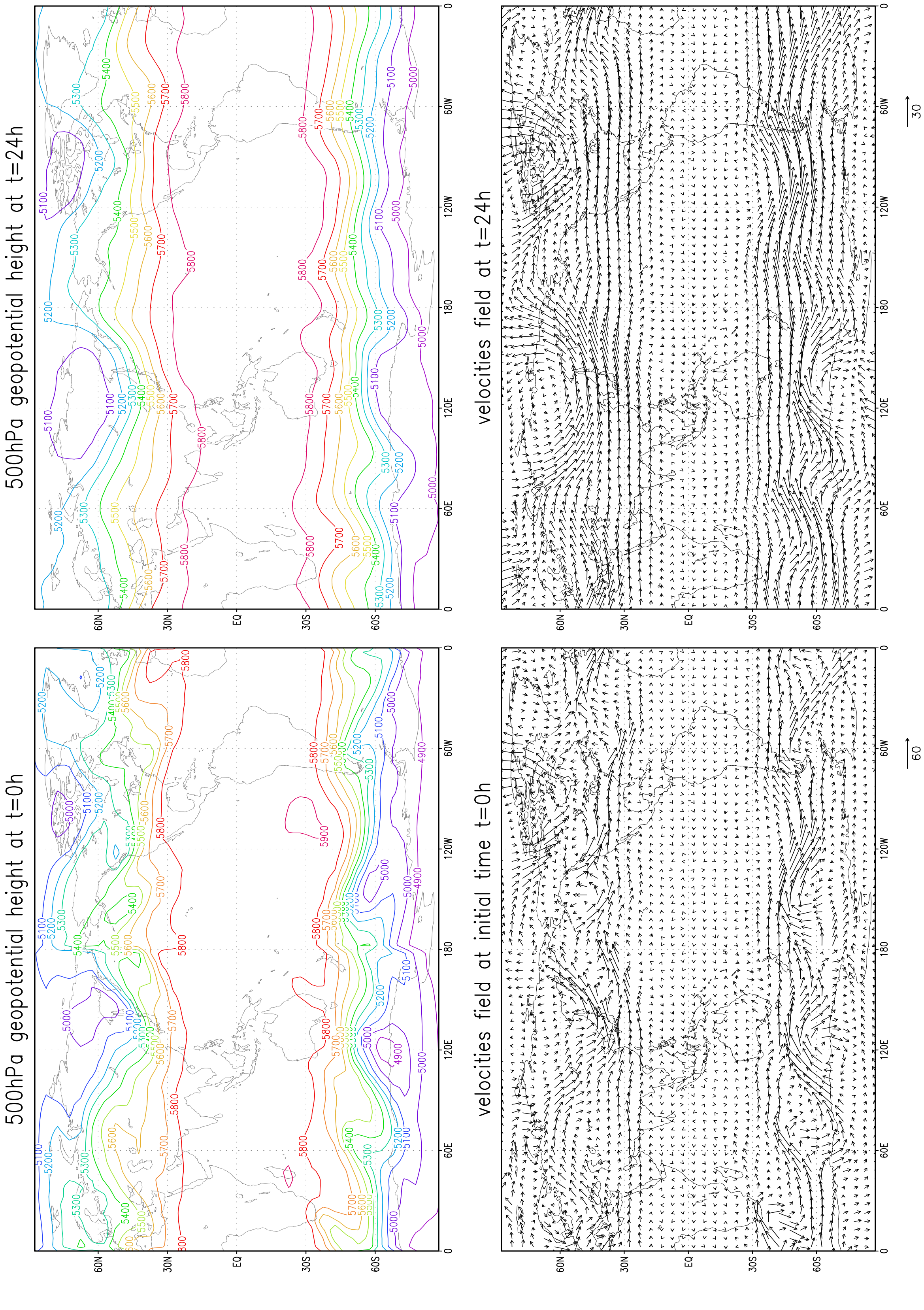

Figure 1: 500hPa geopotential height and velocities field at the initial time t=0h and t=24h forecast

