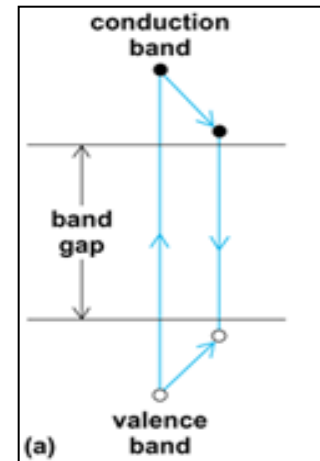
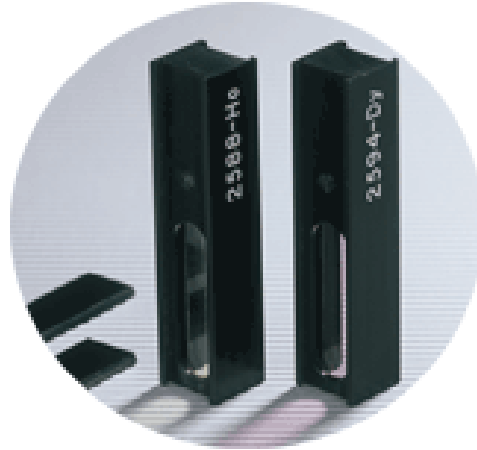


