

# What Values Maximize Activation of S<sub>os</sub>?

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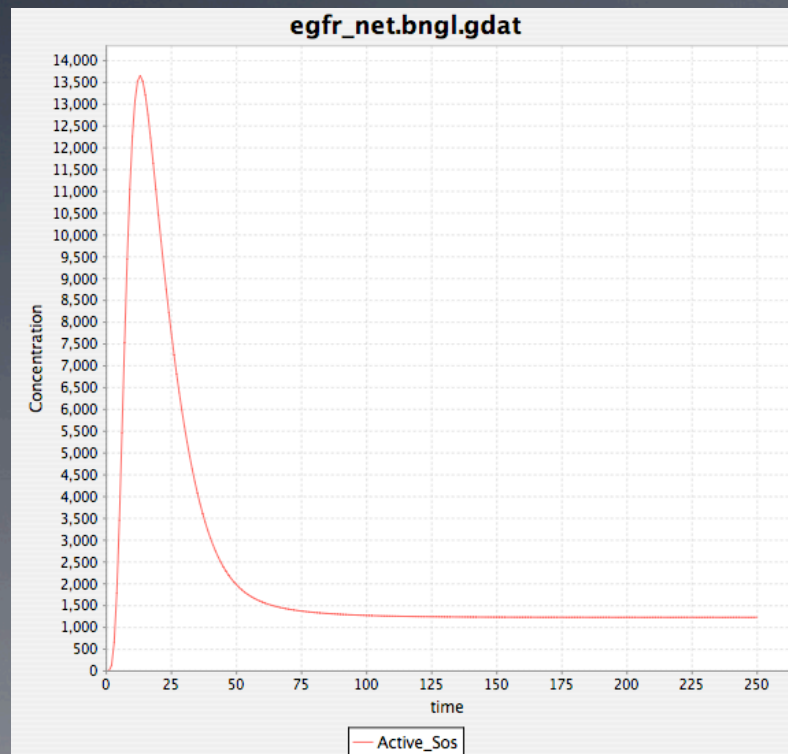
Victor Nnah

# What Values Maximize Activation of Sos?

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- Dimerization Rate
  - Ligand-receptor monomers bind to form a dimer
  - $\text{egfr}(l!1,r) + \text{egfr}(l!2,r) \leftrightarrow \text{egfr}(l!1,r!3).\text{egfr}(l!2,r!3) \quad k_{p2}, k_{m2}$
  - $k_{p2} \quad 5.556e-6$
  - $k_{m2} \quad 0.1$
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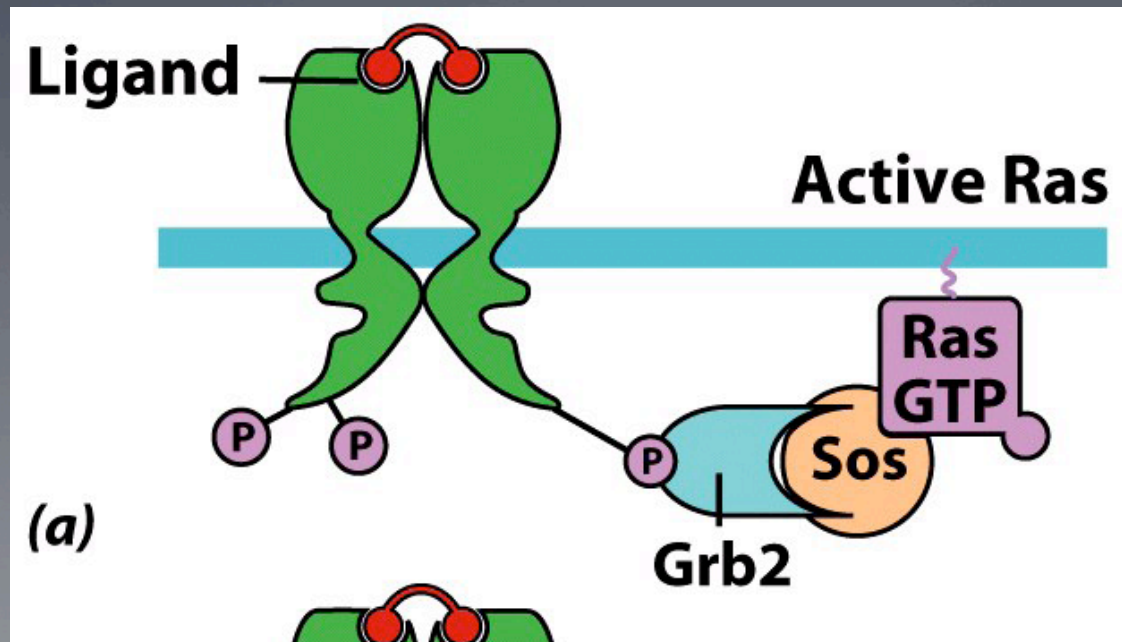
# Graph of Active Sos