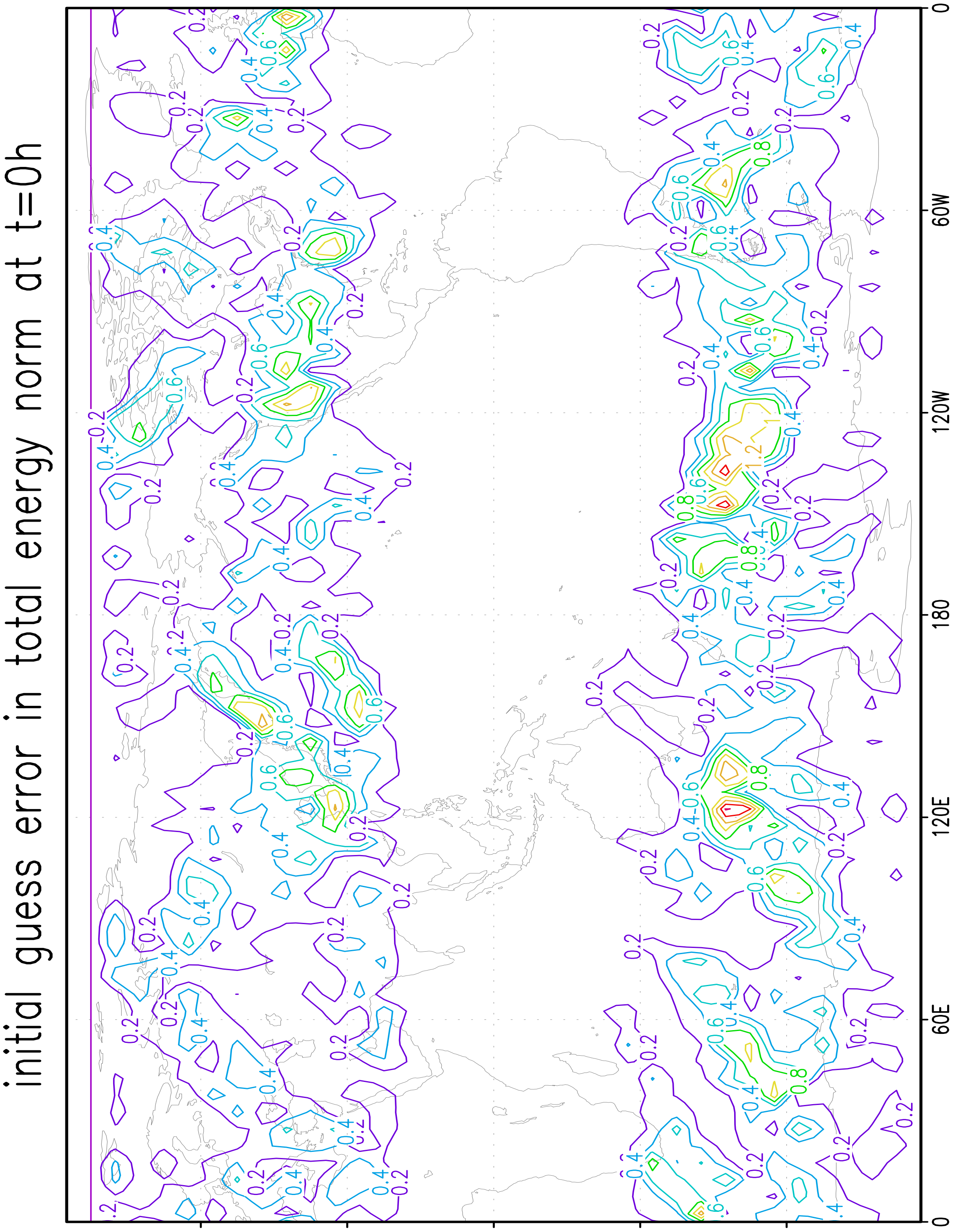

Figure 2: Error in total energy norm of initial guess model state at t=0h

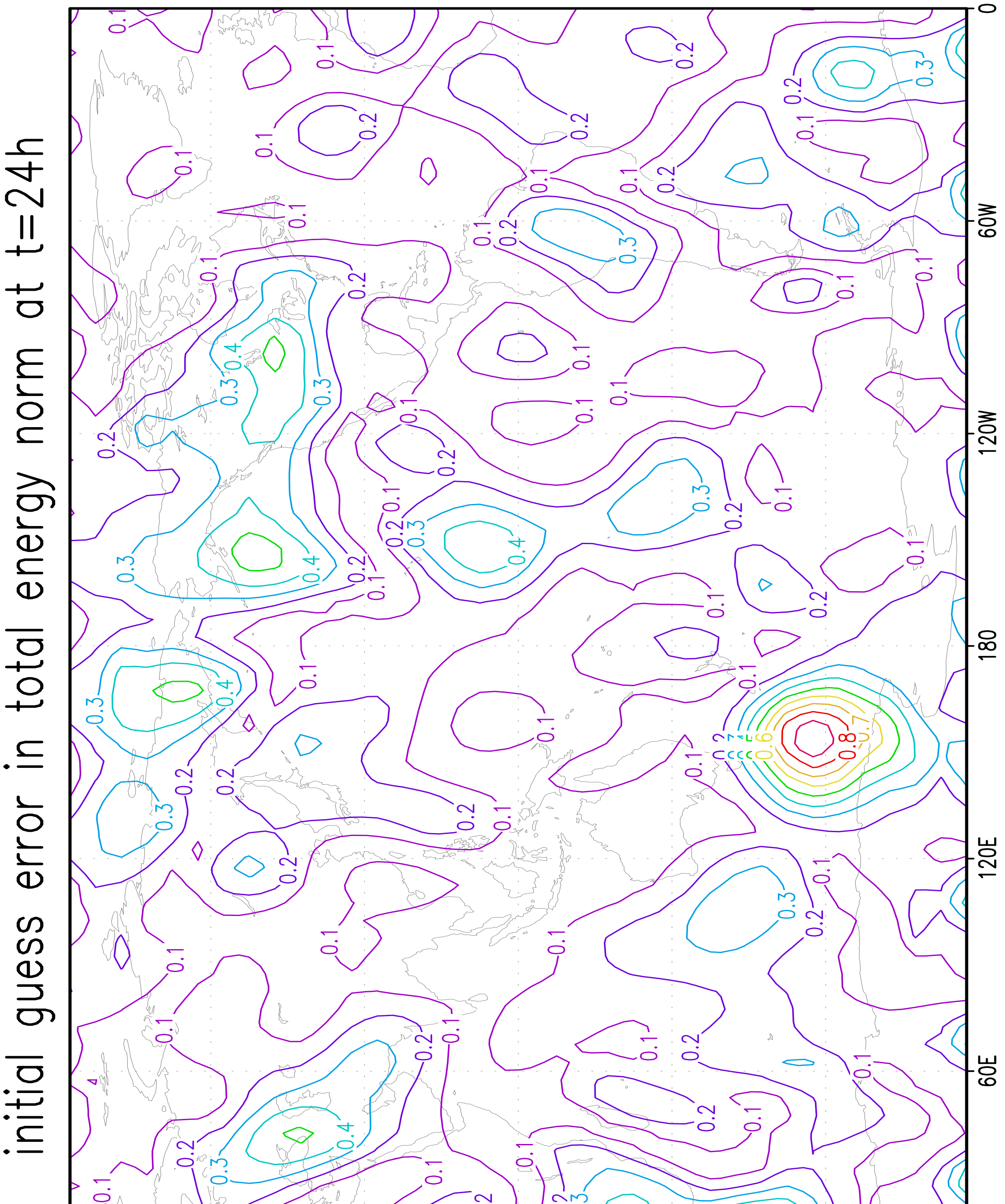

Figure 3: Forecast error at 24h in total energy norm using initial guess model state at t=0h