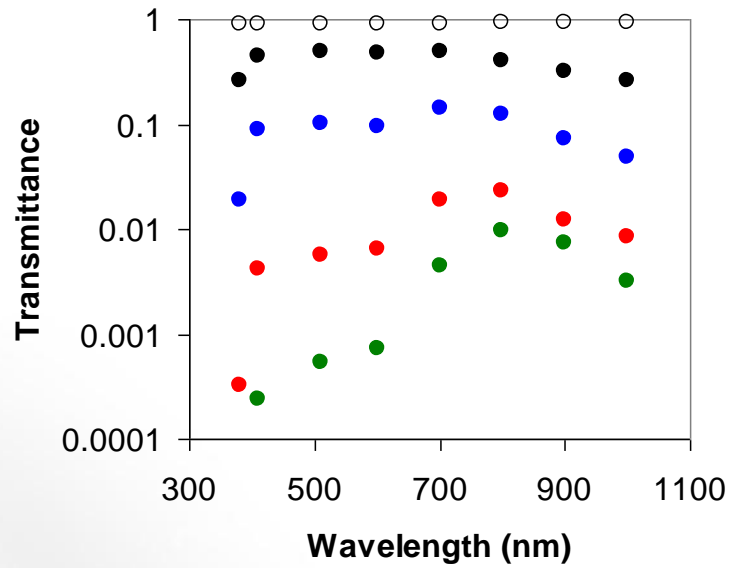
# Transmittance Standards

## Temperature and Temporal Dependence

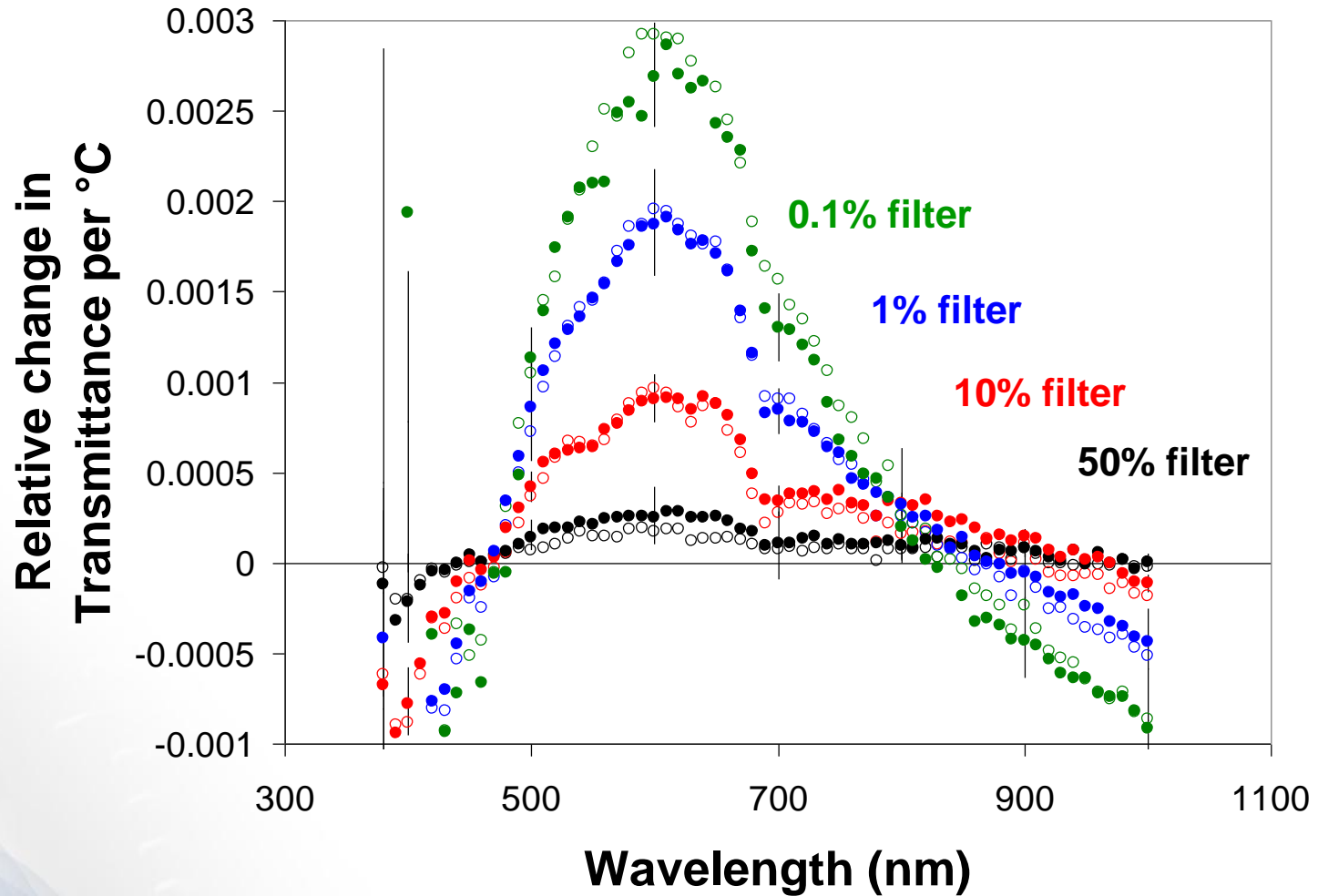
