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Optical Turbulence Forecasts: towards a new hybrid strategy era

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The OT forecast on a time scale of 1 or 2 hours (short time scales) is crucial for all kind of present and new generation instrumentation supported by adaptive optics that will be mainly operated in Service Mode. In this contribution I will summarise a few among the most recent and relevant results obtained in this context by our group and where we are going on. More precisely we undertook a hybrid approach that takes into account a synergic use of the numerical technique (atmospherical models) and statistical techniques such as autoregression/machine learning/deep learning. Our results tell us that we are able to obtain excellent performances with the two operational forecast systems we are leading: ALTA (@ LBT) and FATE (@ VLT). FATE recently as been selected winner proposal of an international Call for Tender opened by ESO aiming to provide nightly and daily forecasts of a set of astroclimatic and atmospheric parameters relevant for the VLT instrumentation. The ESO goals are: (1) to prepare the service mode of ELT by gaining experience on the use of forecast at VLT and by maximising the science return of the VLT, (2) to enable a more aggressive short term scheduling of observations with well understood risk, (3) to decrease the amount of out-of-constraint observations due to unforeseen changes of atmospheric conditions. Such a hybrid approach will allow us in principle to tackle also the forecast of parameters not dependent simply on the atmosphere but also on the AO instruments specifications such as the PSF figures of merit (FWHM, SR, etc.).

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