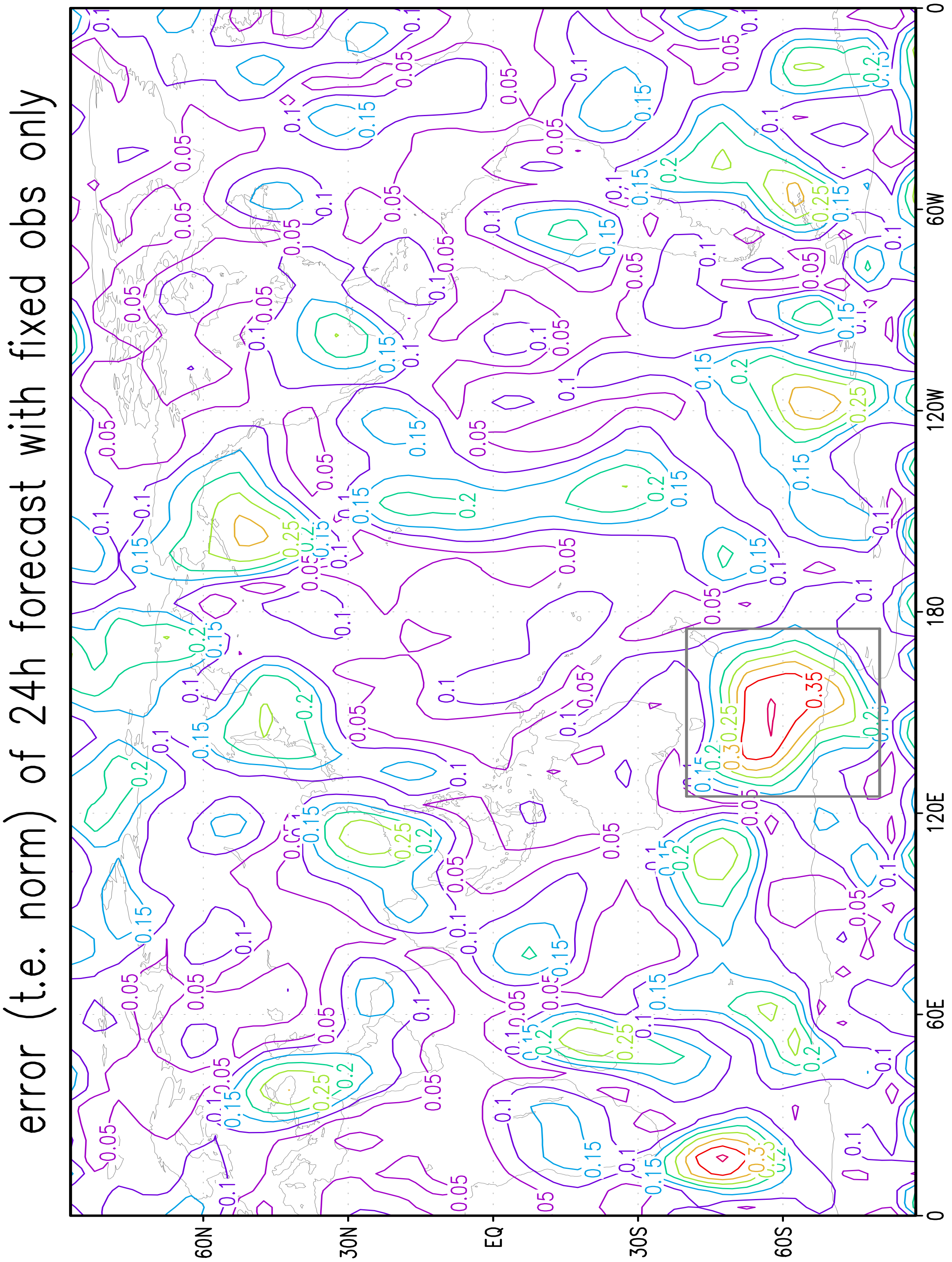

Figure 4: Forecast error at 24h in total energy norm when data assimilation is performed with observations from fixed locations only. Target area is selected from 125E to 175E longitude and from 80S to 40S latitude.

