

ASEN 5044 Spring 2020 - Project Progress Report 2

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Our group has decided to solve the state estimation problem for system A - Cooperative Air-Ground Robot Localization

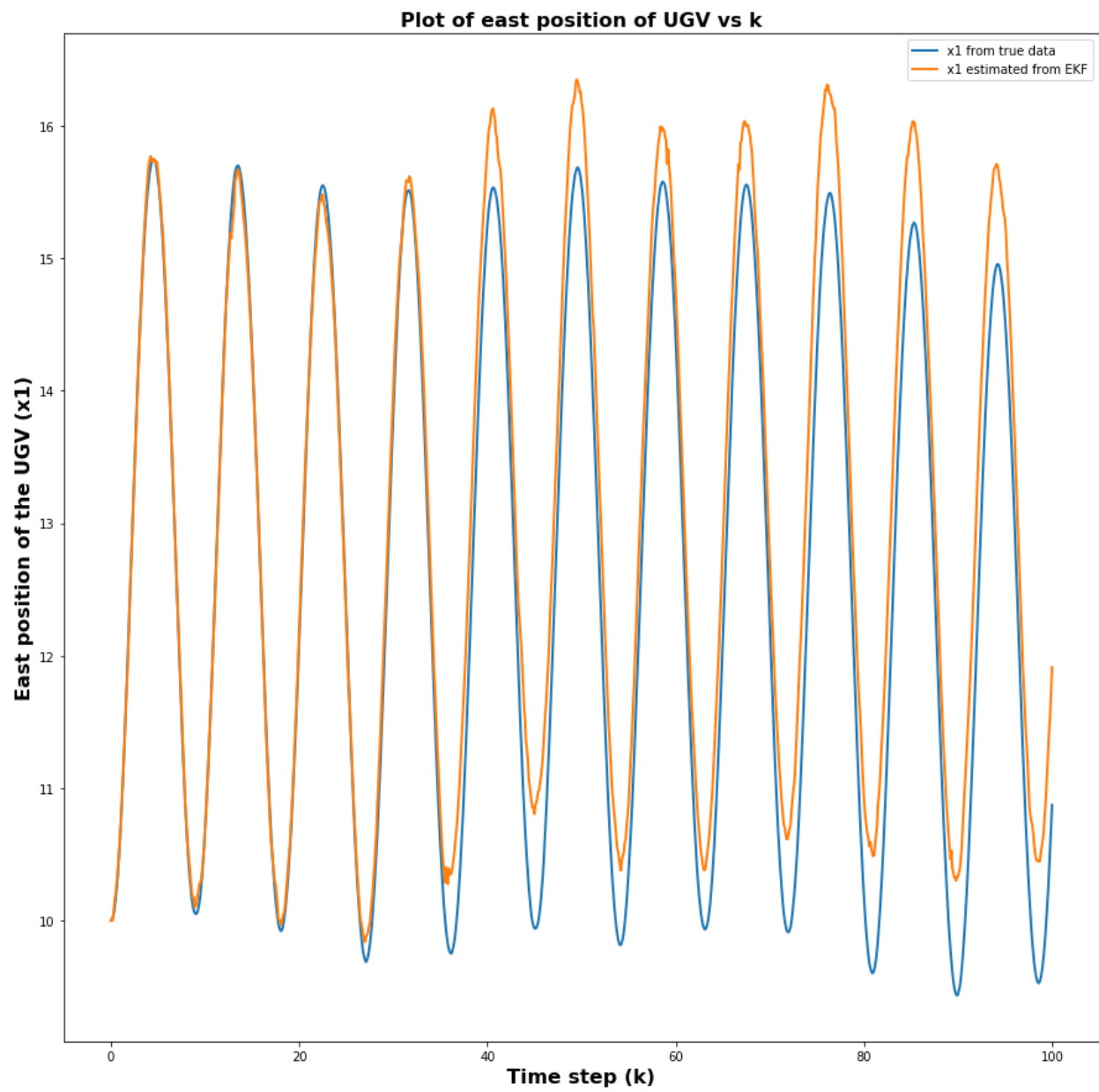
CURRENT STATUS:

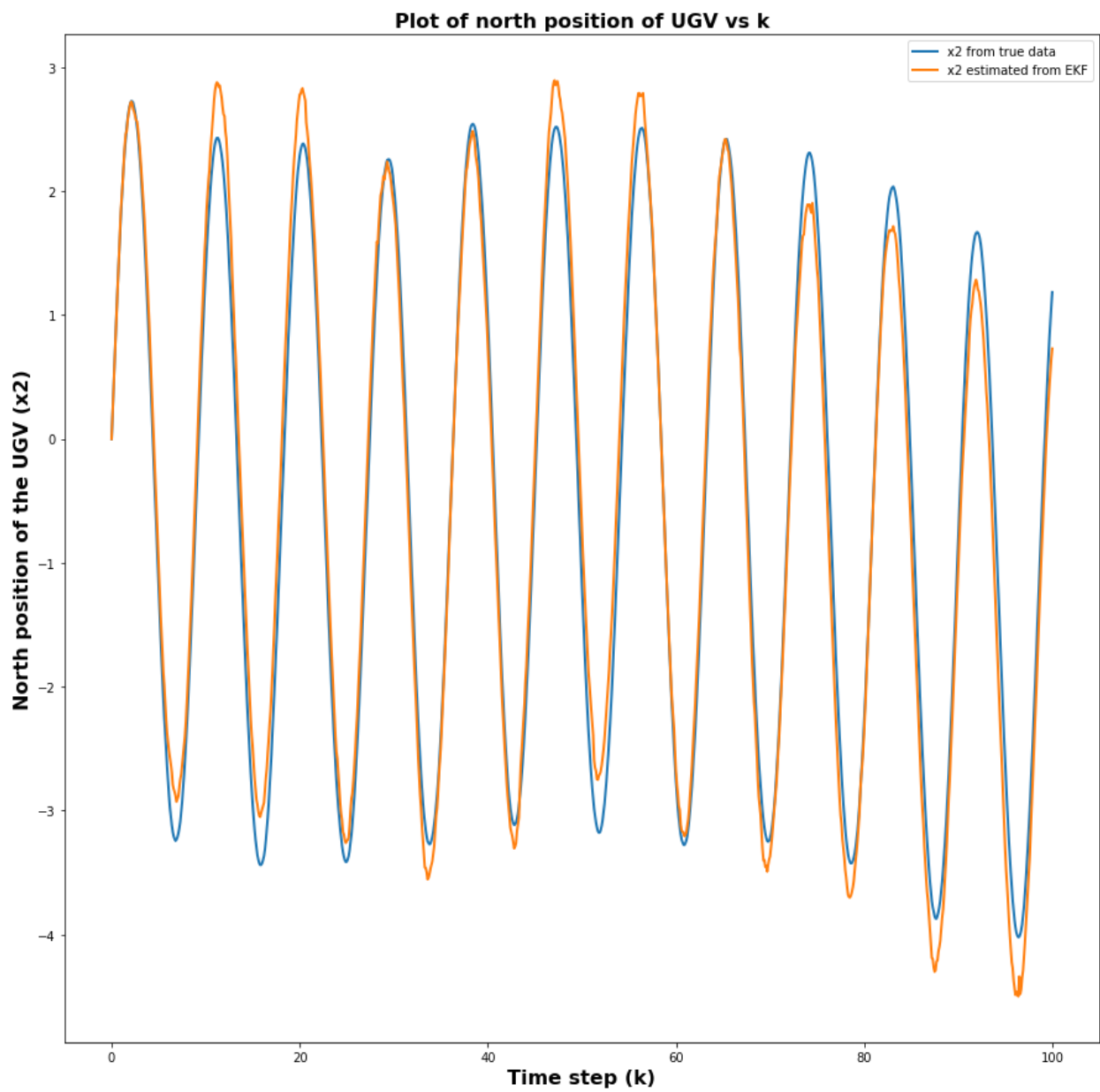
- EKF
 - Filter has been successfully implemented and seems to be generating decent estimates.
 - NEES and NIS chi square analysis has been done as well. However the results are not great. The EKF seems to be inconsistent and seems like the Q_{KF} values we have chosen are too small and we need to choose larger values.
 - We need to tune the kalman filter and we are struggling with that a lot.
 - NEES and NIS analysis in the process of implementation. Tuning process has not started.
- LKF
 - Filter has been successfully implemented and seems to be generating decent estimates.
 - NEES and NIS chi square analysis has been done as well. However the results are not great. The LKF seems to be inconsistent and seems like the Q_{KF} values we have chosen are too small and we need to choose larger values.
 - We need to tune the kalman filter and we are struggling with that a lot.

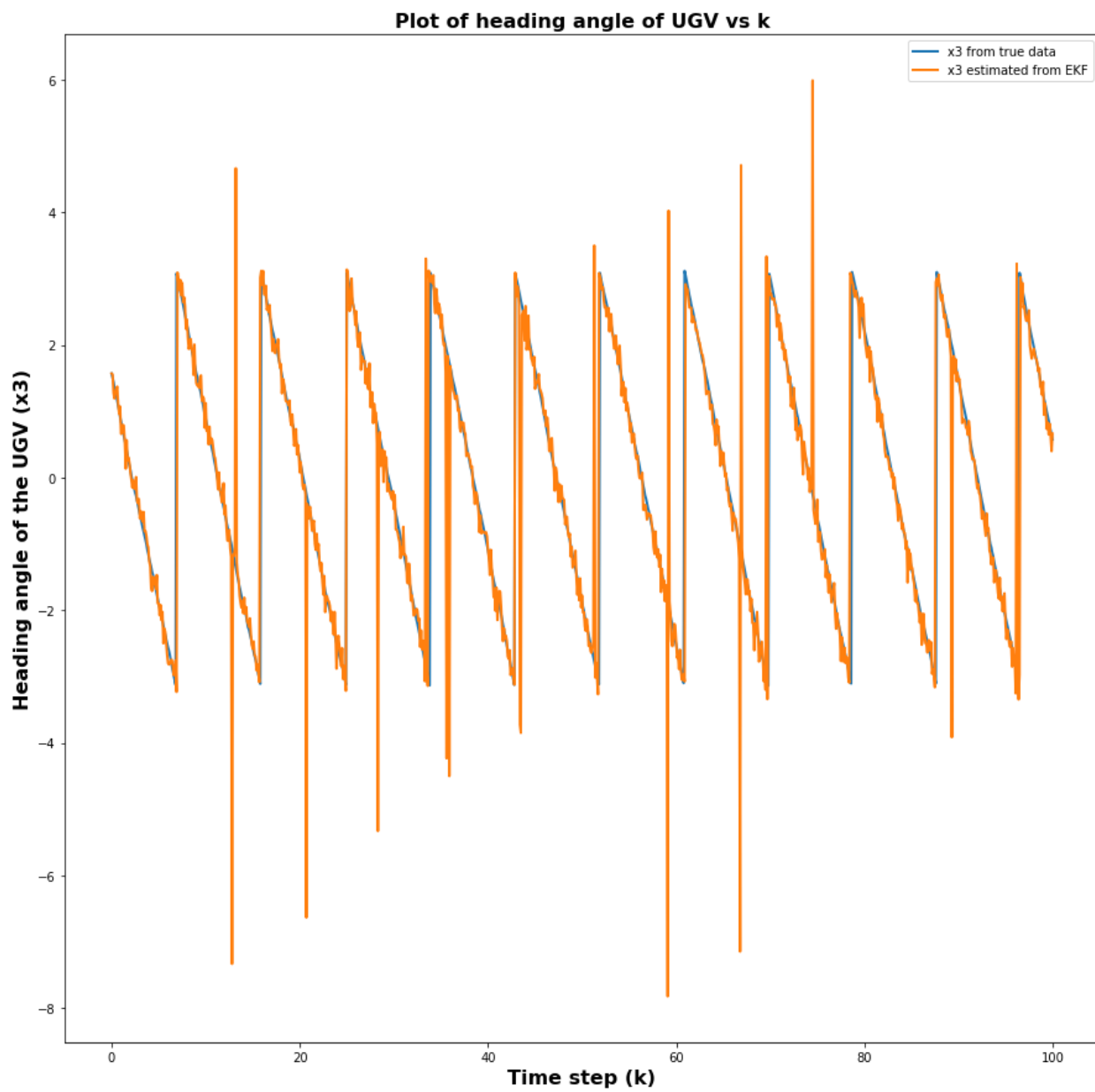
(NEES and NIS tests are both performed using mean values from a family of simulations)