- Max. Concentration of Active Sos: (9, 13500)
- From  $t = 0, 9$ ; the concentration of Active Sos increases rapidly
- At  $t = 50$ , the concentration of Active Sos remains constant at a level of 1250

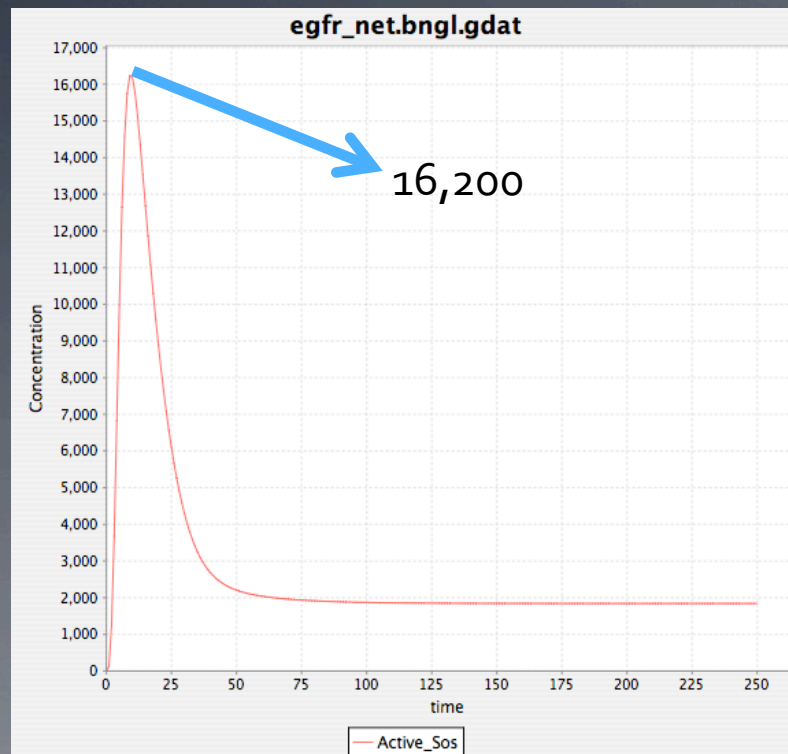
# Does Activation of Sos Increase with Dimerization Rates?

- Hypothesis: If we increase the dimerization rate  $K_{p2}$ , then the concentration of Active Sos will also increase.