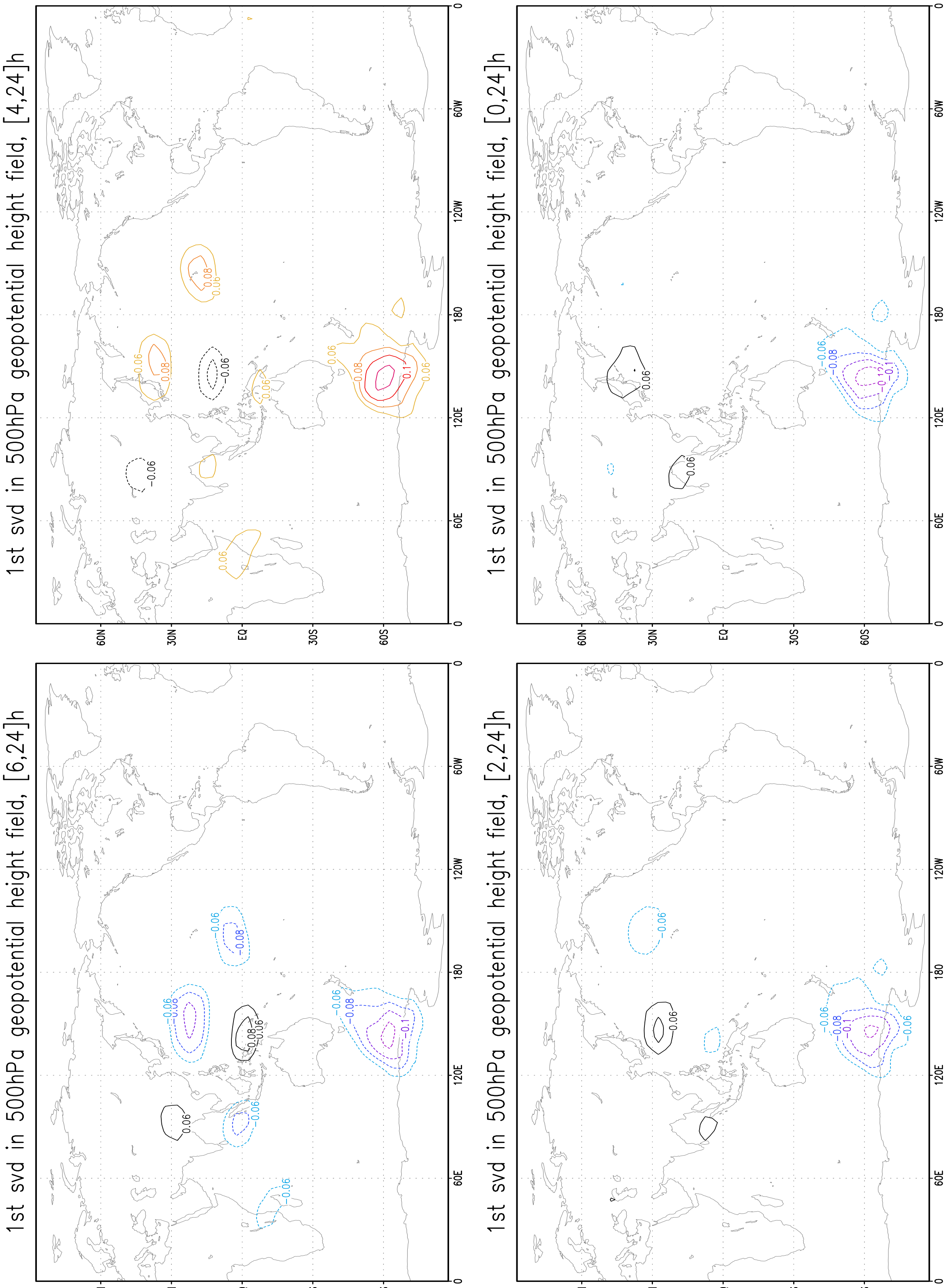

Figure 5: Time evolution of the first singular vector in 500hPa geopotential height field for the optimization interval [t, 24h] with t=0h, 2h, 4h, 6h.

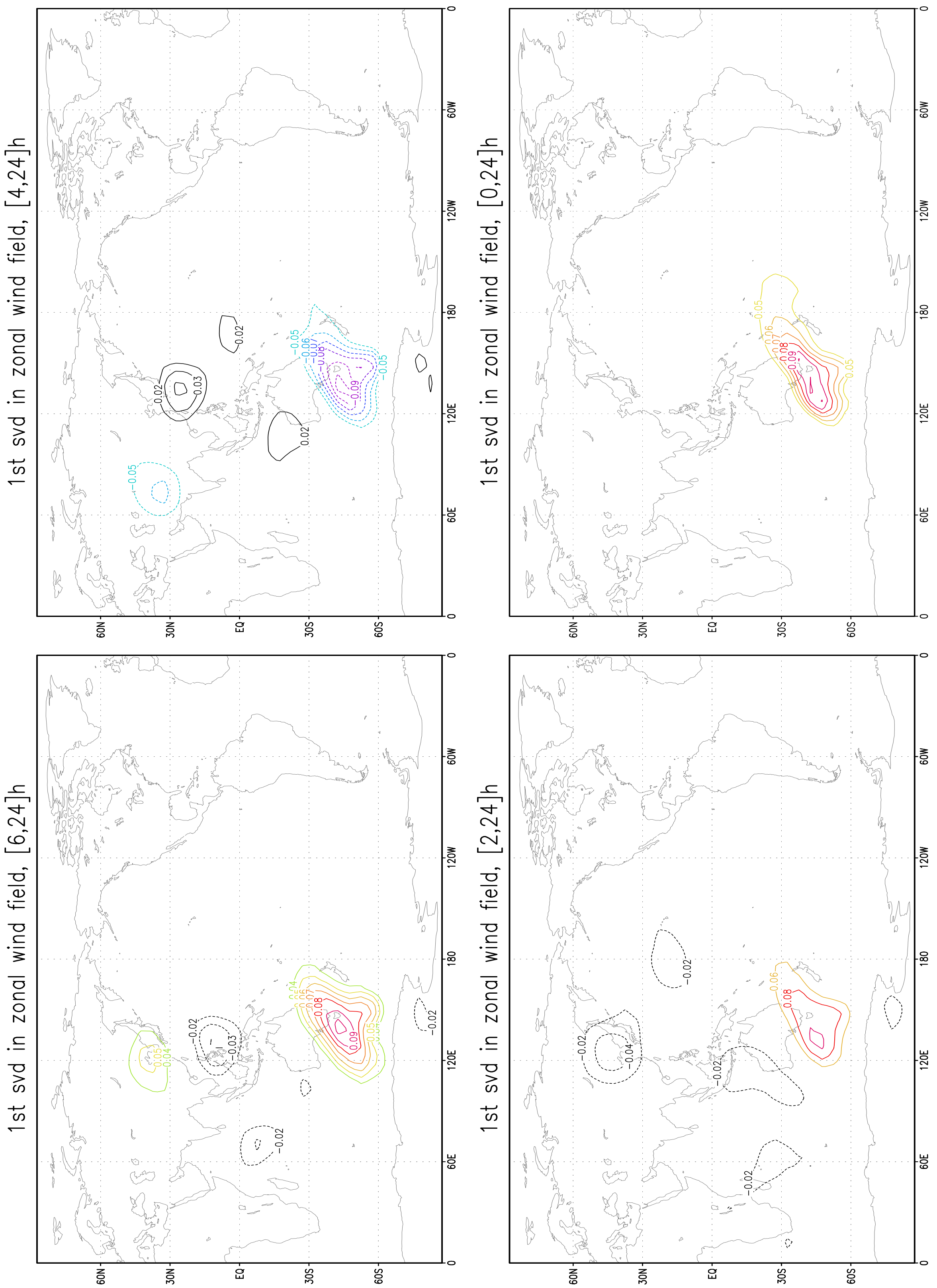

Figure 6: Time evolution of the first singular vector in zonal wind field for the optimization interval [t, 24h] with t=0h, 2h, 4h, 6h.