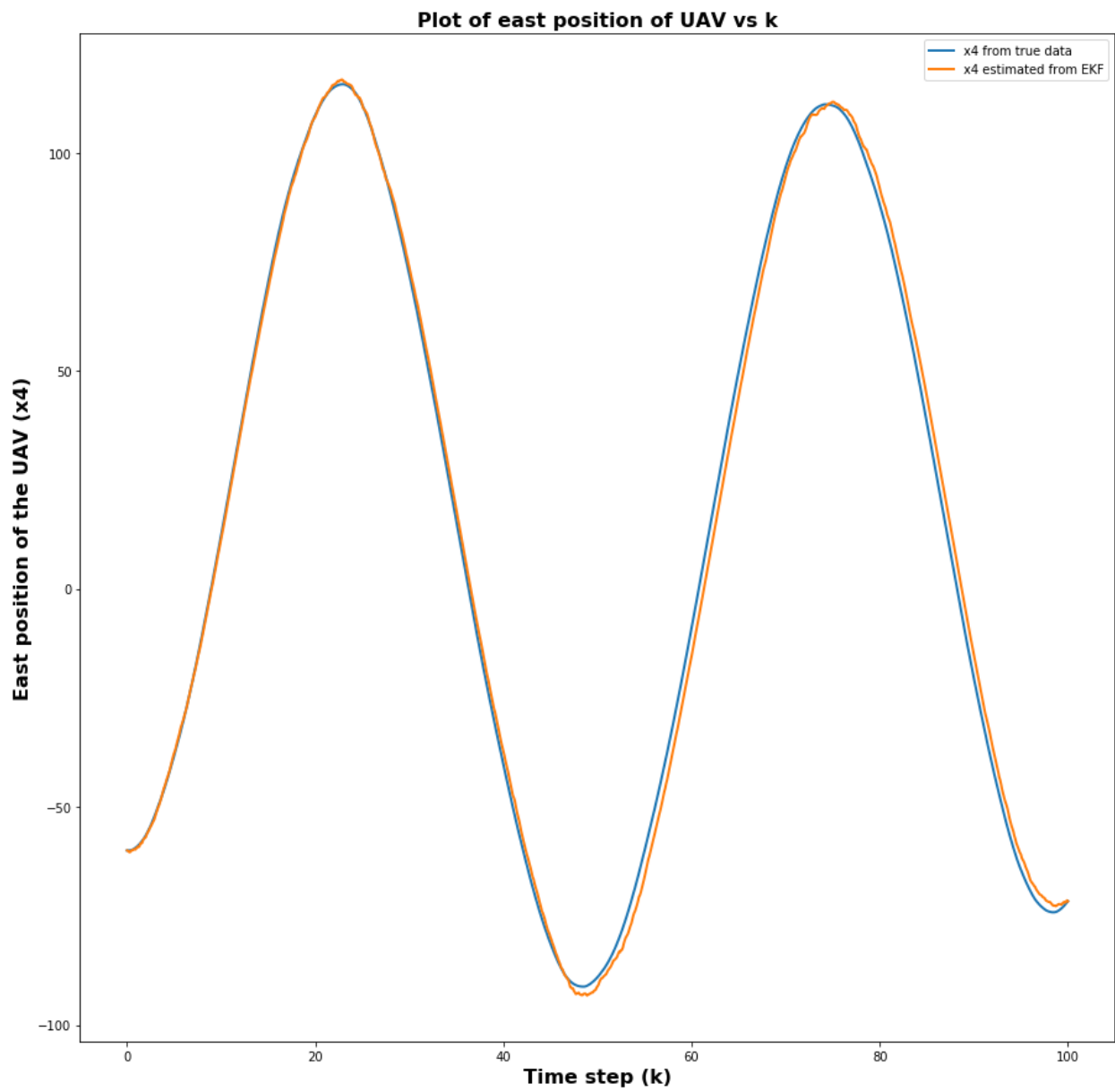
VARIOUS DIFFERENT PLOTS AS MENTIONED ARE ATTACHED BELOW

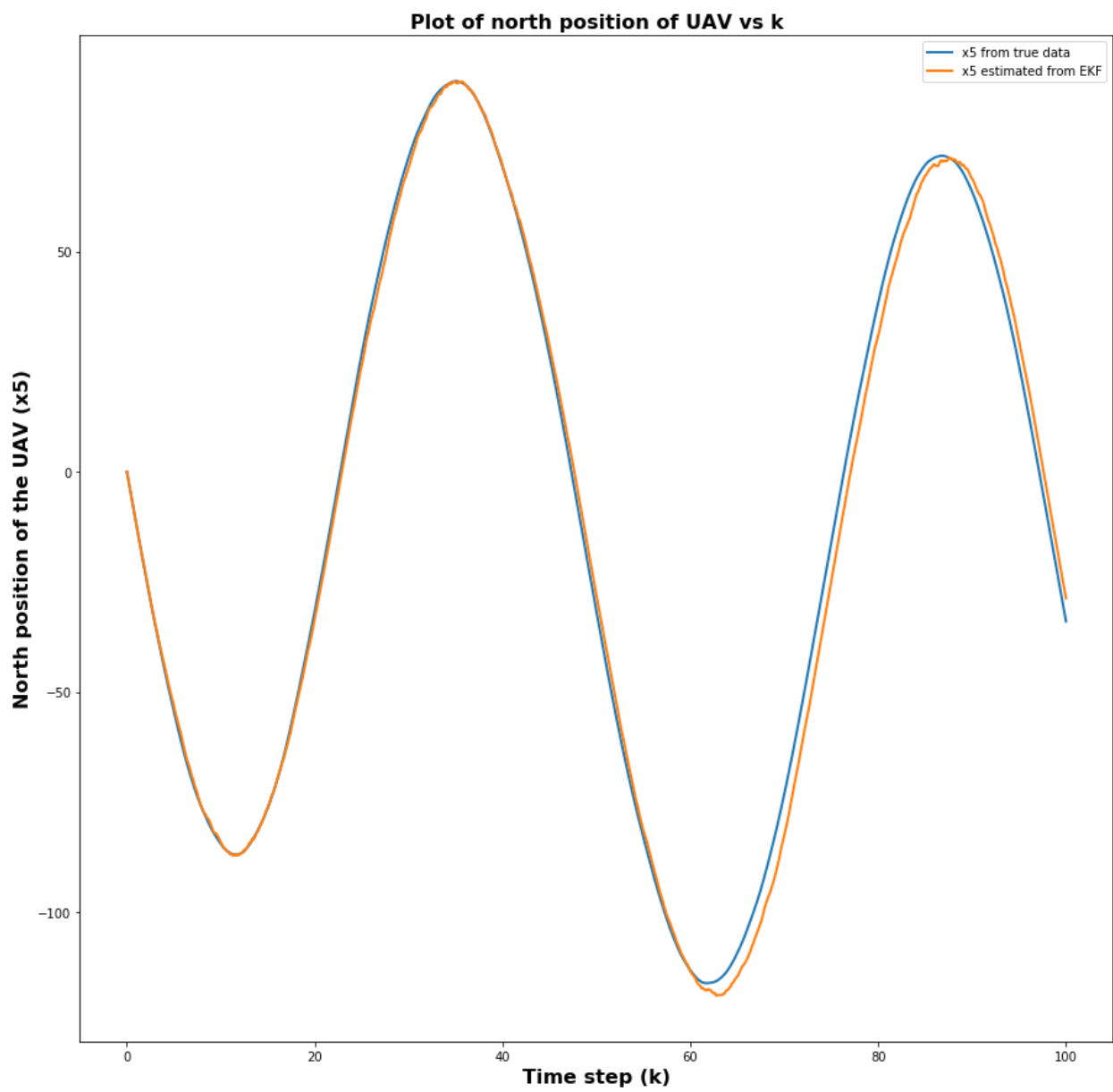
For EKF:

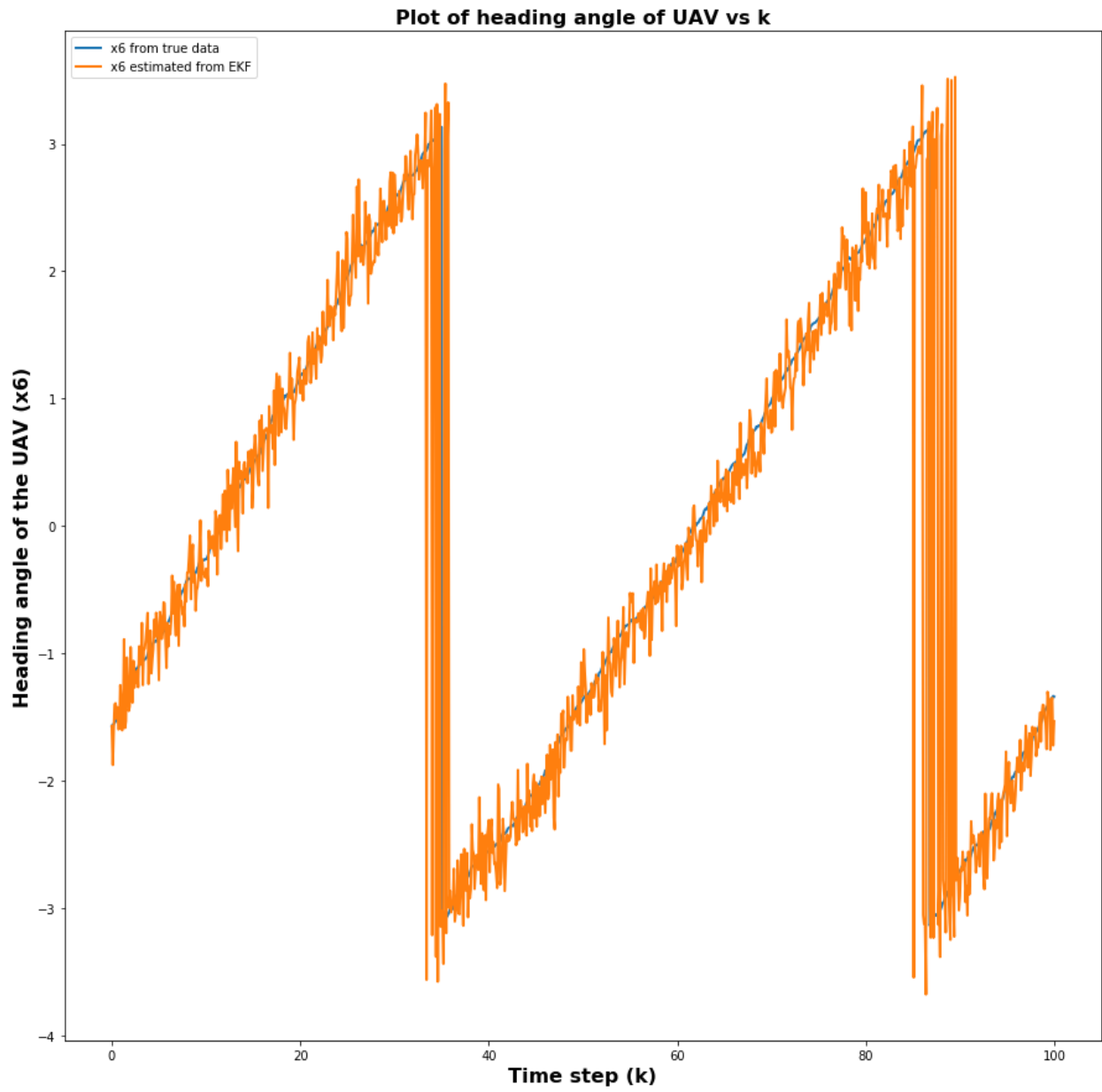


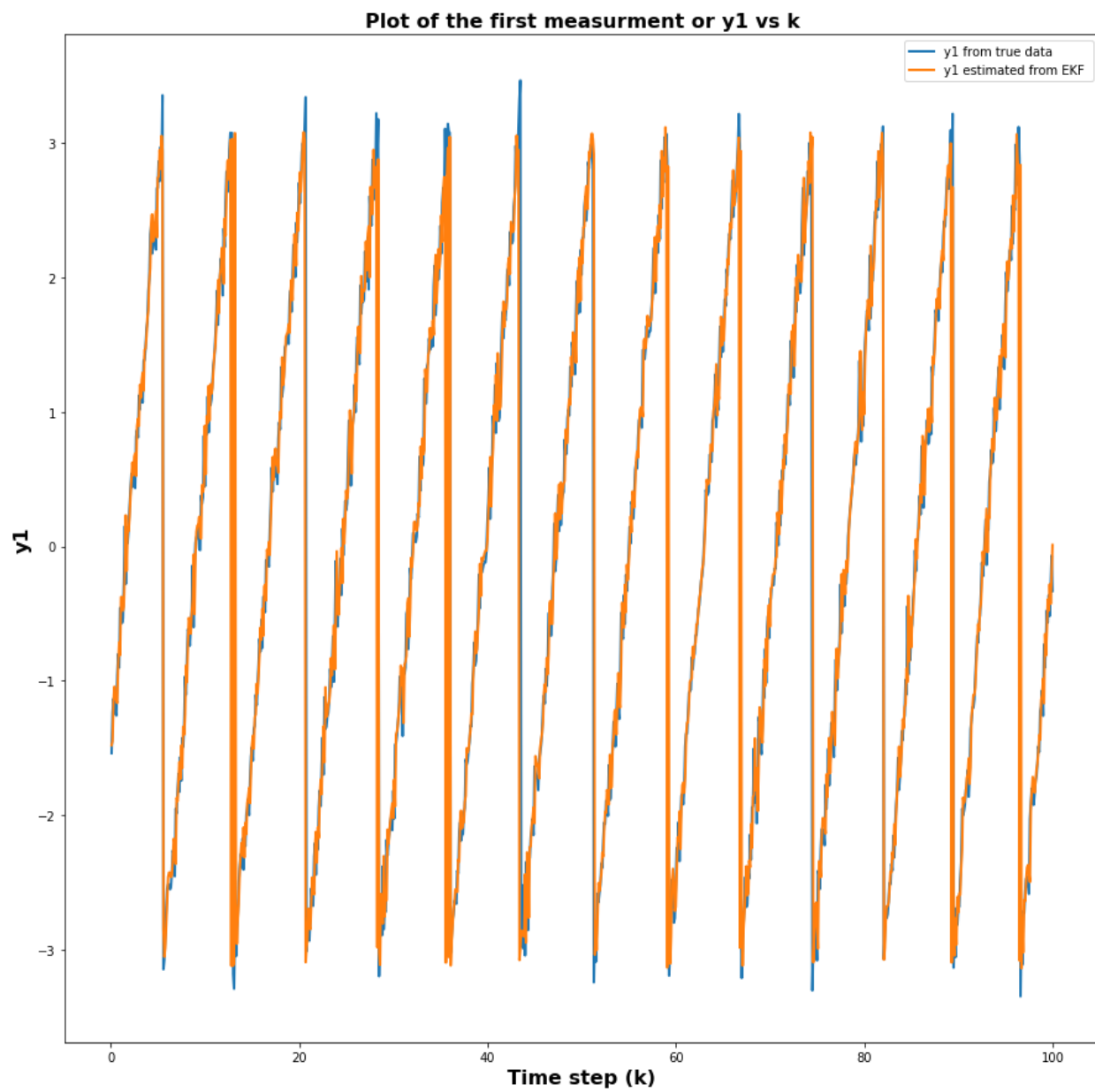


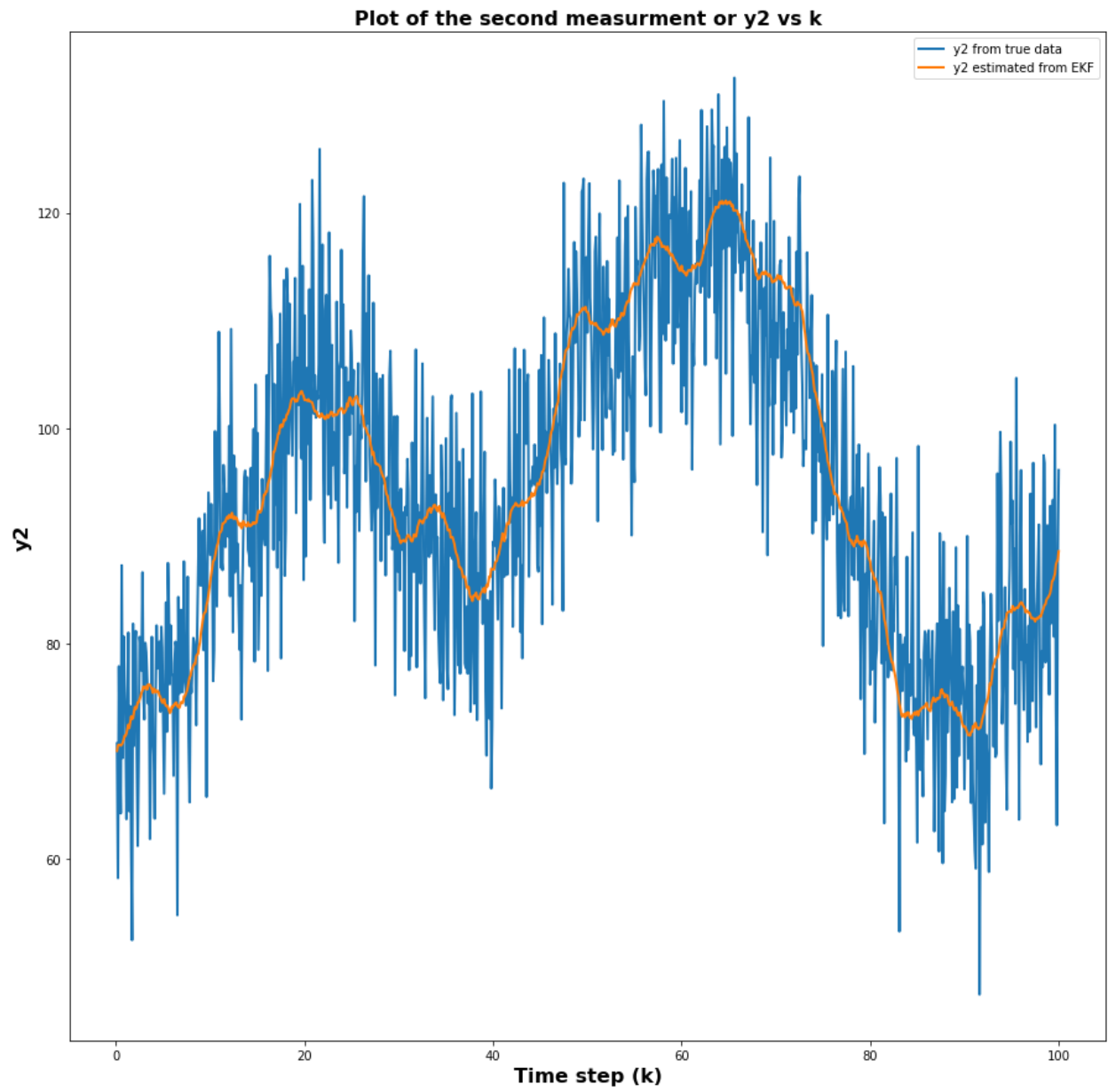