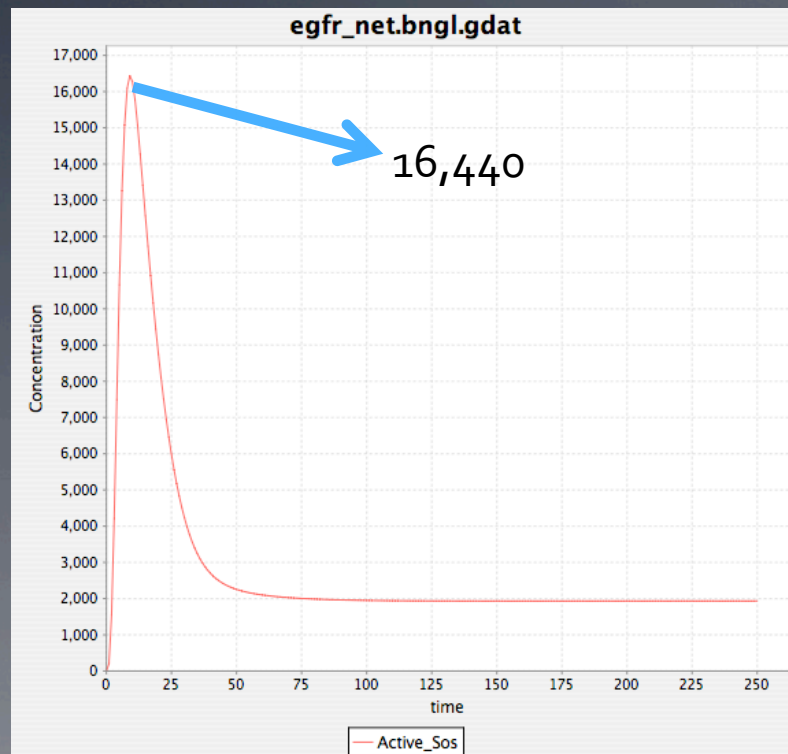


$$Kp2 = 5.556 \text{ e-}4$$



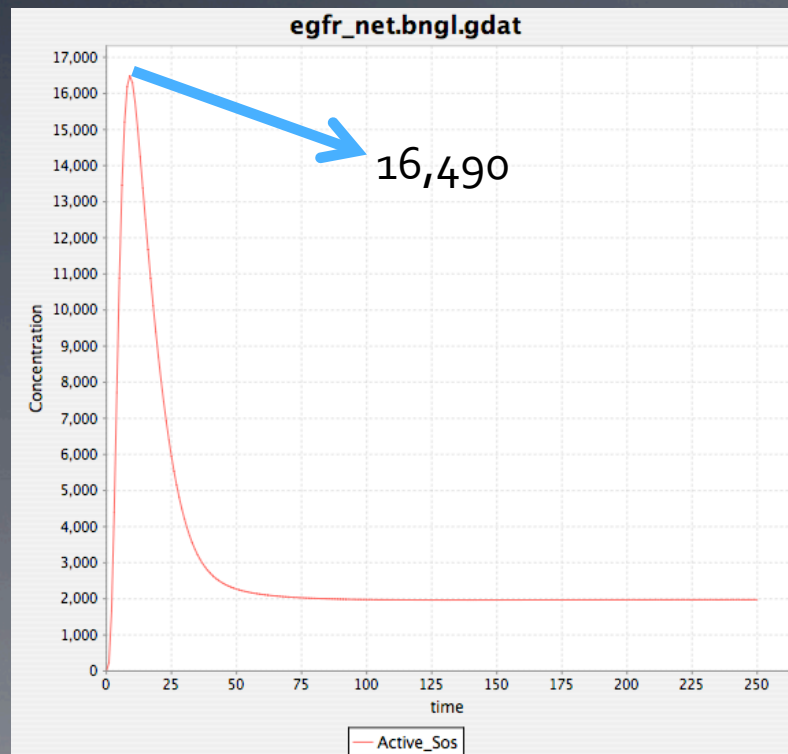
- A big increase from the original values (13,500)