# Regular Spectral Transmittance



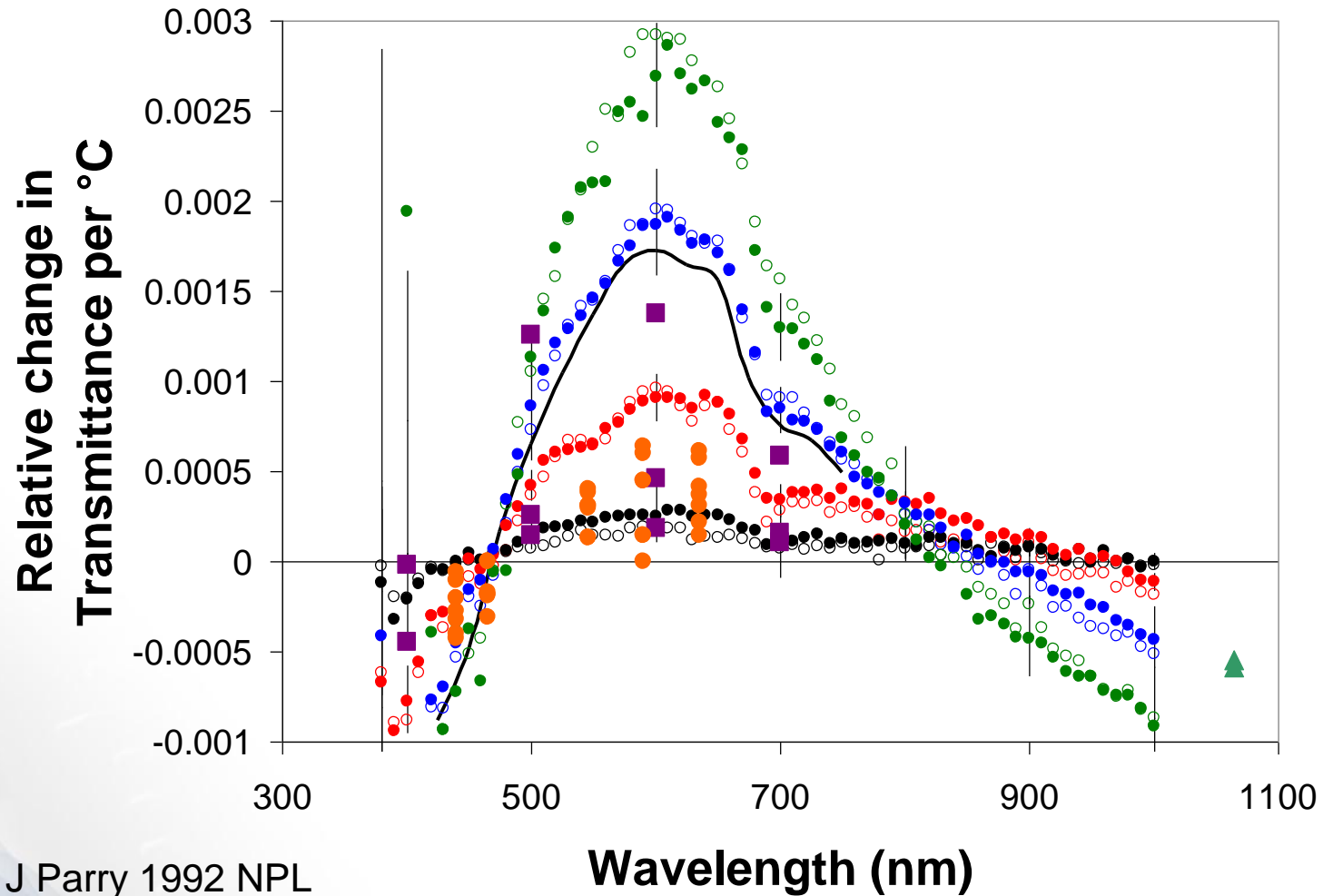
# Key Comparison



# Temperature Dependence

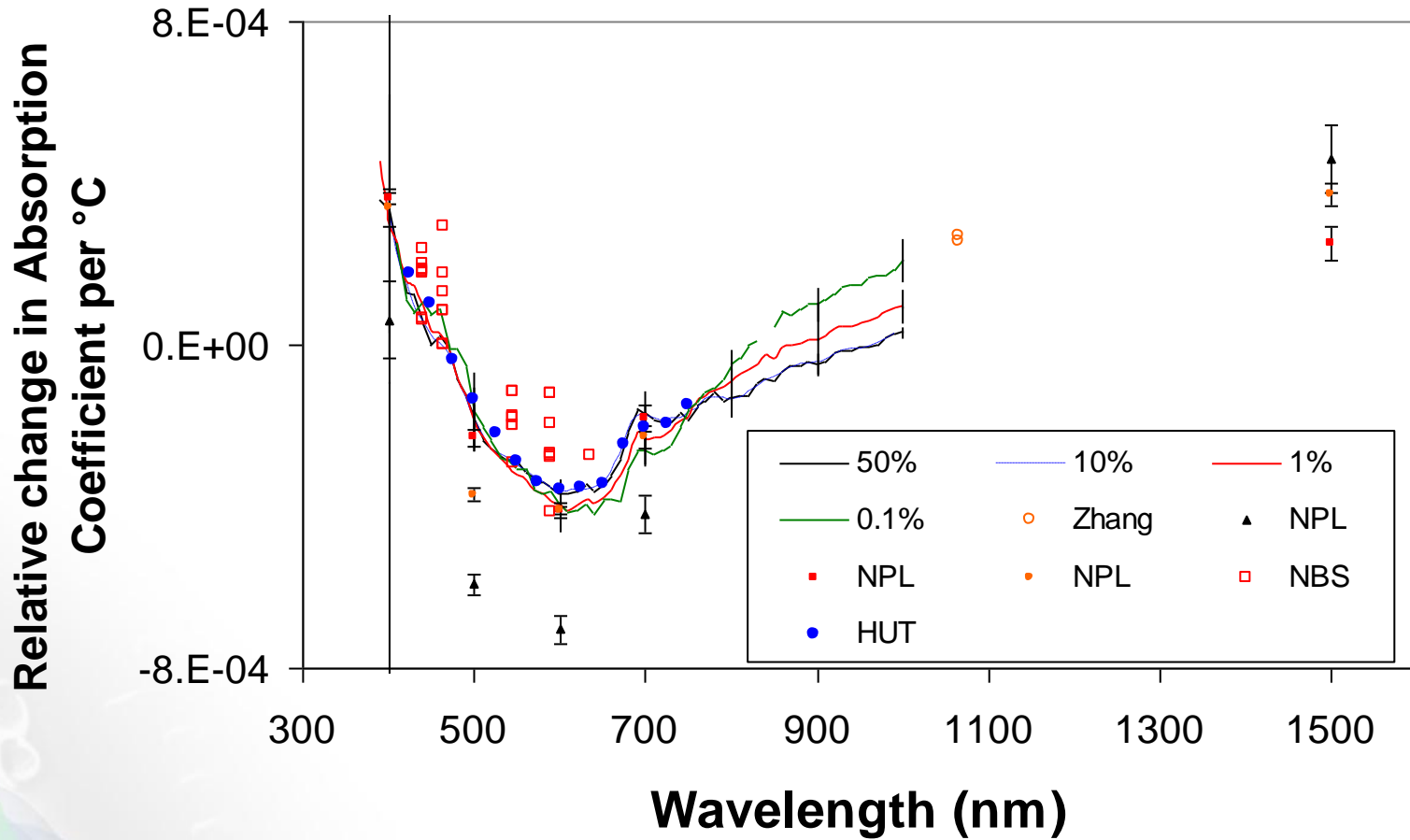