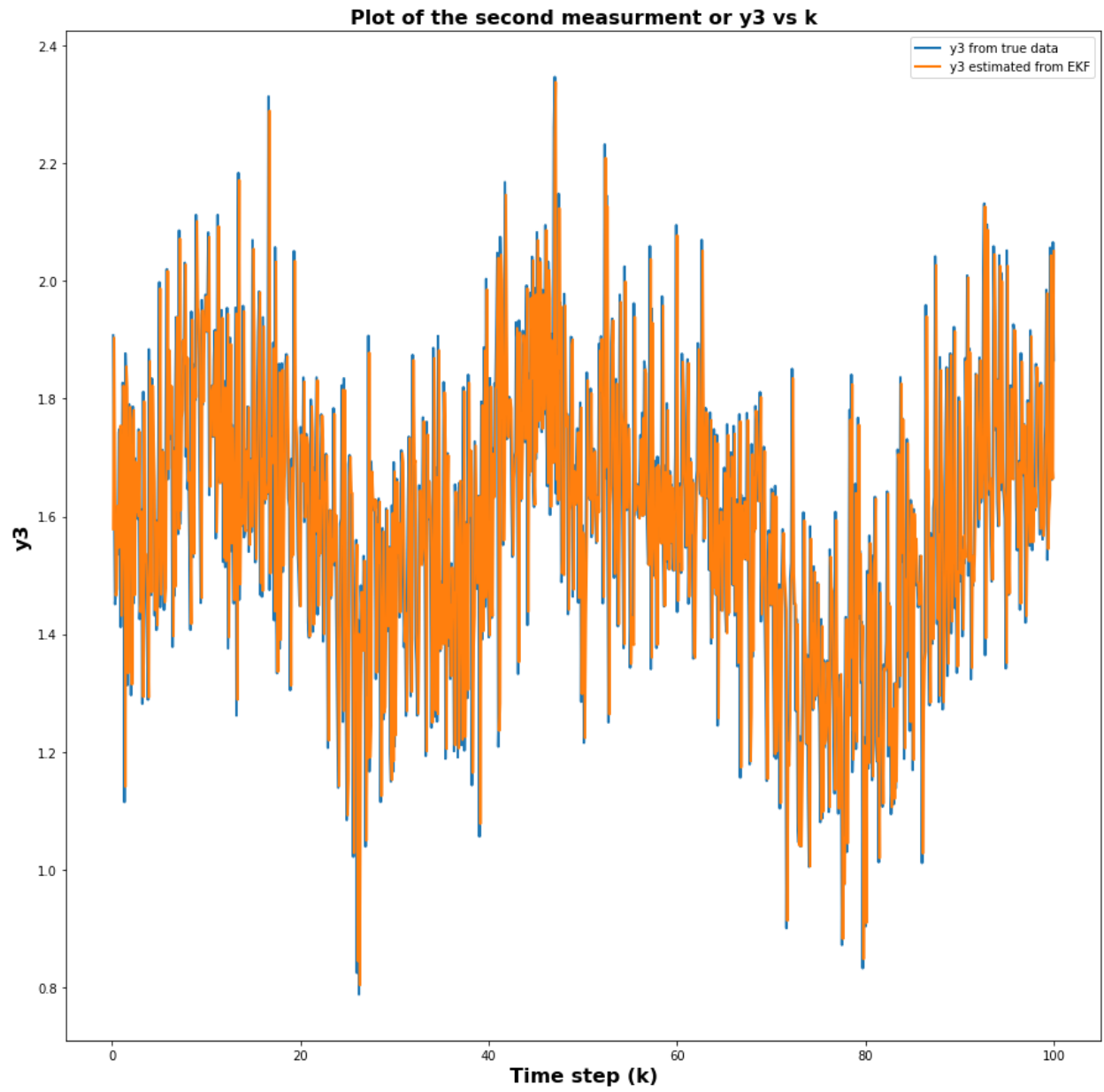


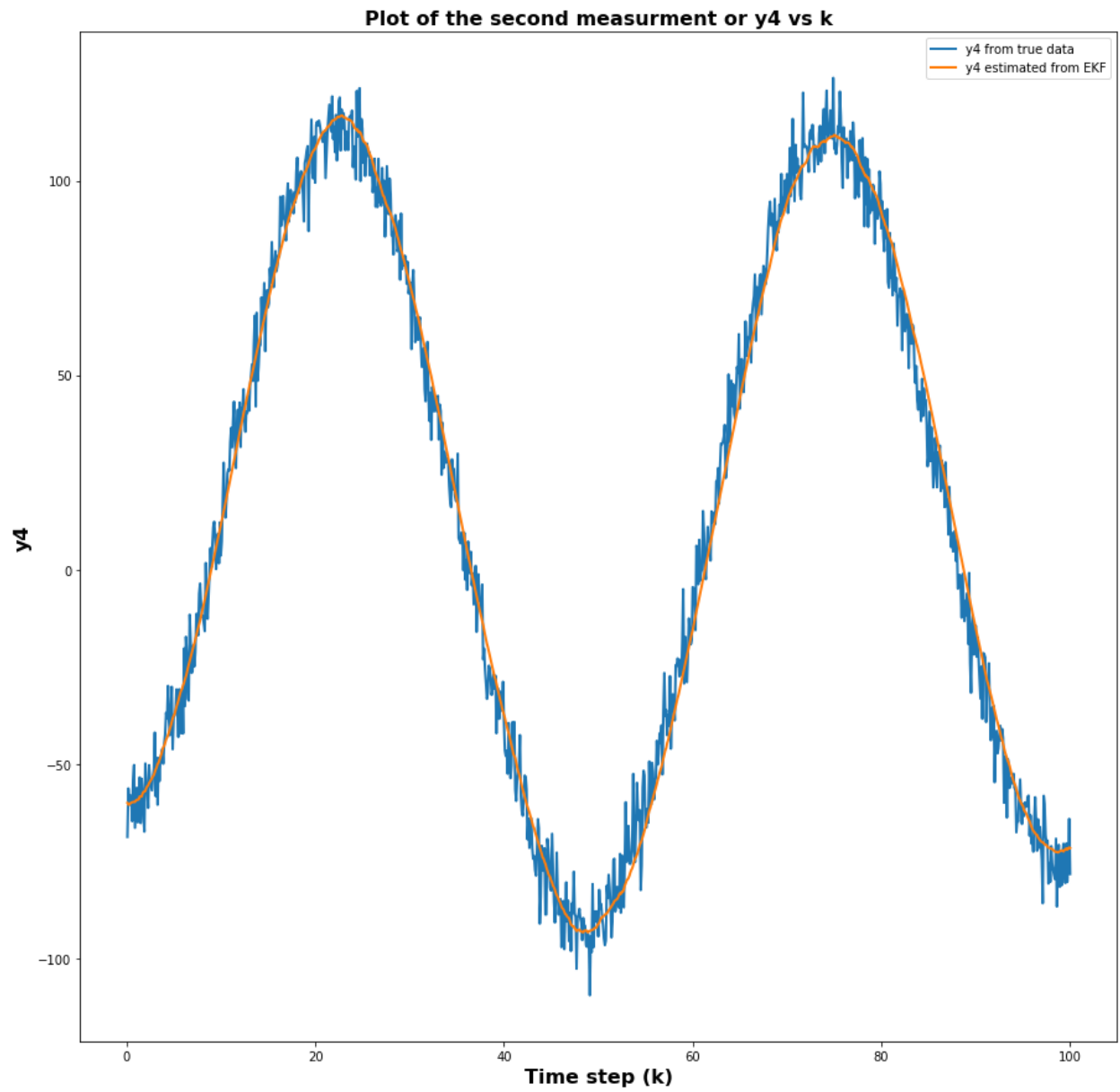


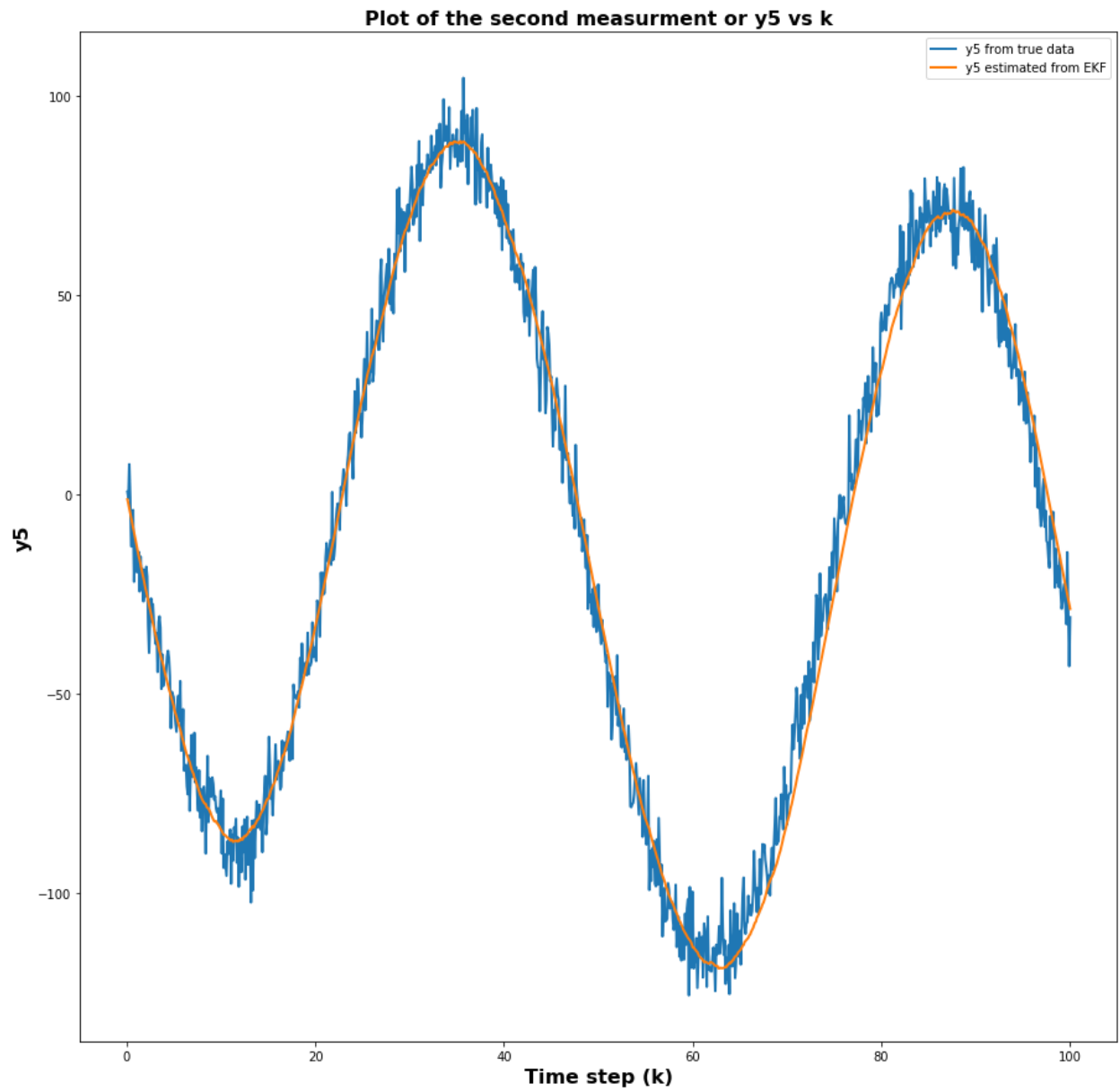


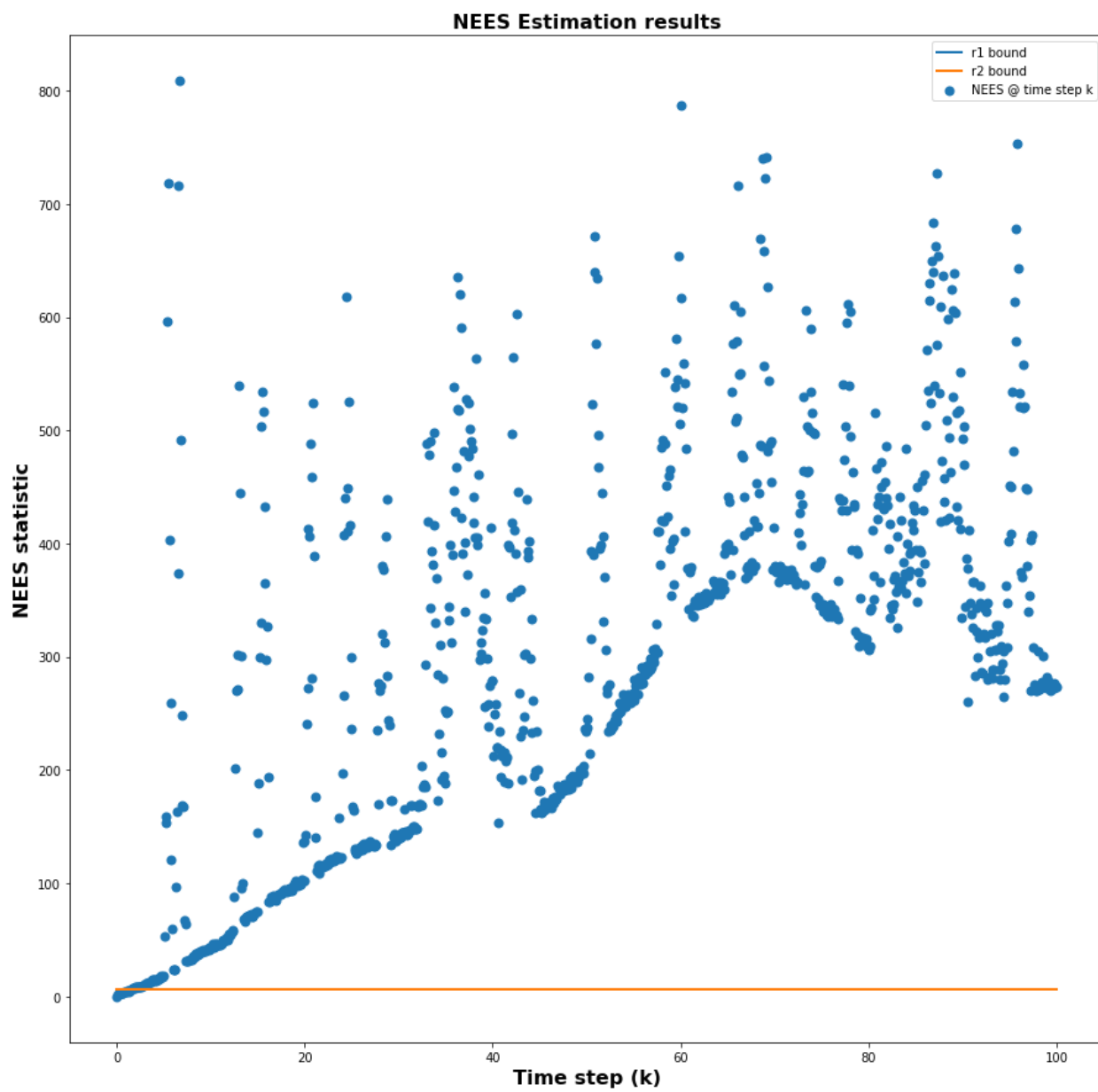