$$Kp2 = 5.556 \text{ e-}3$$



- Still increasing

$$K_{p2} = 5.556 \text{ e-}2$$



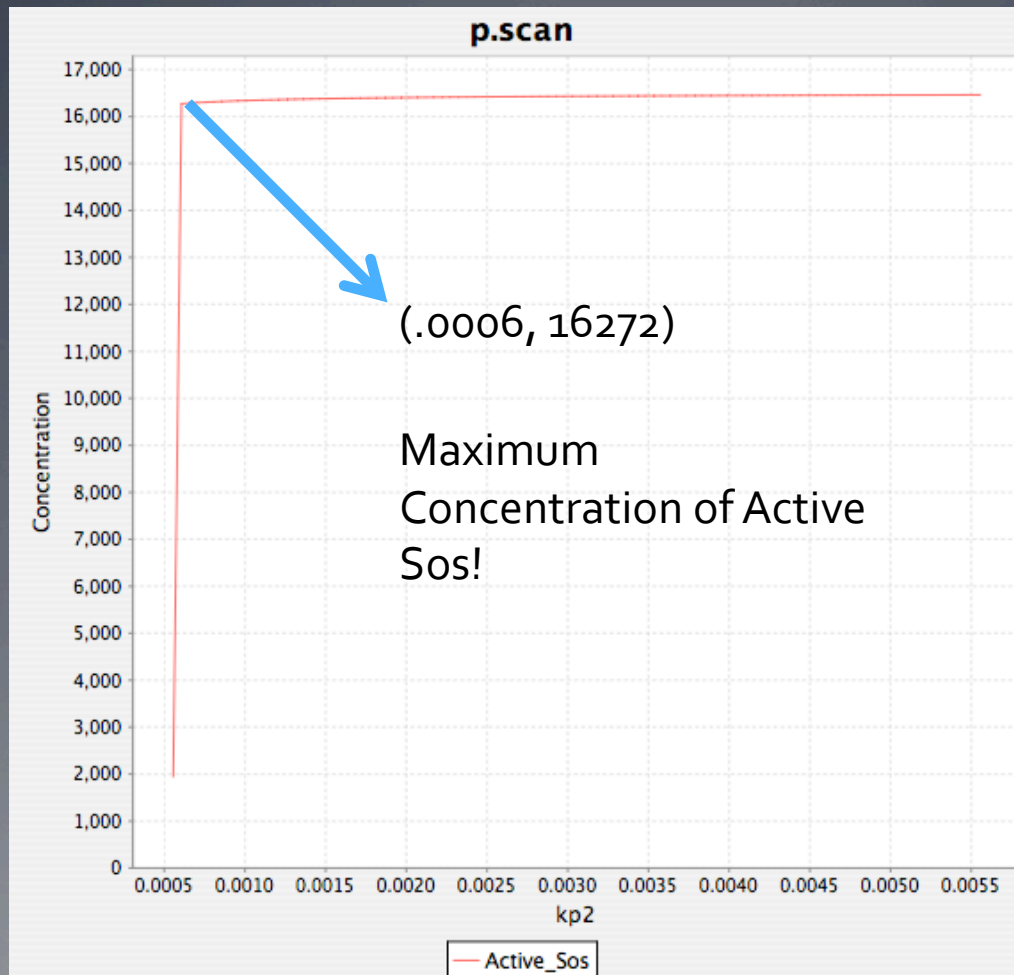
- Not a big increase!

# Summary of Results

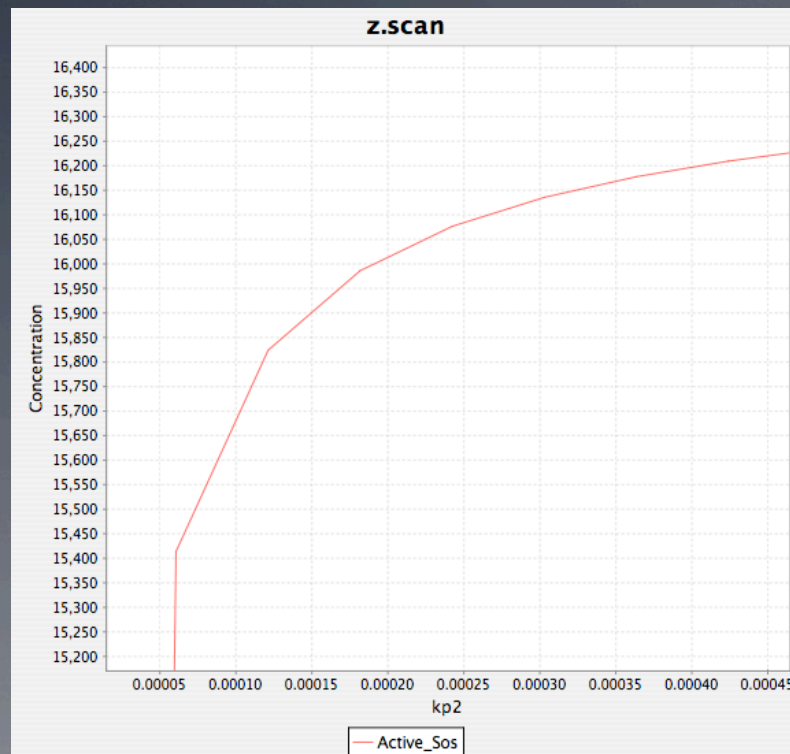
kp2	Max Concentration of Sos
5.556 e-6	13,500
5.556 e-4	16,200
5.556 e-3	16,440
5.556 e-2	16,490