# Temperature Dependence

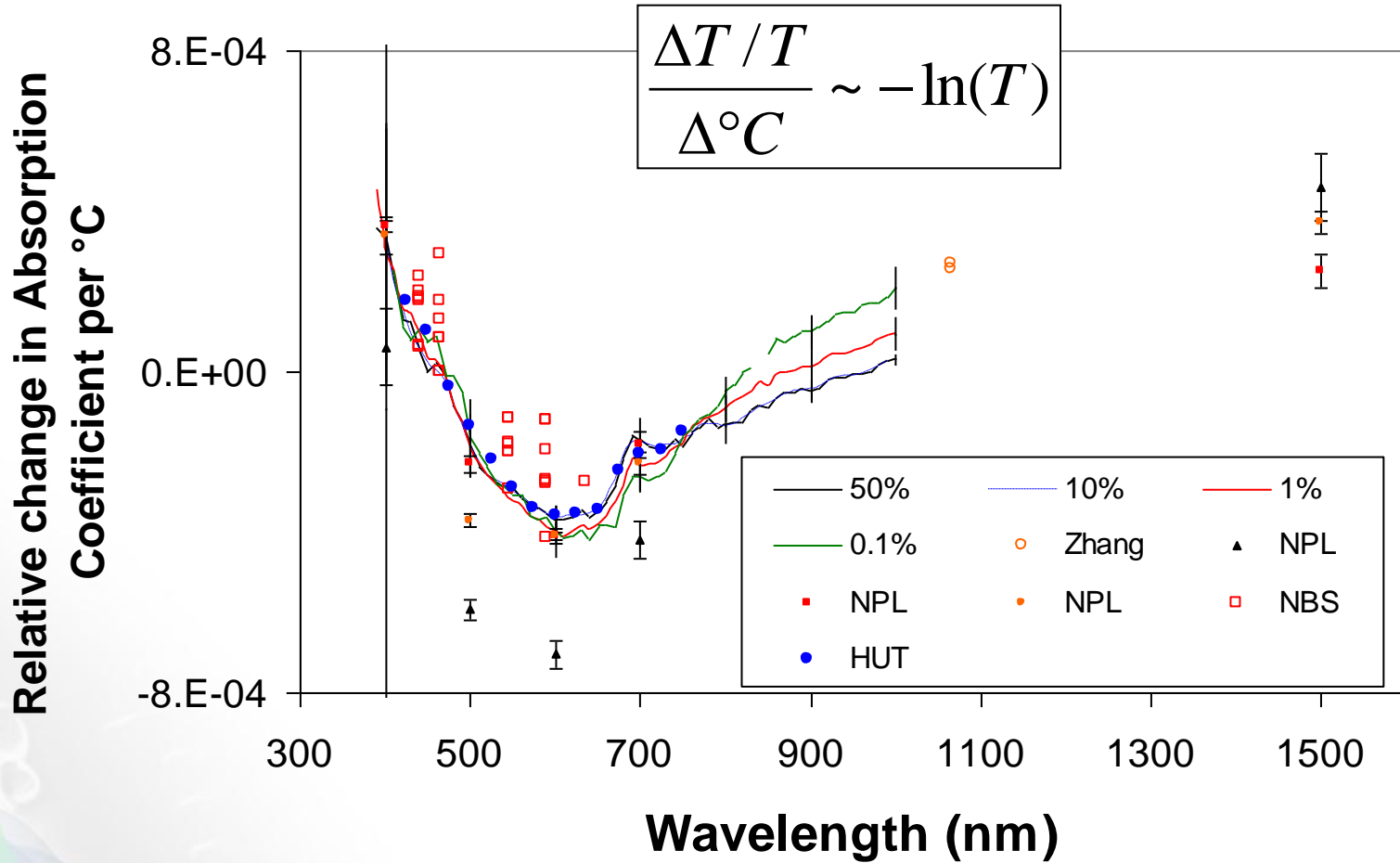


- D J Parry 1992 NPL
- ▲ Zhang, Gentile, Migdall and Datla 1997 *Applied Optics* **36** p. 8889-8895
- R Mavrodineau and J R Baldwin 1975 *NBS Special Publication* **260-51**
- Manoochchri, Ikonen, Liedquist 1996 *Col. Res. Appl.* **21** p. 440-7