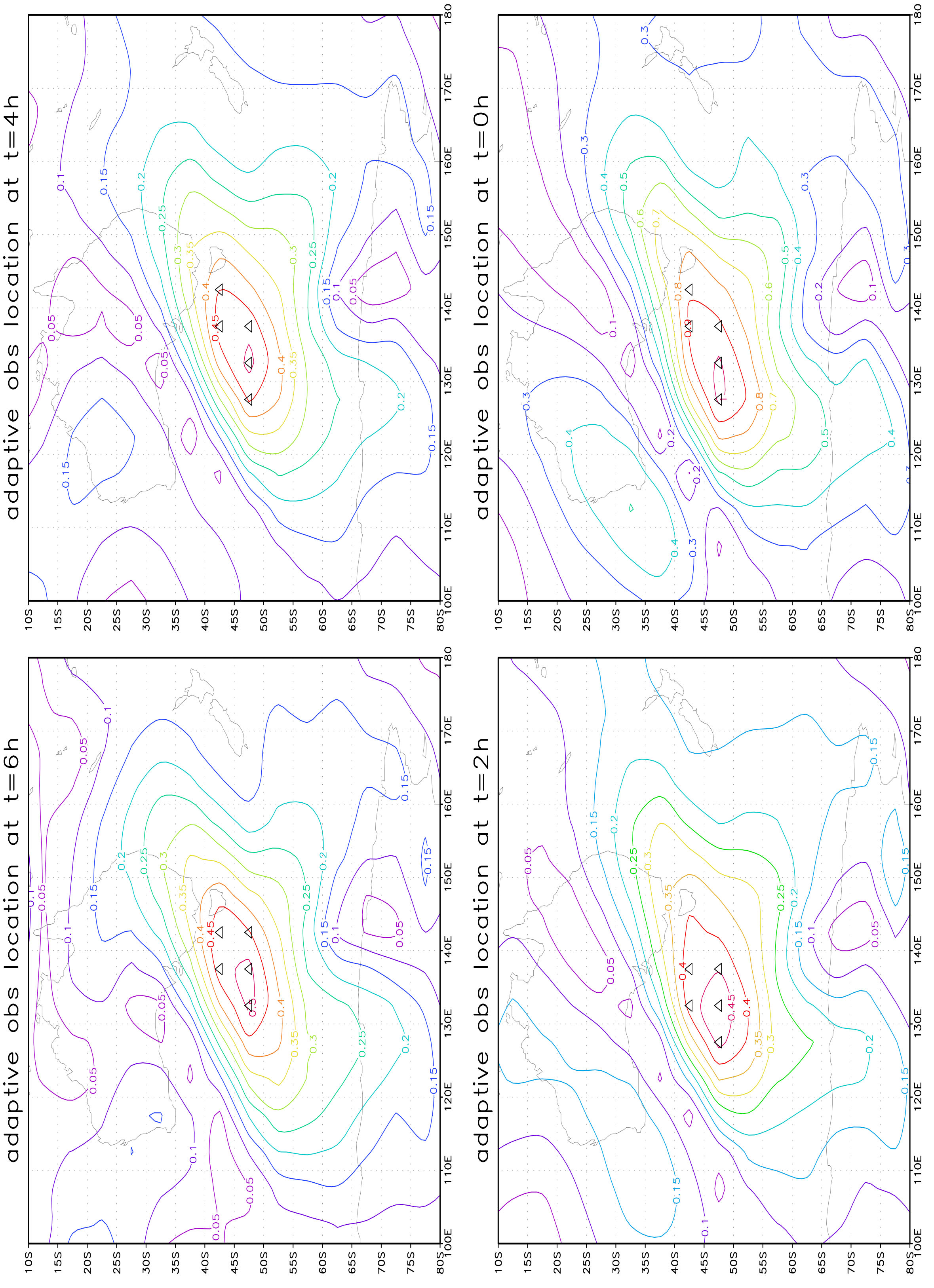

Figure 7: Time evolution of the adjoint sensitivity field and adaptive observations location