# Parameter Scan of $kp_2$



# Close-up of Parameter Scan



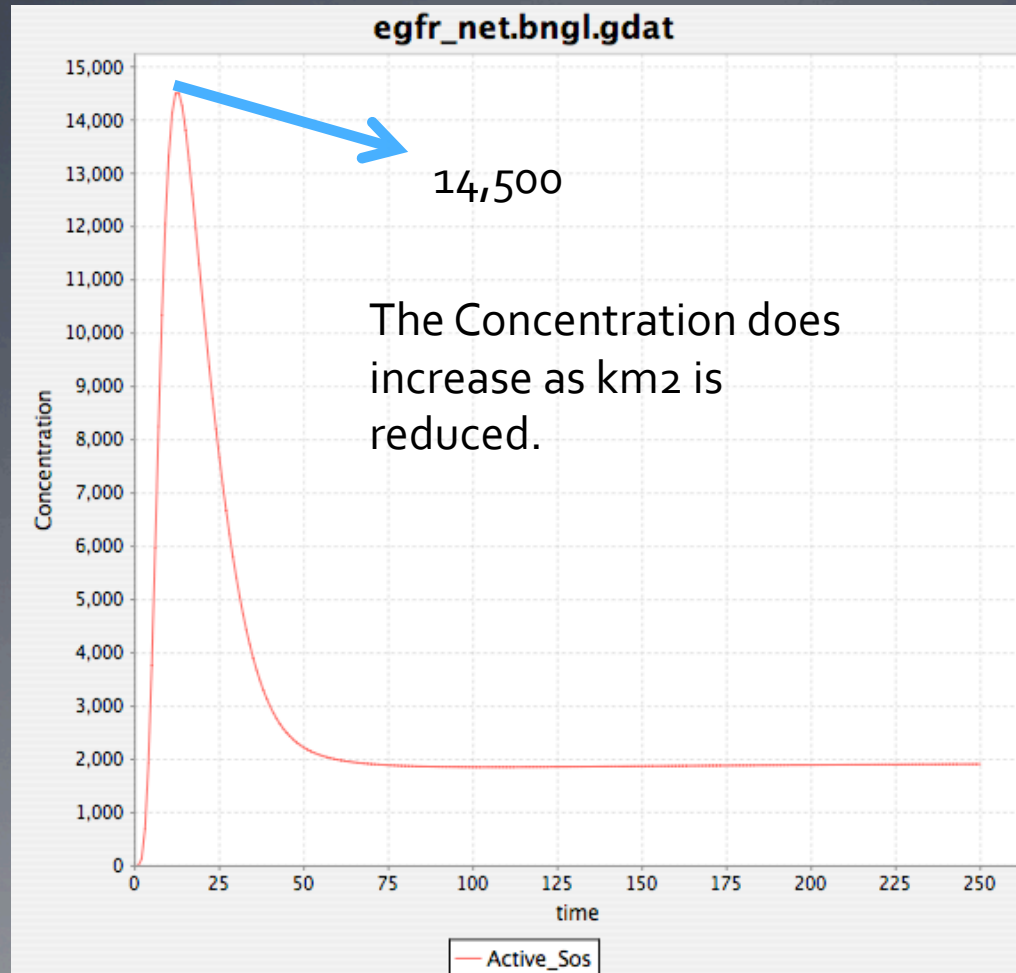
- The effect of dimerization rate from  $kp2 = 0$  to  $.0006$
- Concentration of Active Sos continues to increase but at a less rapid rate until the increase is insignificant