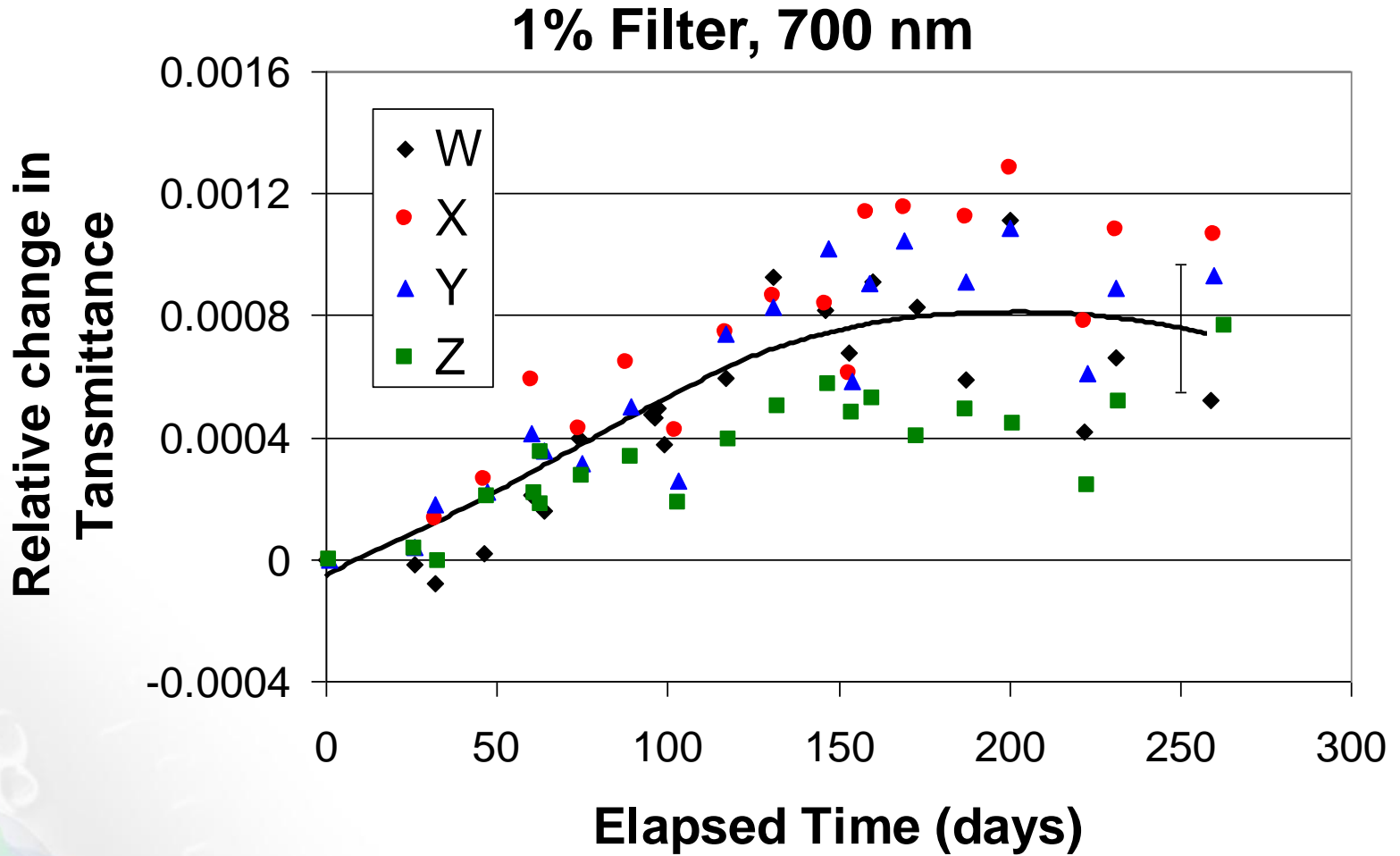
# Temperature Dependence



# Temperature Dependence



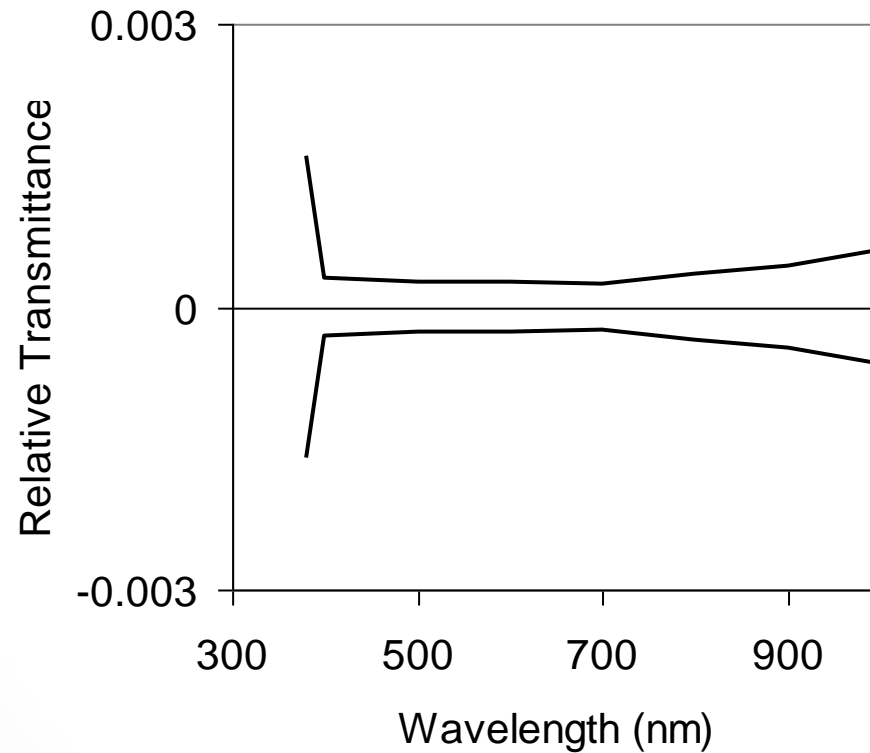