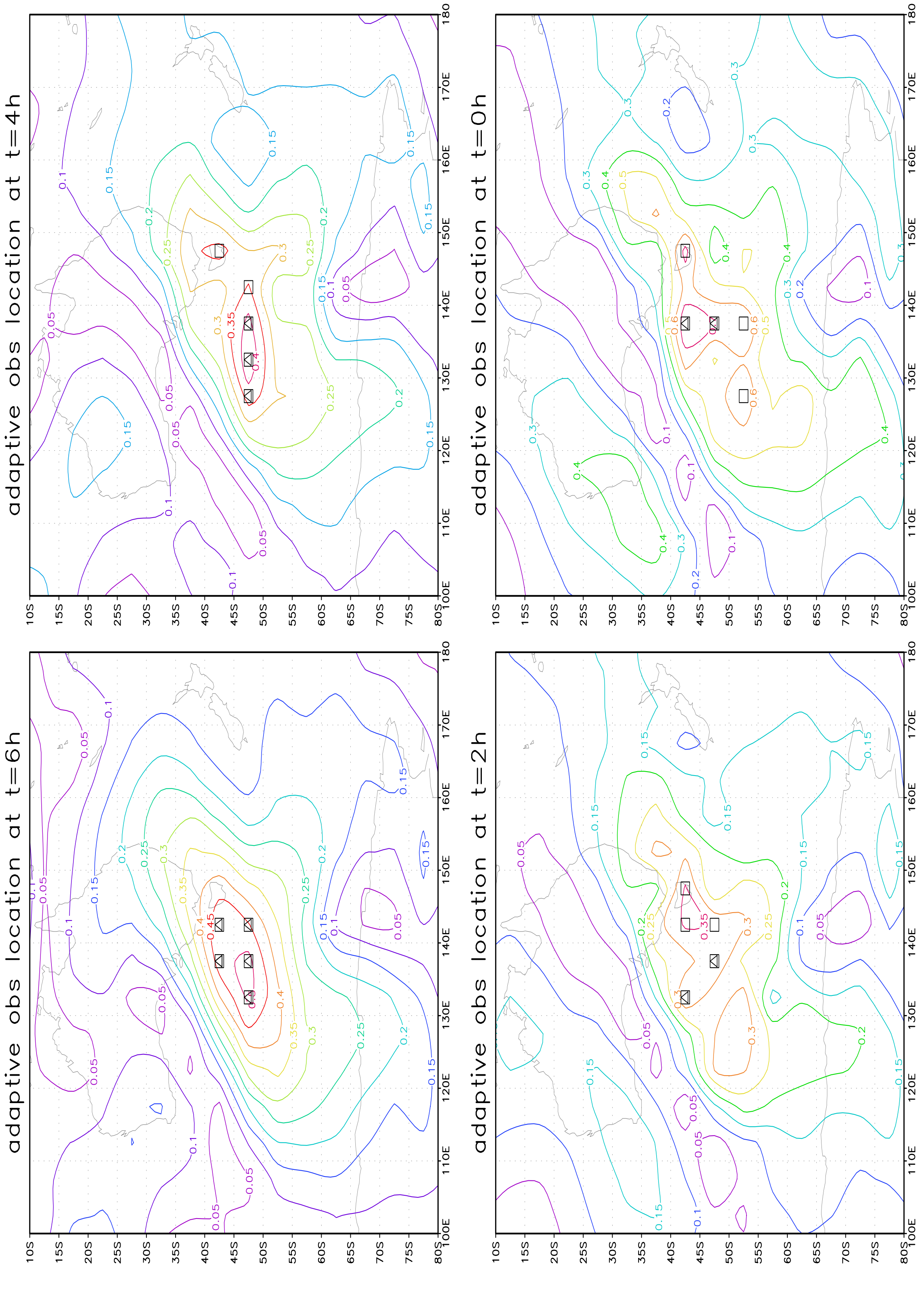

Figure 8: Time evolution of the adjoint sensitivity field and adaptive observations location using interaction between observations. Locations marked with △ were selected also by the previous approach (Fig. 1).

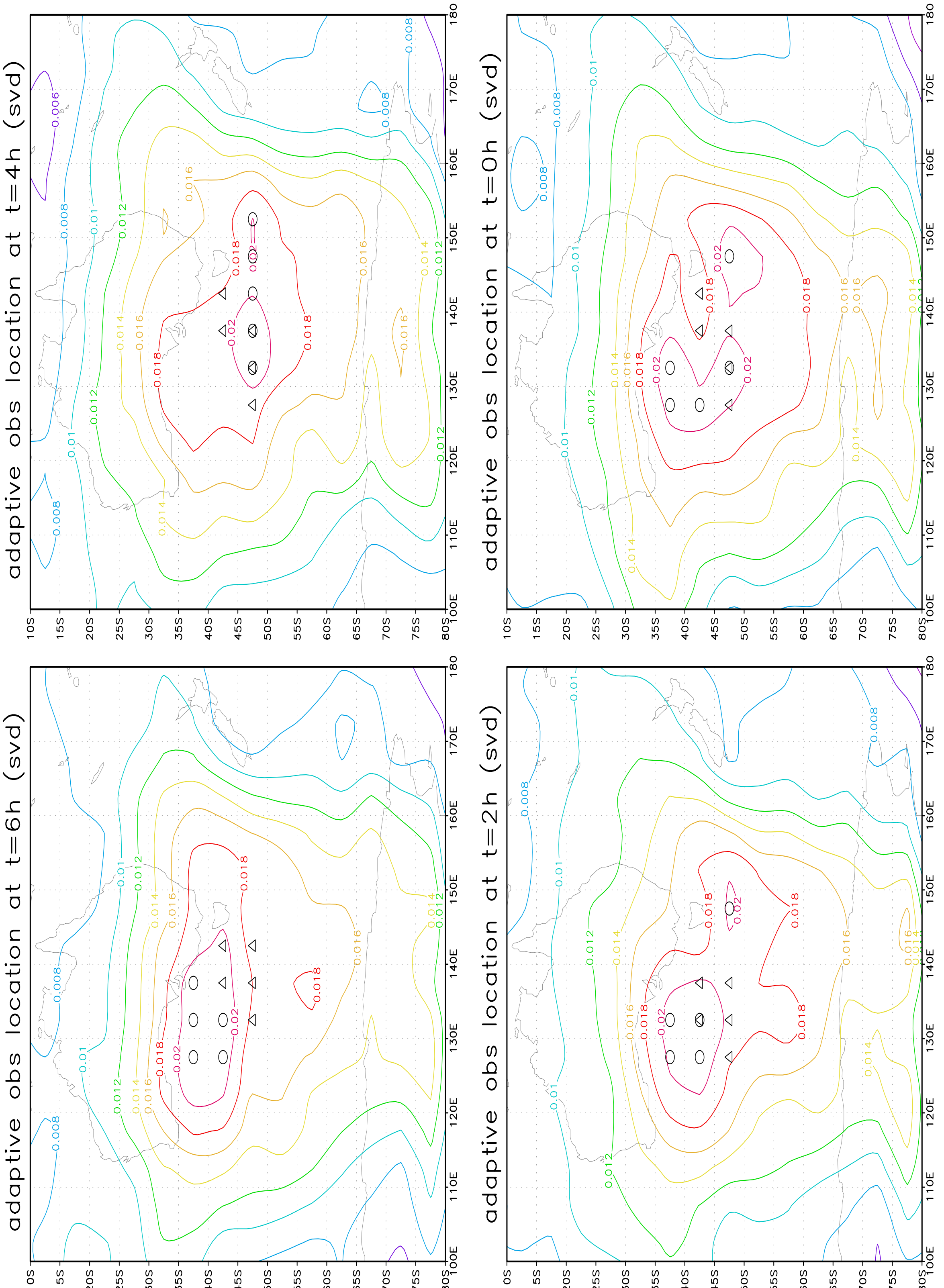

Figure 9: Time evolution of the svd sensitivity field and adaptive observations location ('○'). Locations marked with △ were selected by the adjoint sensitivty approach (Fig. 1).