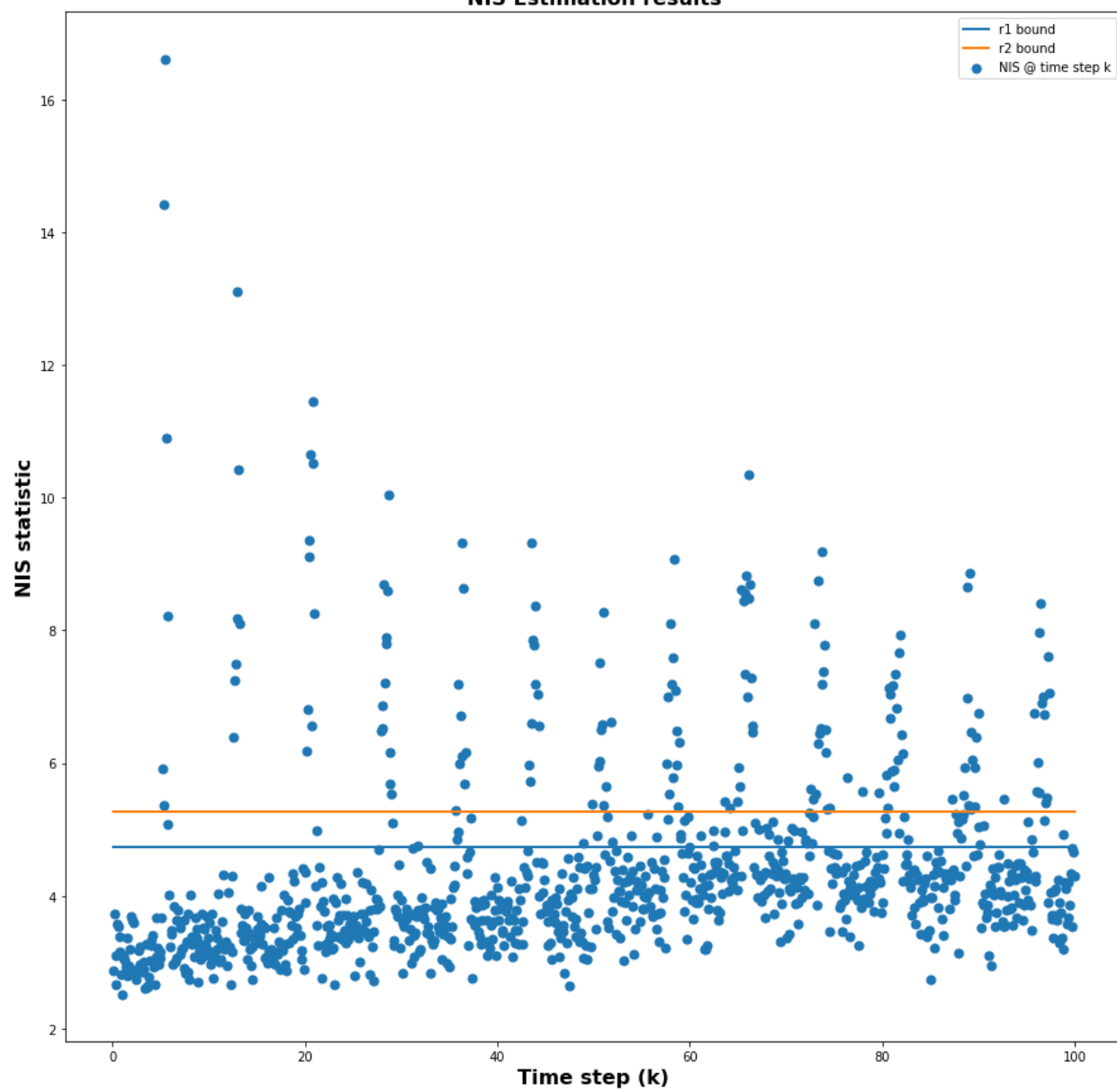




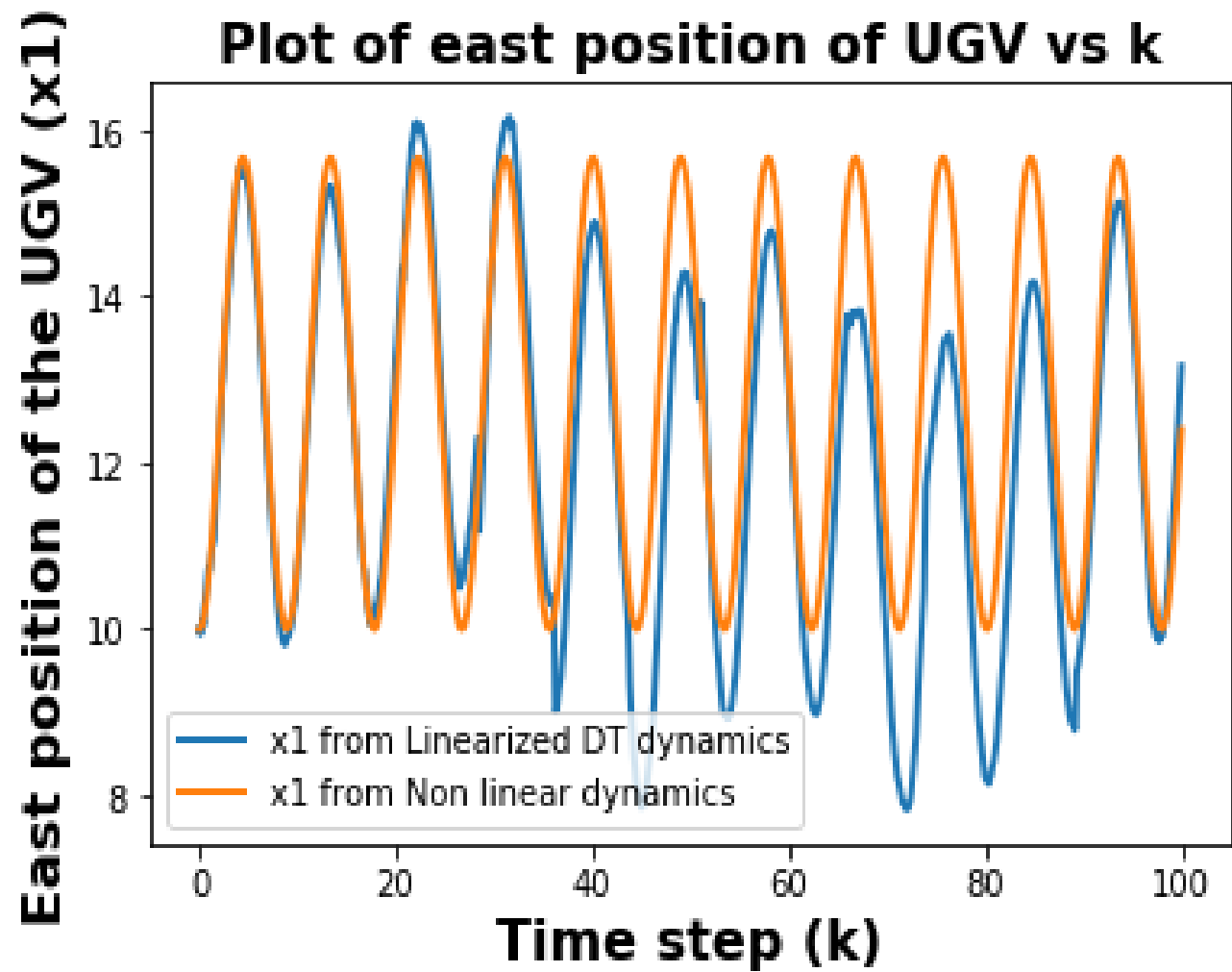


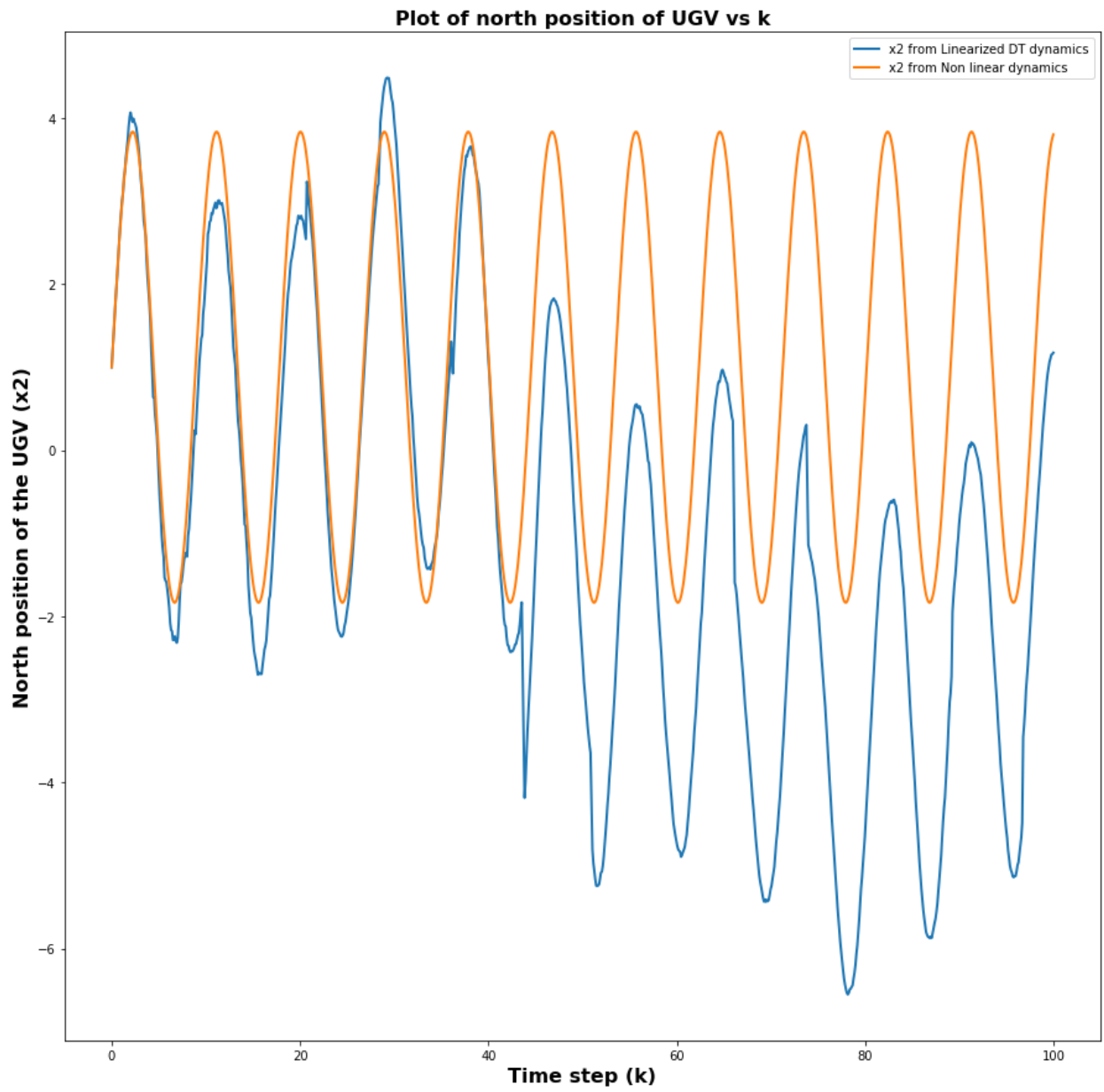