# Time Dependence





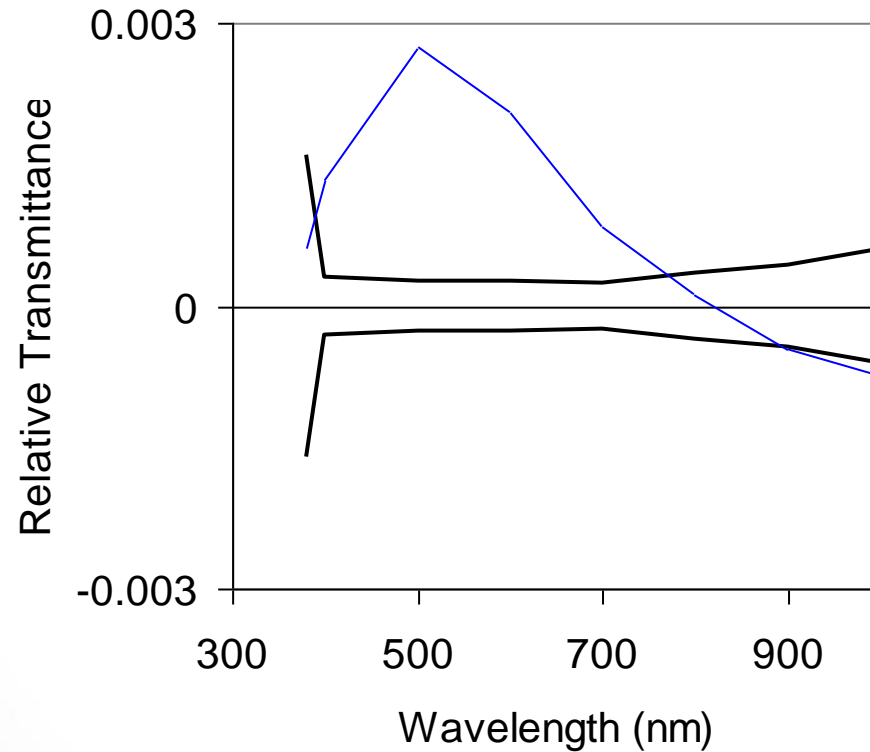
# So...?

## NG11 filter (nominal 50% transmittance)



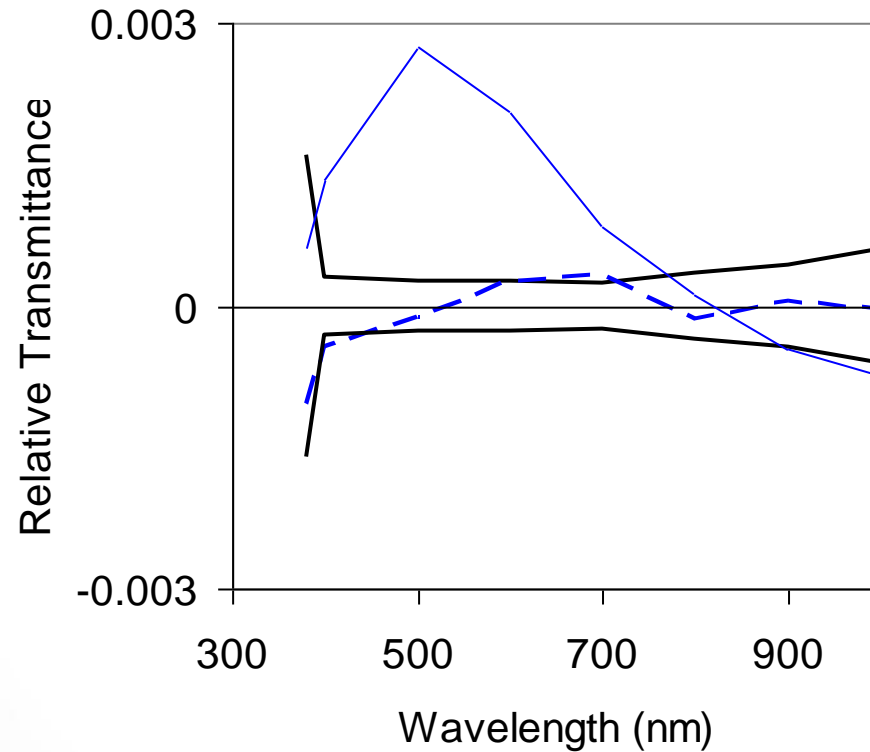
# So...?