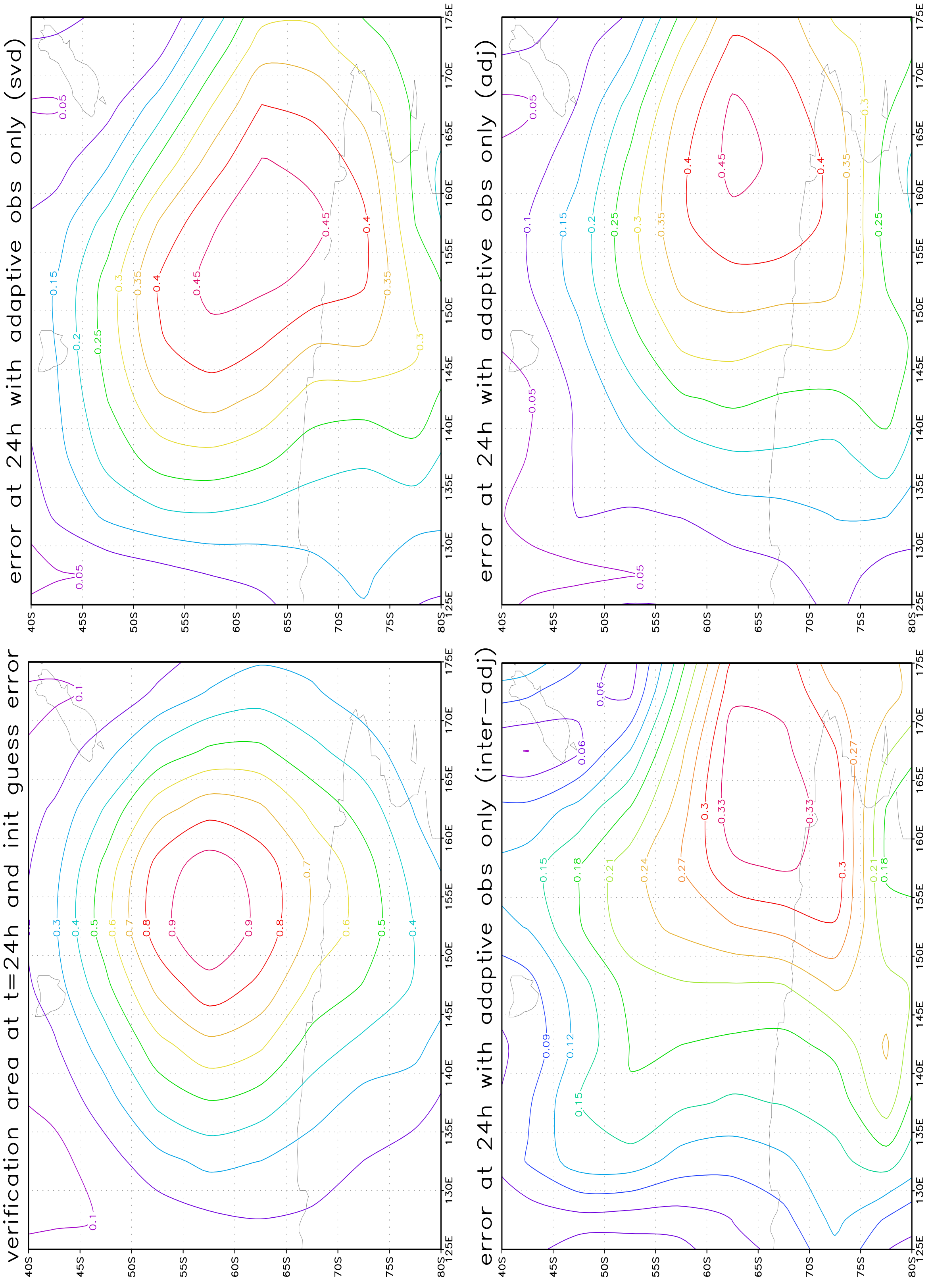

Figure 10: Forecast error at 24h in total energy norm using only adaptive observations