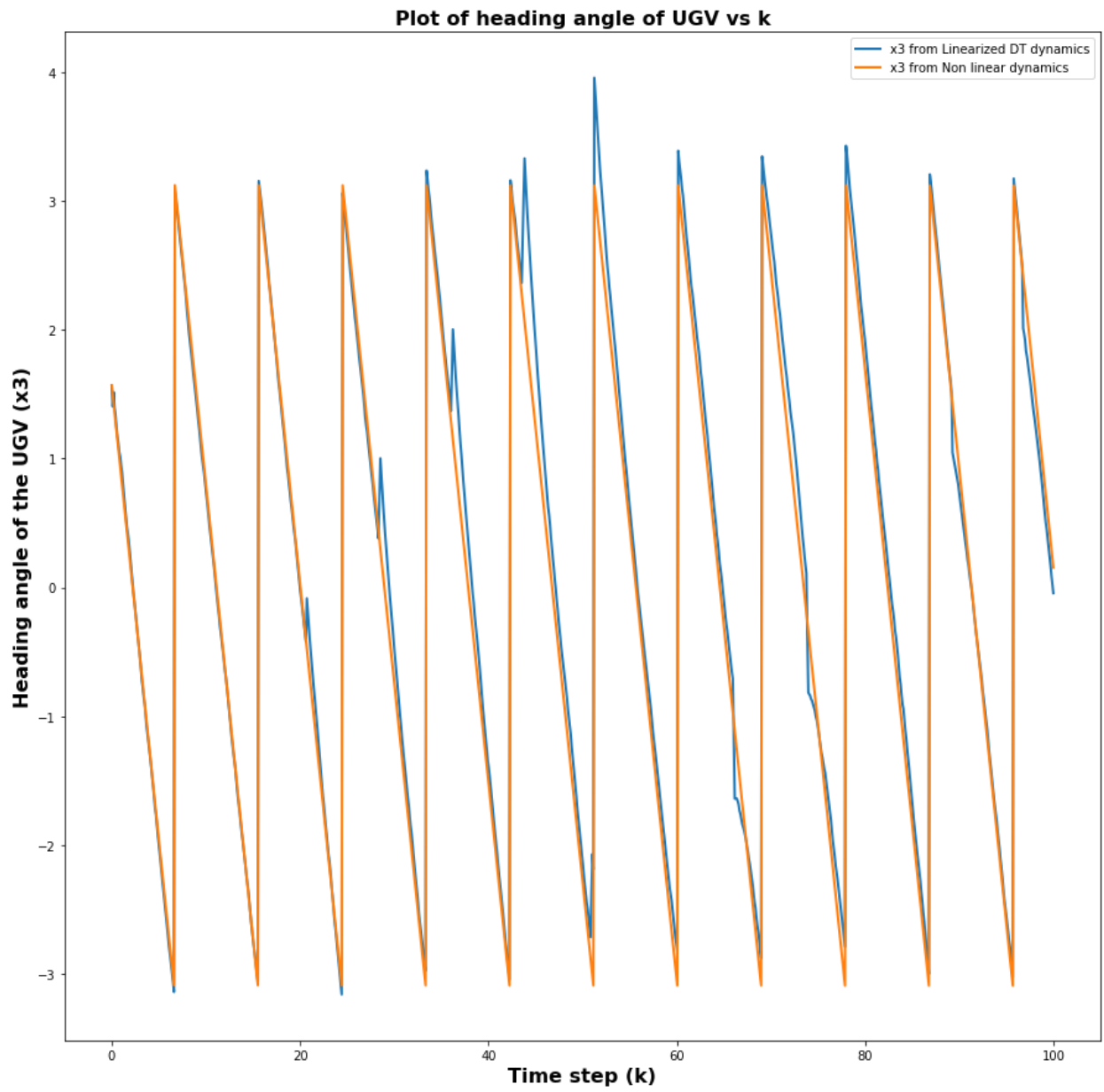
NIS Estimation results

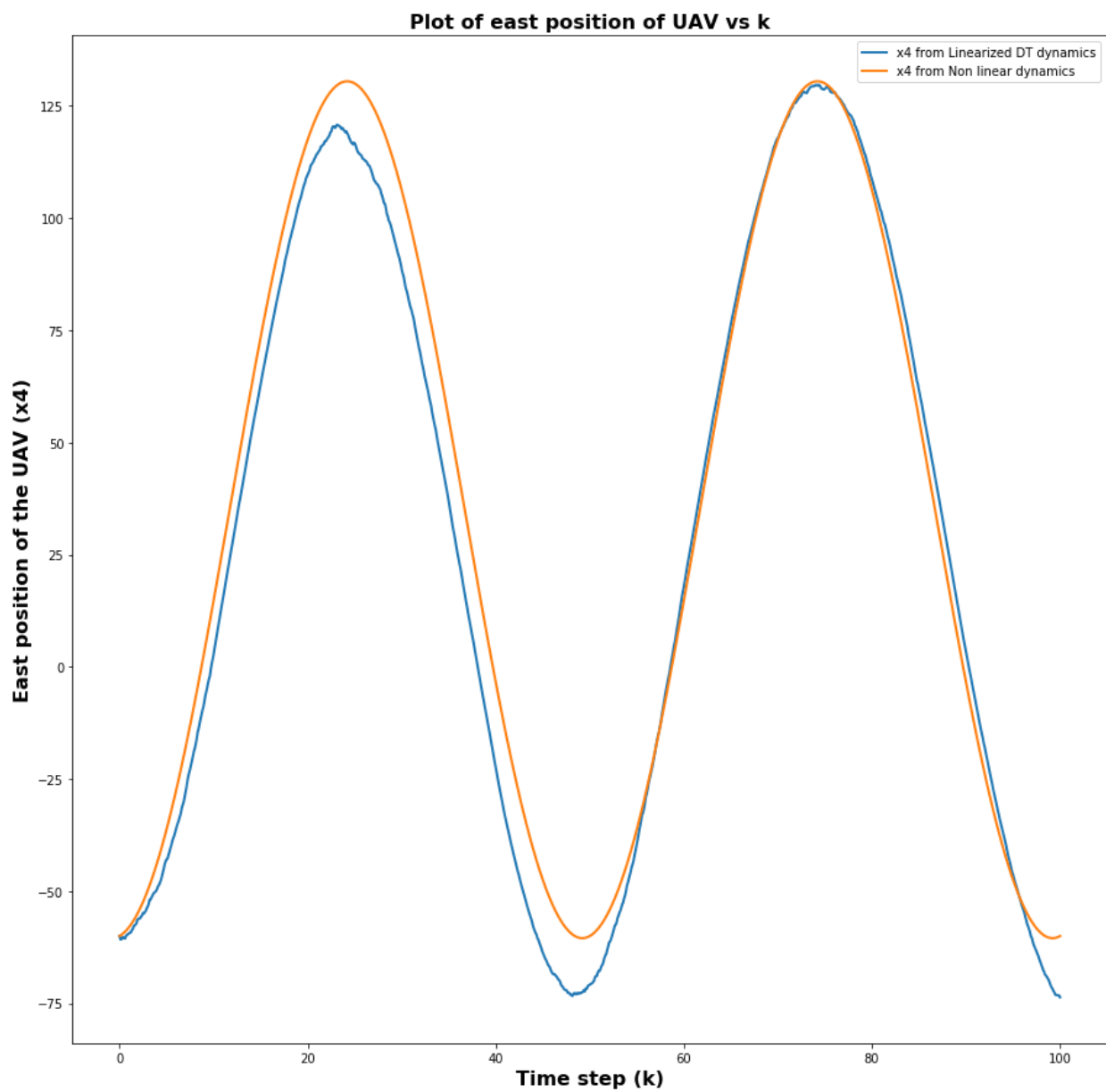


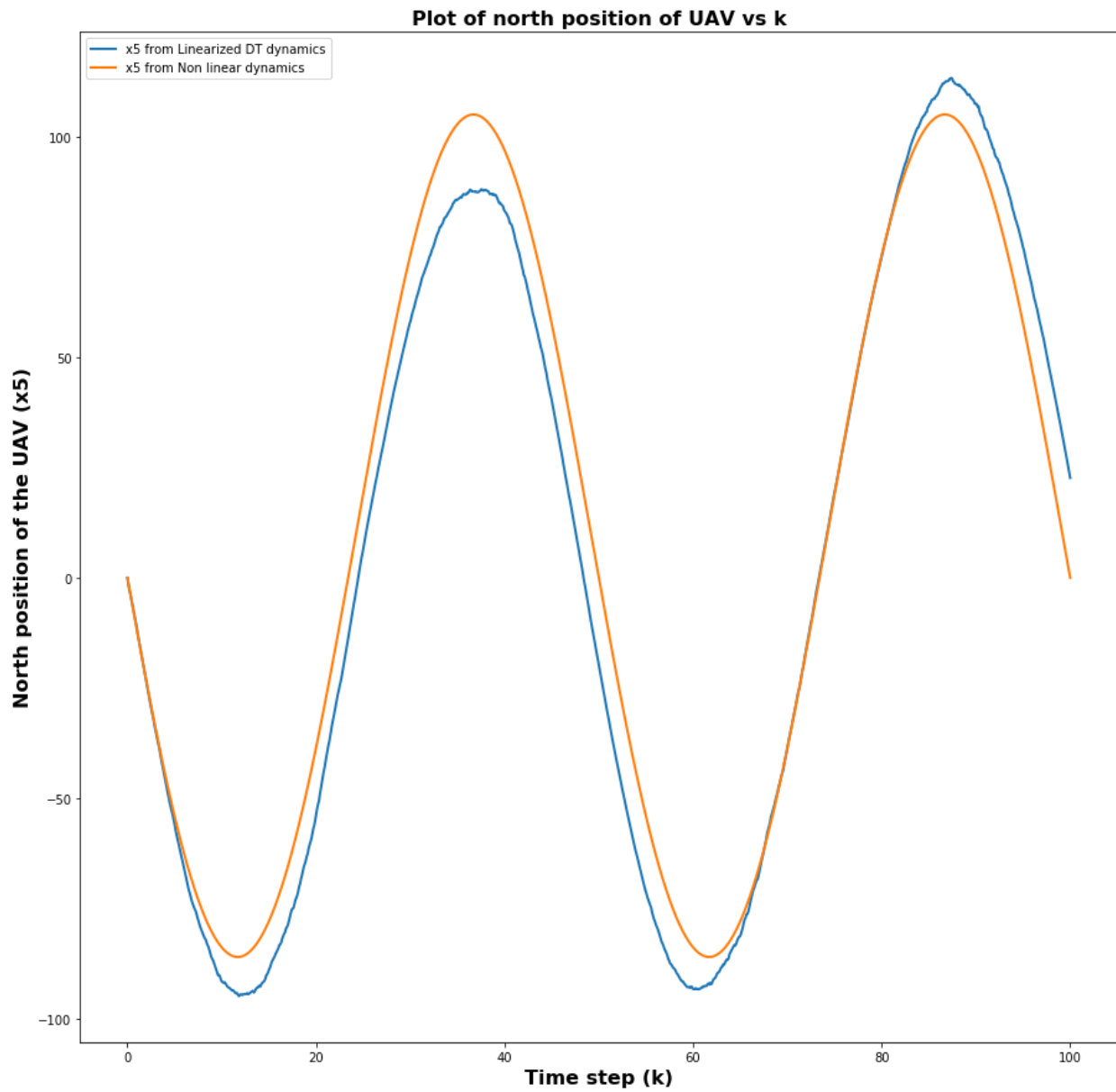
For LKF:

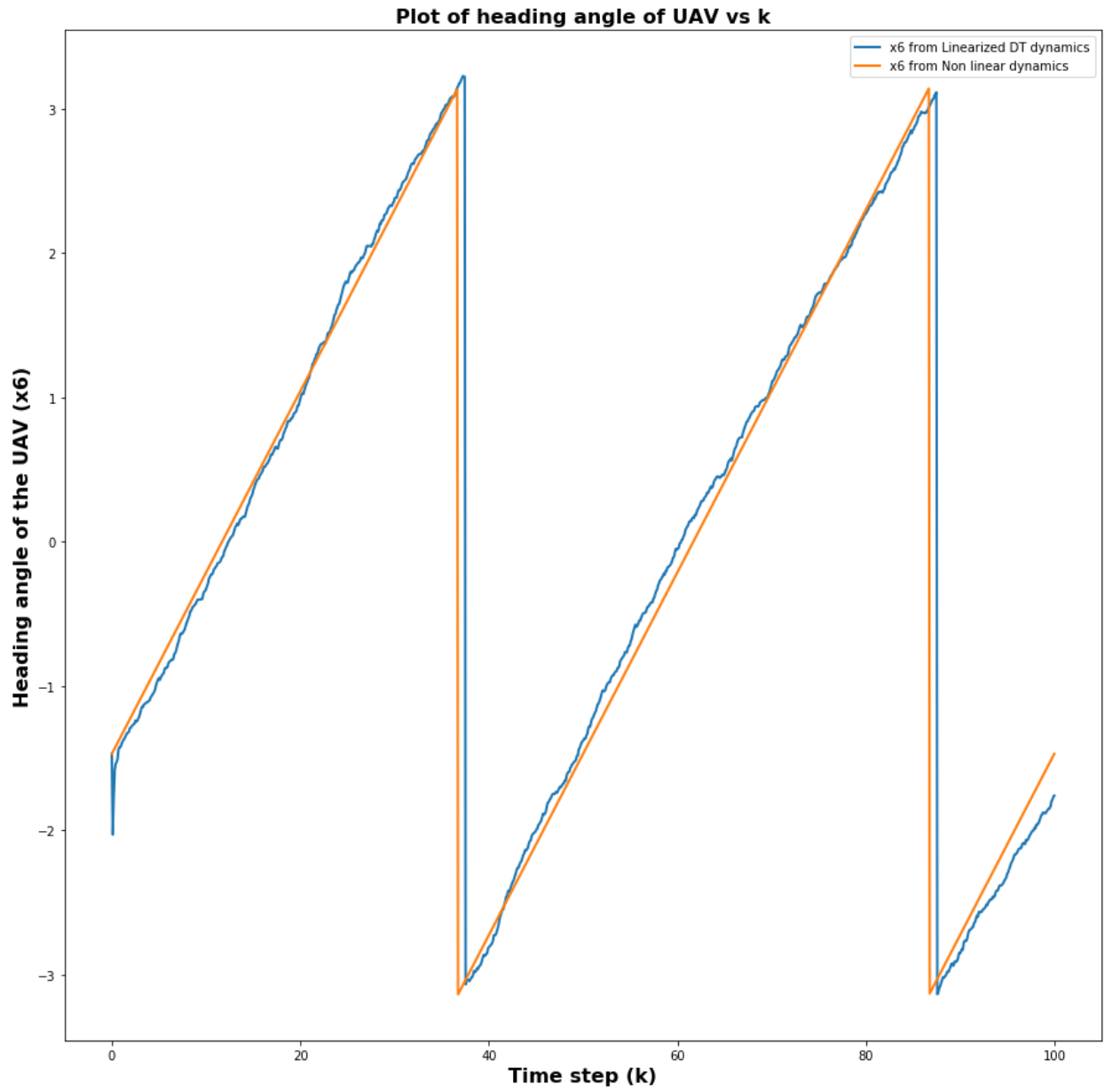


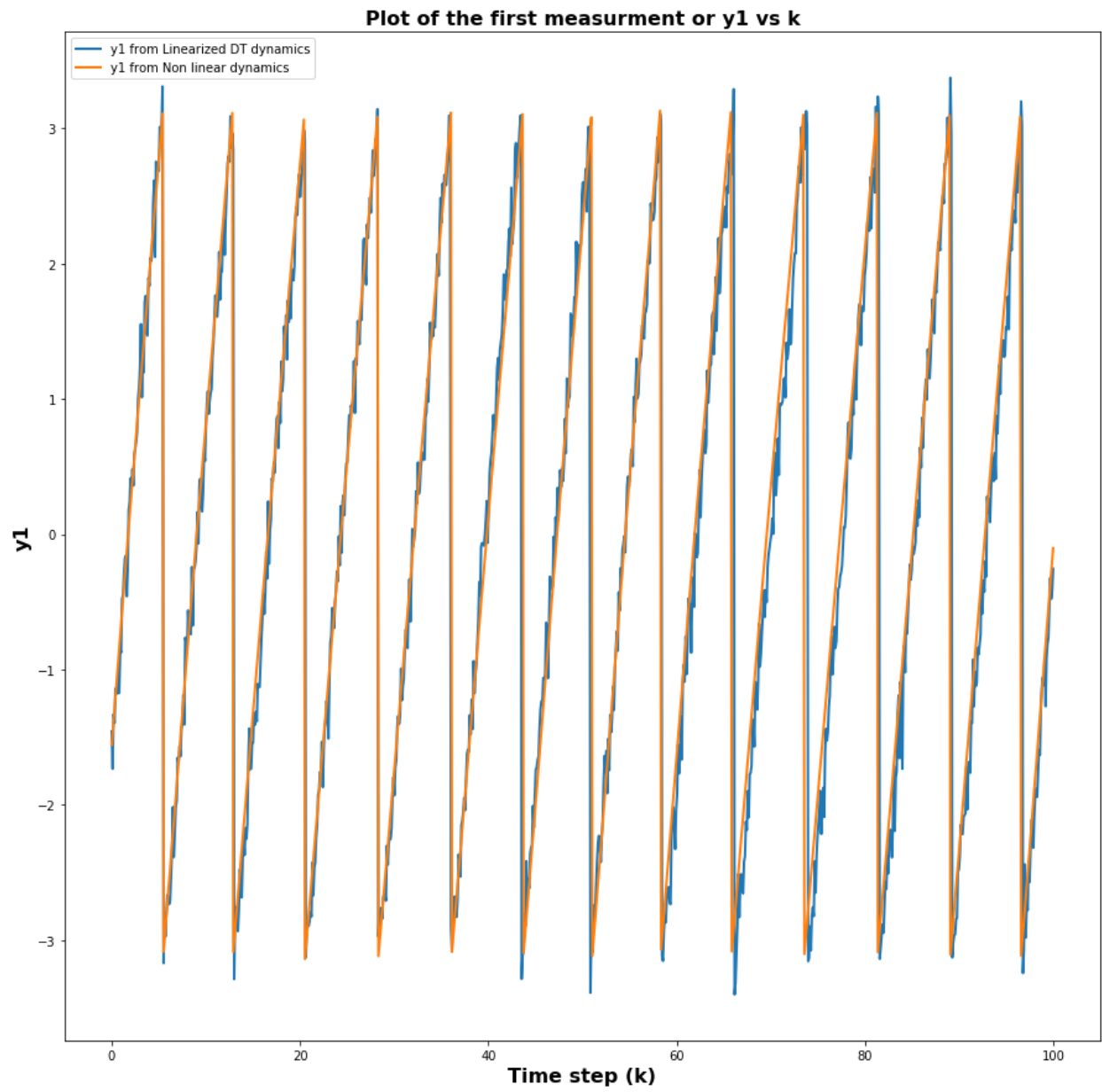


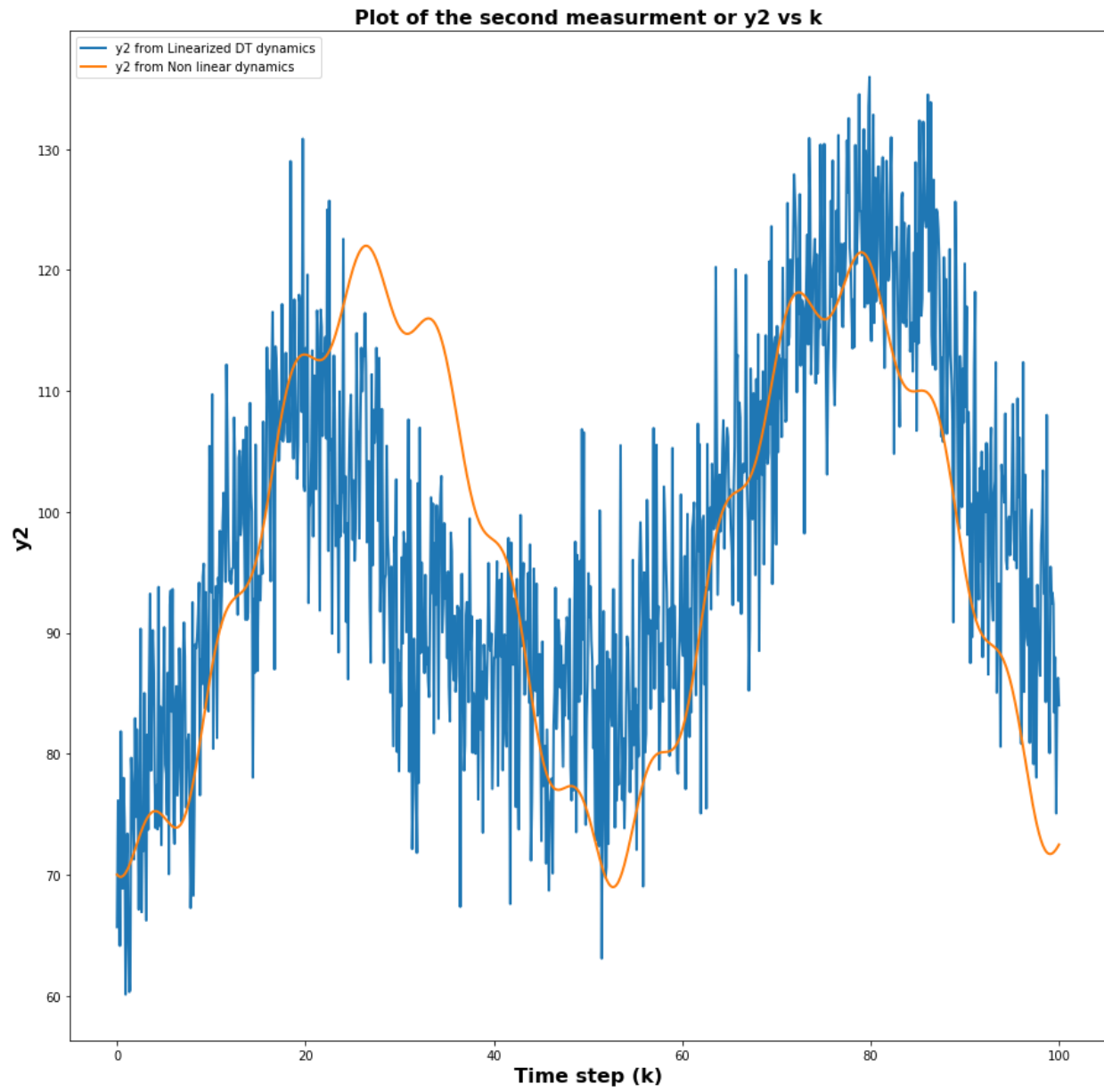


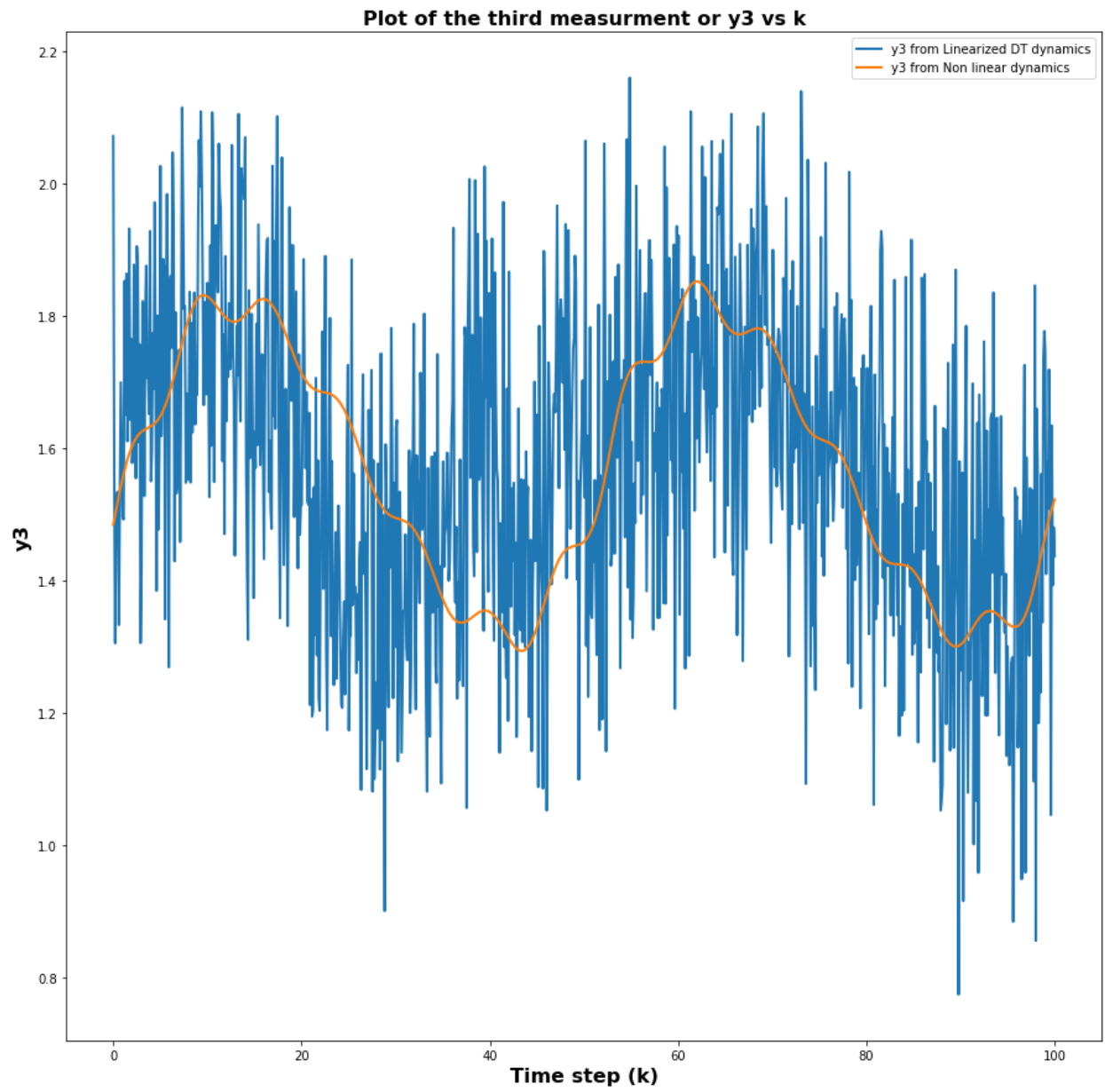


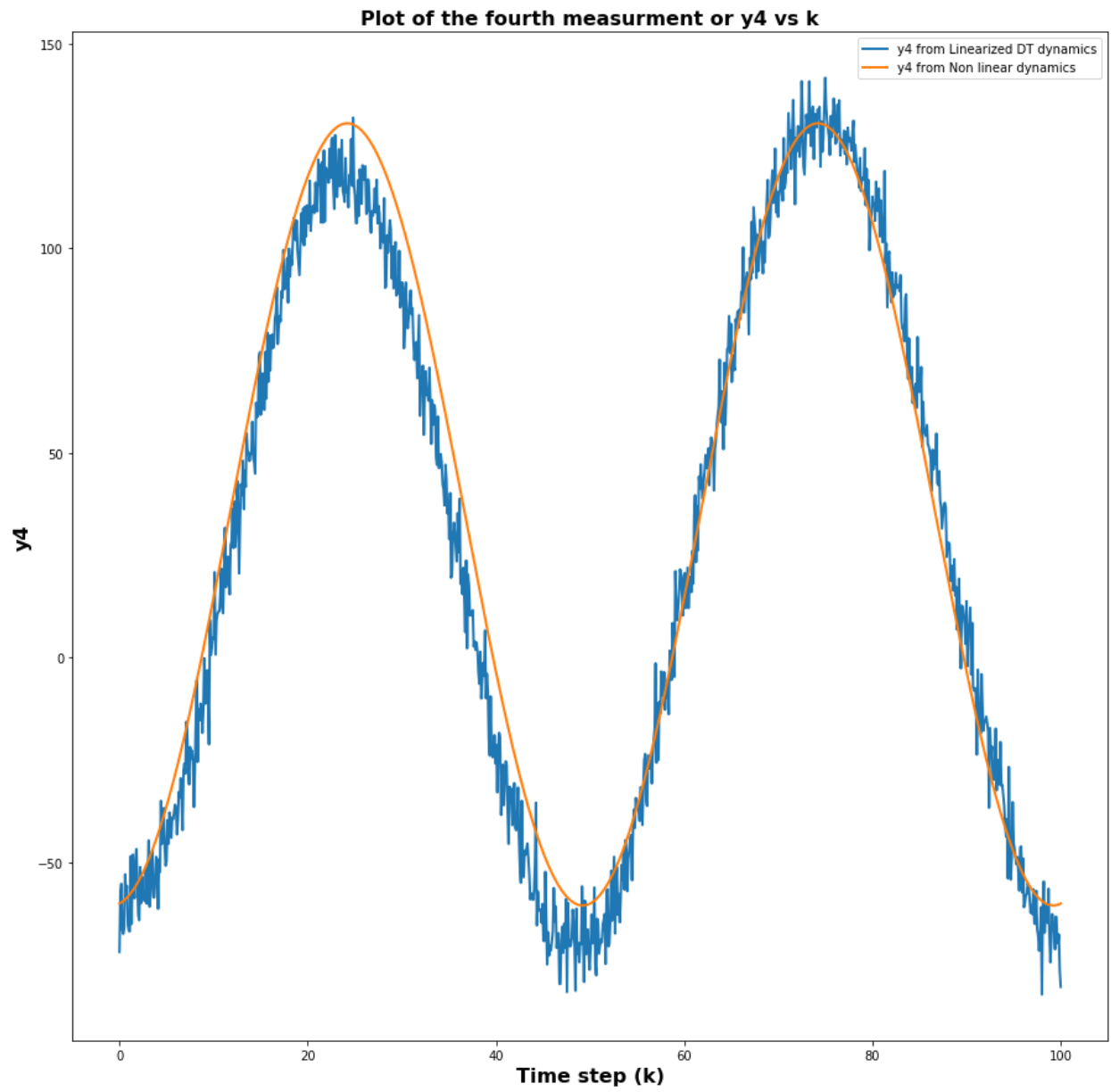


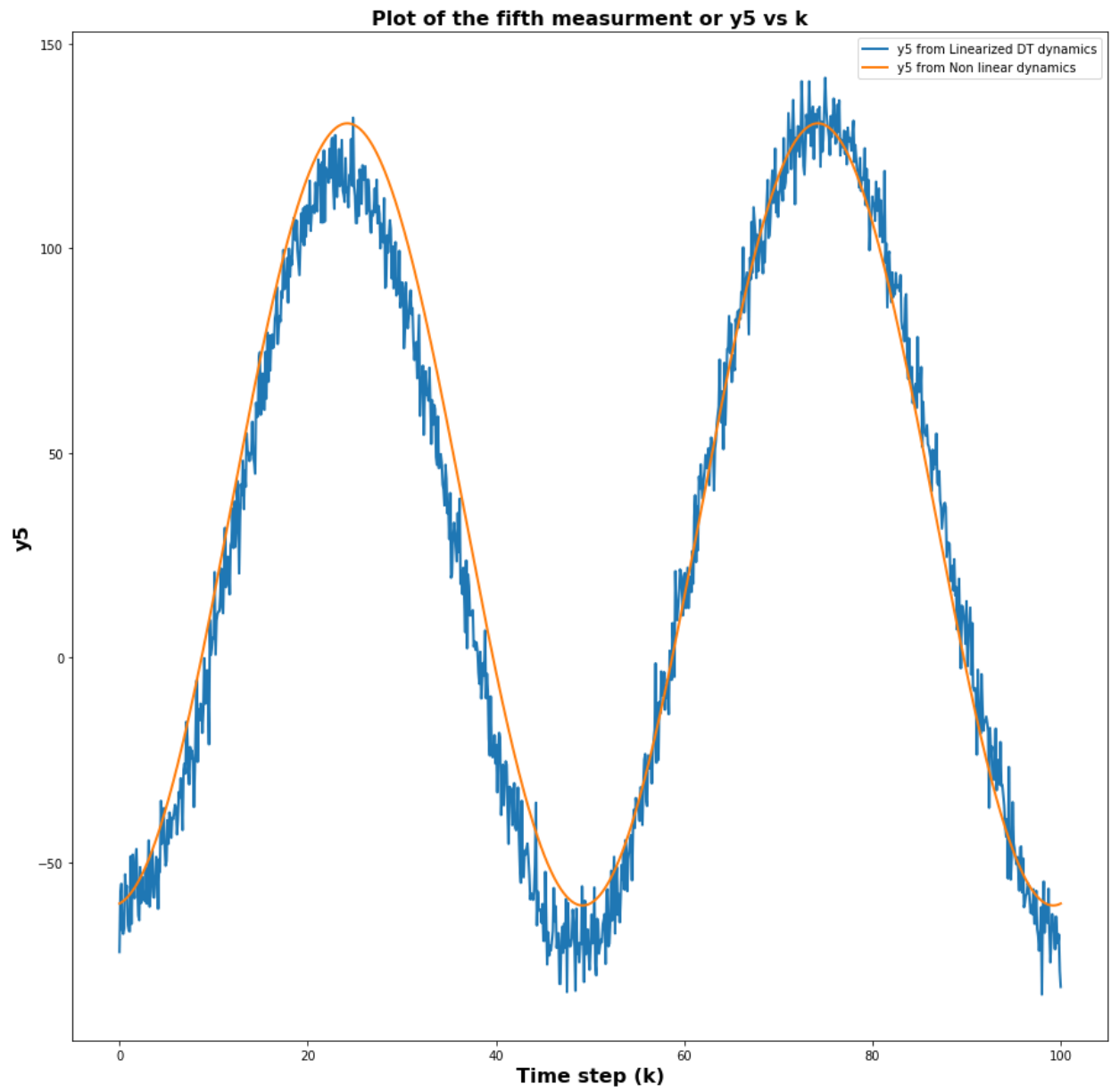


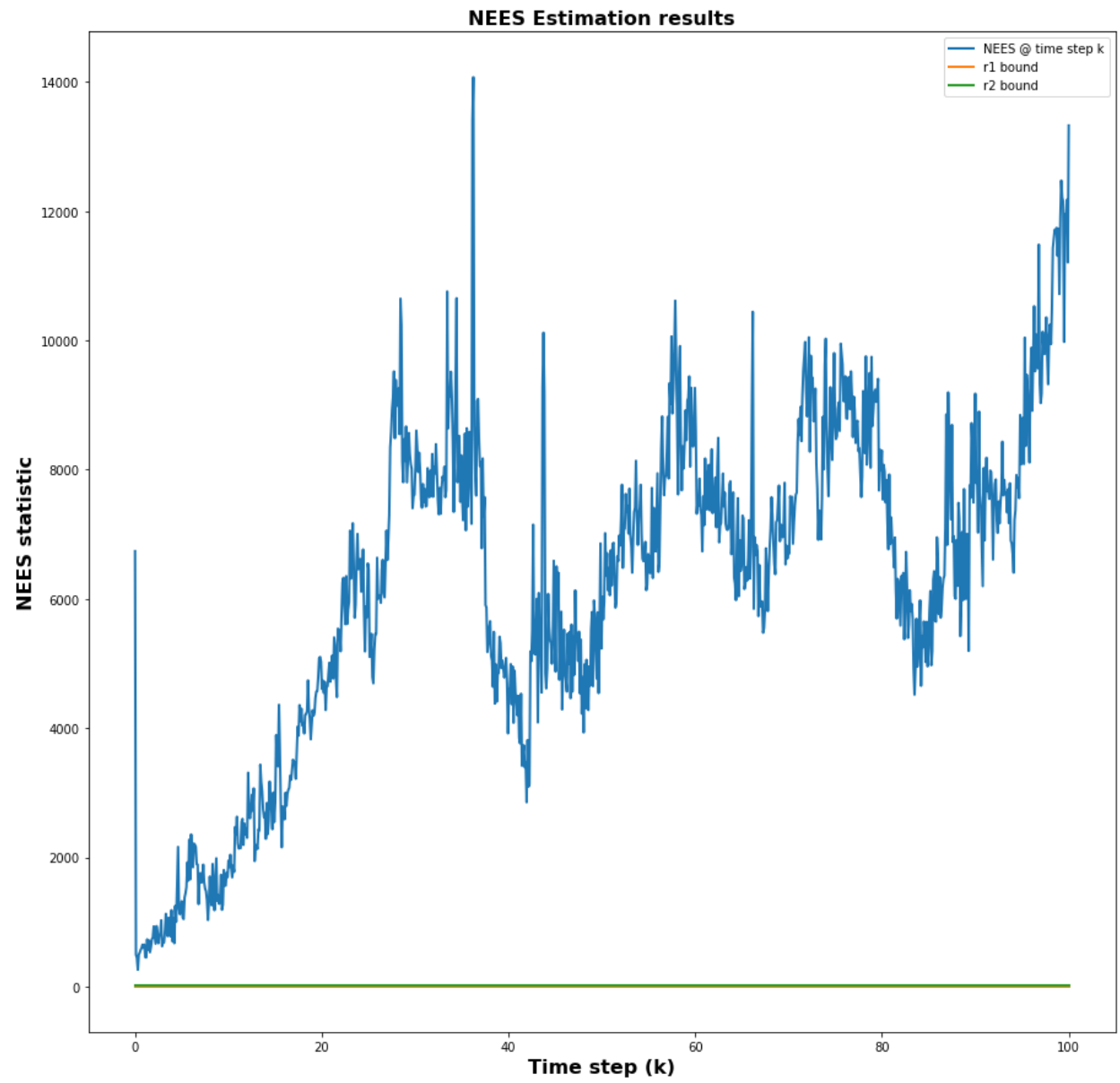


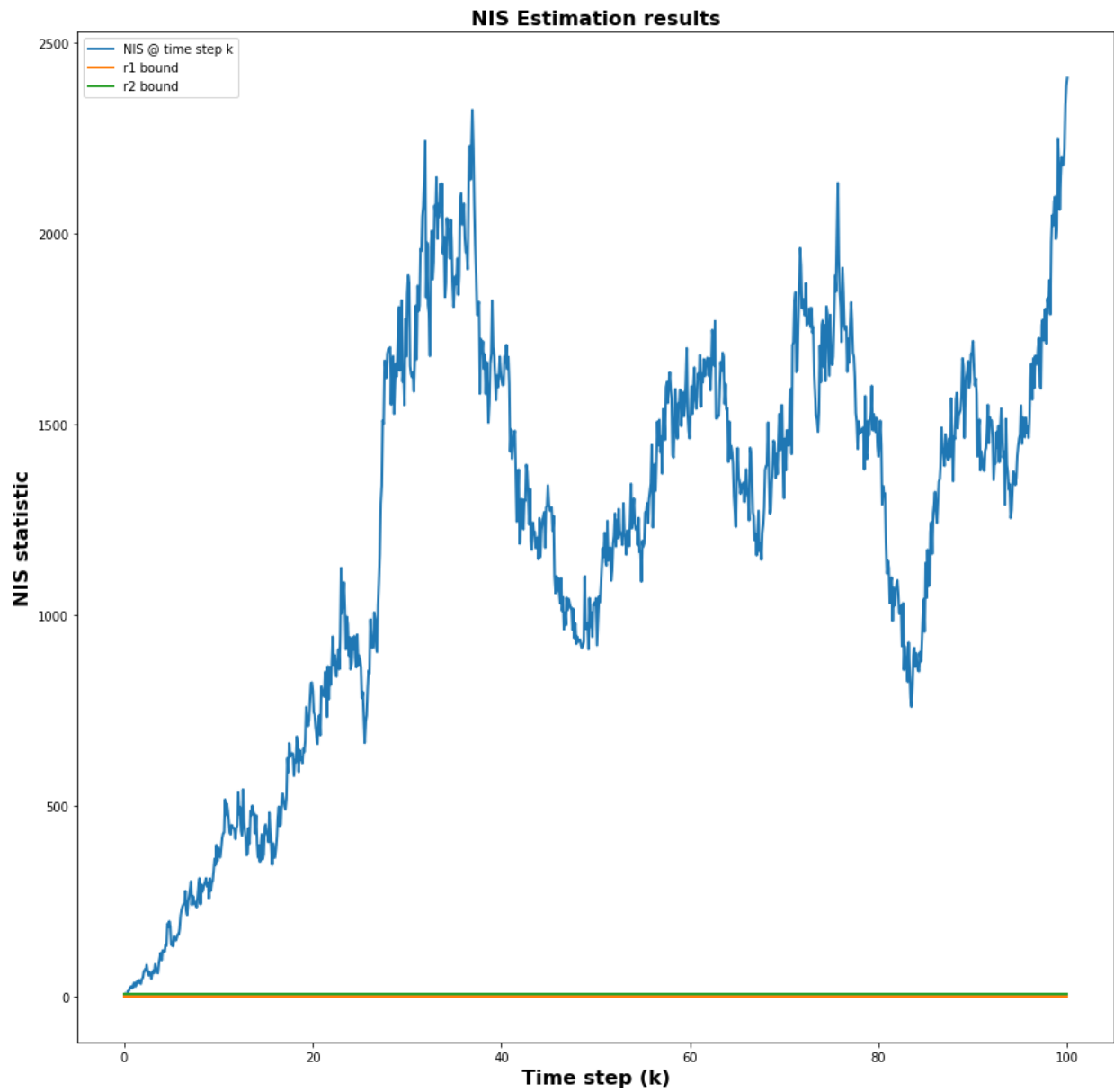












We aren't sure why NEES and NIS results are not falling between r_1 and r_2 bounds. We tried tuning the KF and playing around with the Q_{KF} value but nothing seemed to work. We understand that since the plots are above both the bounds, we are supposed to increase our Q_{KF} , but it still doesn't seem to fall within the bound.

So, we are stuck right now. Maybe there is an error in the code and so we need to review that as well.