## NG11 filter (nominal 50% transmittance)



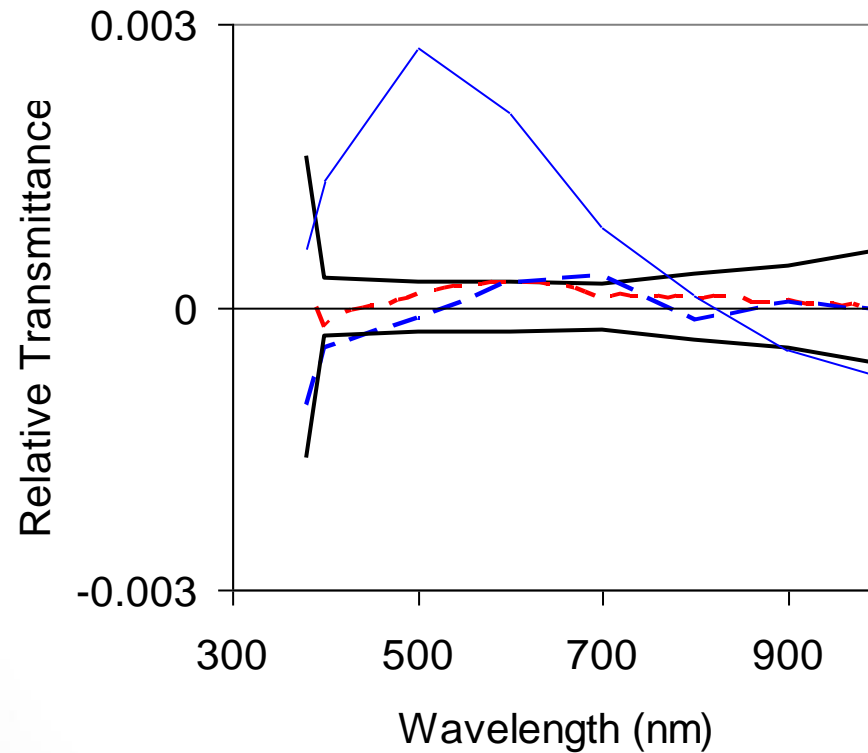
# So...?

## NG11 filter (nominal 50% transmittance)



# So...?

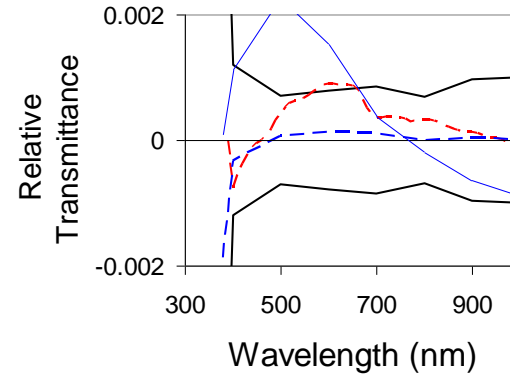
## NG11 filter (nominal 50% transmittance)



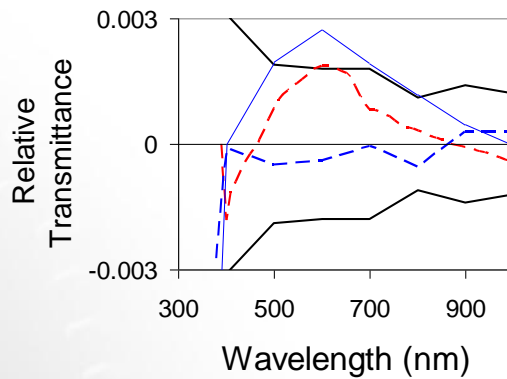
# So...?

- relative change with time (3 months to June 2011)
- - relative change with time (3 months to Sept 2011)
- - relative change with temperature (per °C)

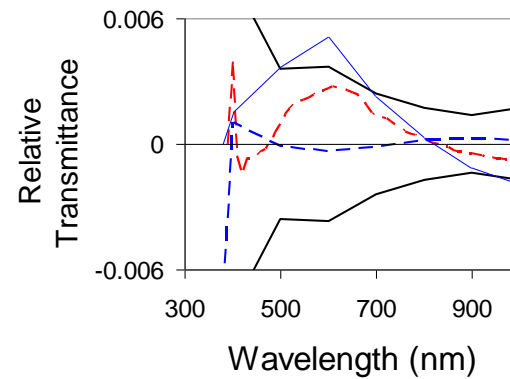
**NG5 filter (nominal 10% transmittance)**



**NG4 filter (nominal 1% transmittance)**



**NG3 filter (nominal 0.1% transmittance)**



During the previous comparison, a **difference in temperature** between MSL and another laboratory of **0.4 °C** would have produced an **error** in transmittance relative to that lab **equal** to MSL's **standard uncertainty** for the 10% filter at 600 nm.

If the filters of the previous comparison were **drifting** at the **June 2011 rate**, the 50% filter at 500 nm would have drifted beyond MSL's standard uncertainty within **2 weeks** of calibration; if drift was at the the **September 2011 rate**, that would increase to **4 months**.