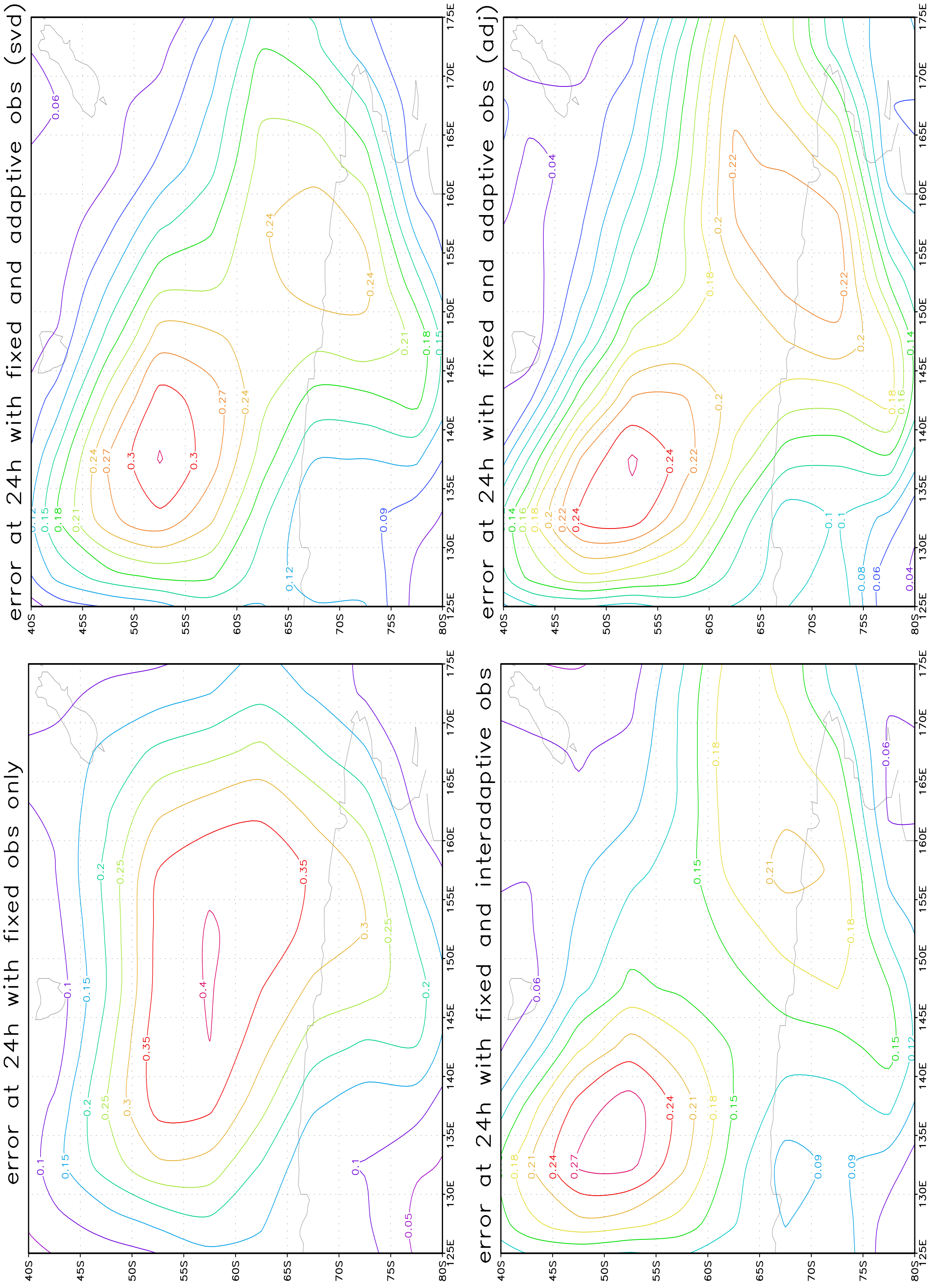

Figure 11: Forecast error at 24h in total energy norm using fixed and adaptive observations

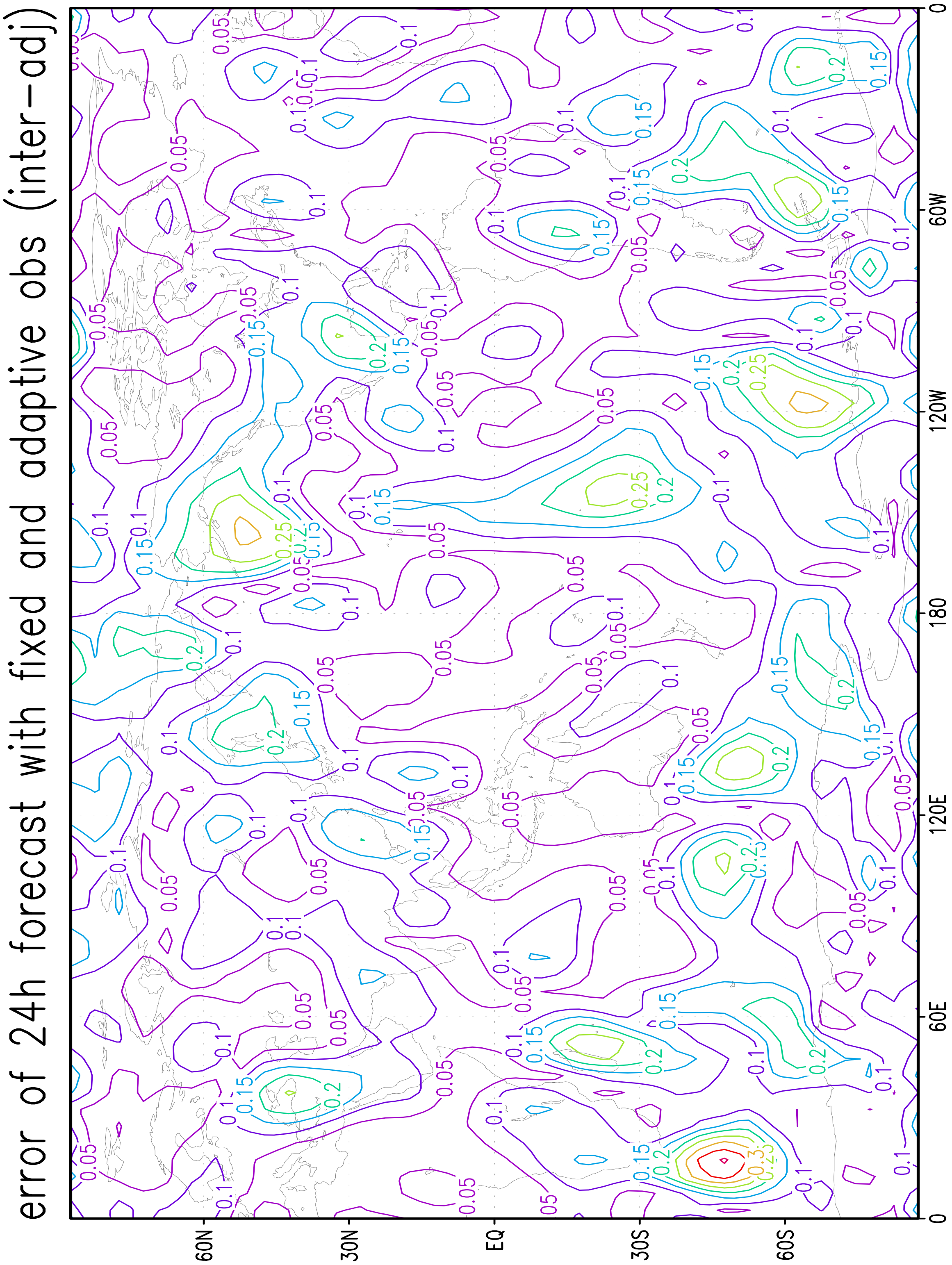

Figure 12: Forecast error at 24h in total energy norm when data assimilation is performed using fixed location and adaptive observations with interaction.