# What about $k_{m2}$ ?

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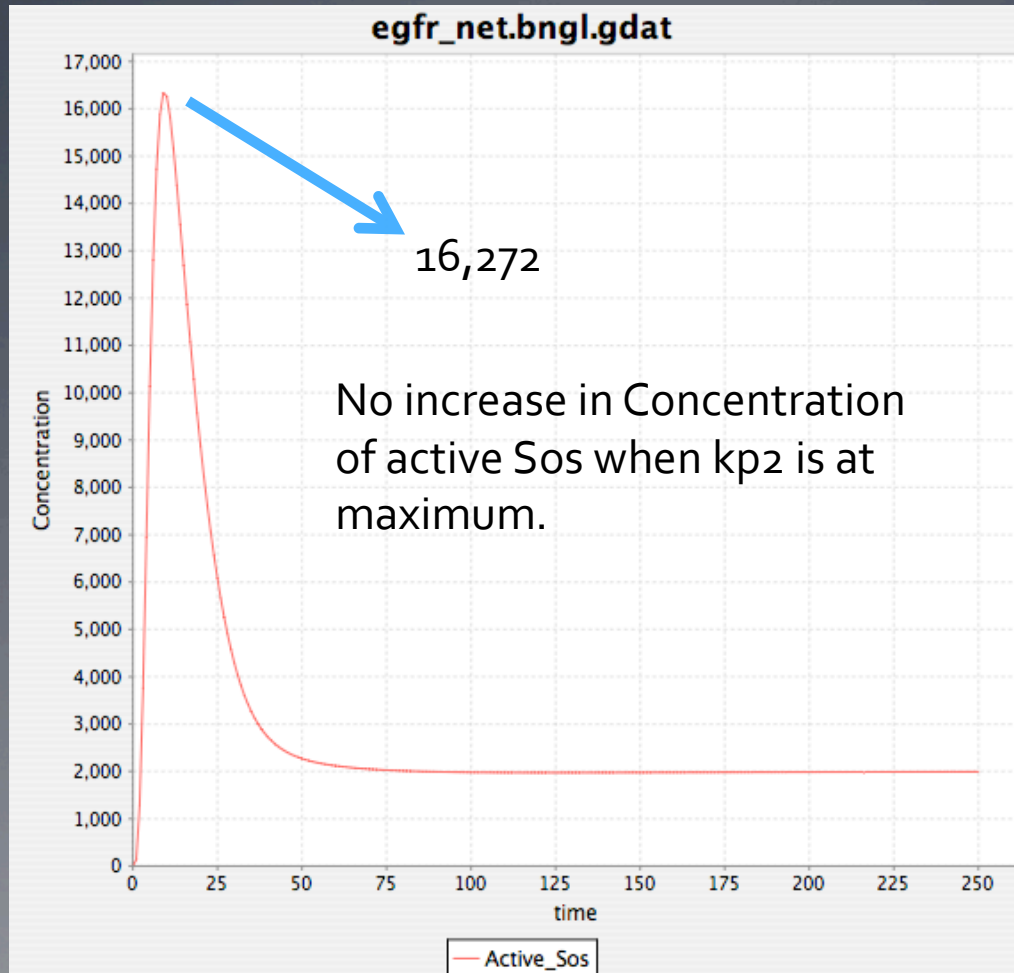
- $egfr(l!1,r) + egfr(l!2,r) \leftrightarrow egfr(l!1,r!3).egfr(l!2,r!3) \quad k_{p2}, k_{m2}$
  - $K_{m2}$  is the dimer dissociation rate
  - How does the reverse rate,  $k_{m2}$ , affect levels of concentration of active Sos? Does decreasing the reverse rate increase the concentration of active Sos?
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$$km2 = 0, kp2 = 5.556 \text{ e-}6$$





$$k_{m2} = 0, k_{p2} = .0006$$



# Conclusions

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- At  $t = 9$ , the concentration of active Sos reaches a peak and then decreases
  - When the dimerization rate is increased, the peak of active Sos also increases
  - The concentration only increases greatly until  $k_{p2} = 0.0006$ , after which the increase is insignificant since the slope of the concentration vs.  $k_{p2}$  graph approaches 0
  - $k_{m2}$  does not have much of an effect as  $k_{p2}$
  - In fact, when  $k_{p2}$  is at 0.0006, reducing  $k_{m2}$  has no effect whatsoever
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# Questions?

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