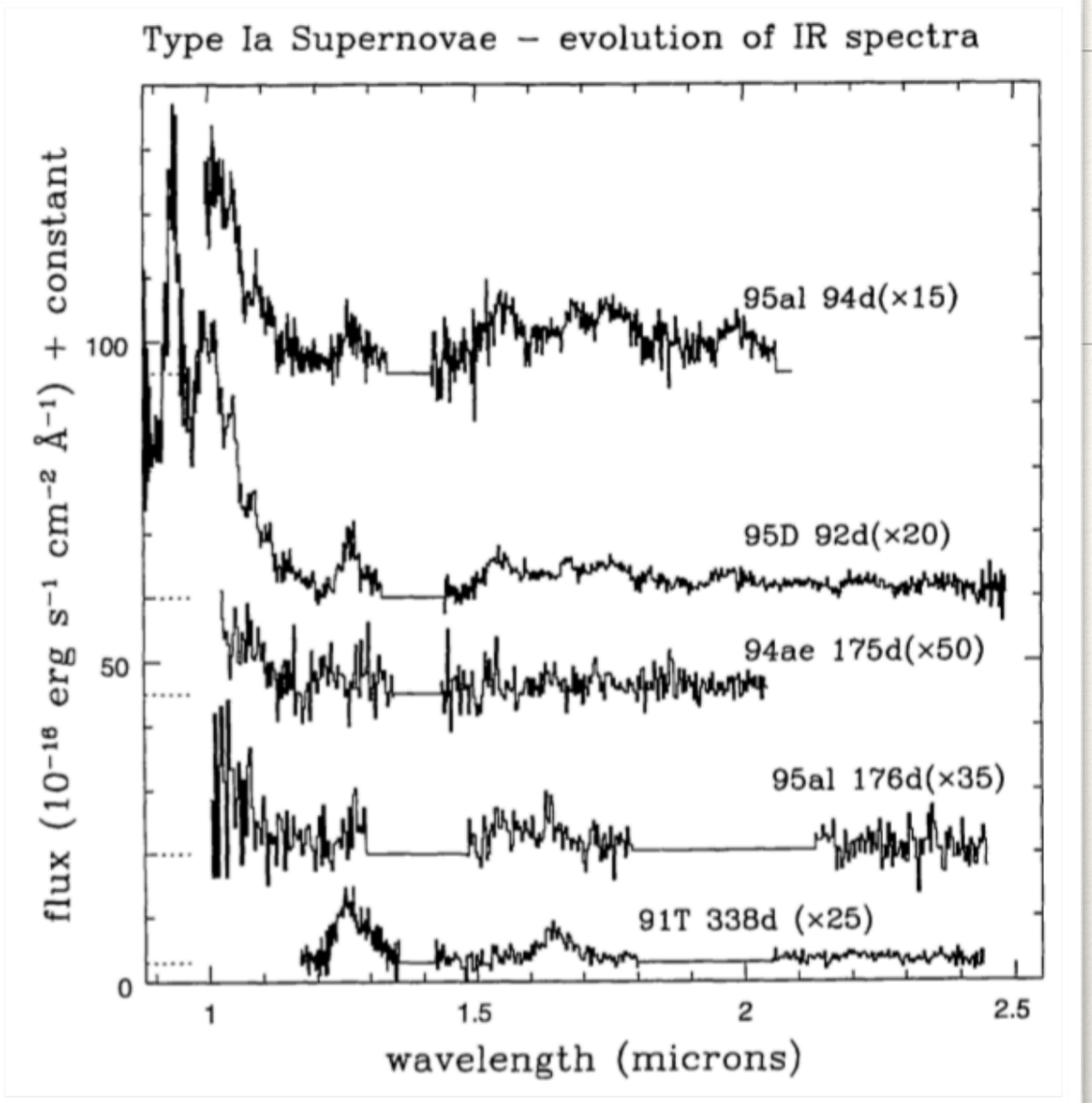
13 April 2018

Nebular Spectra in NIR

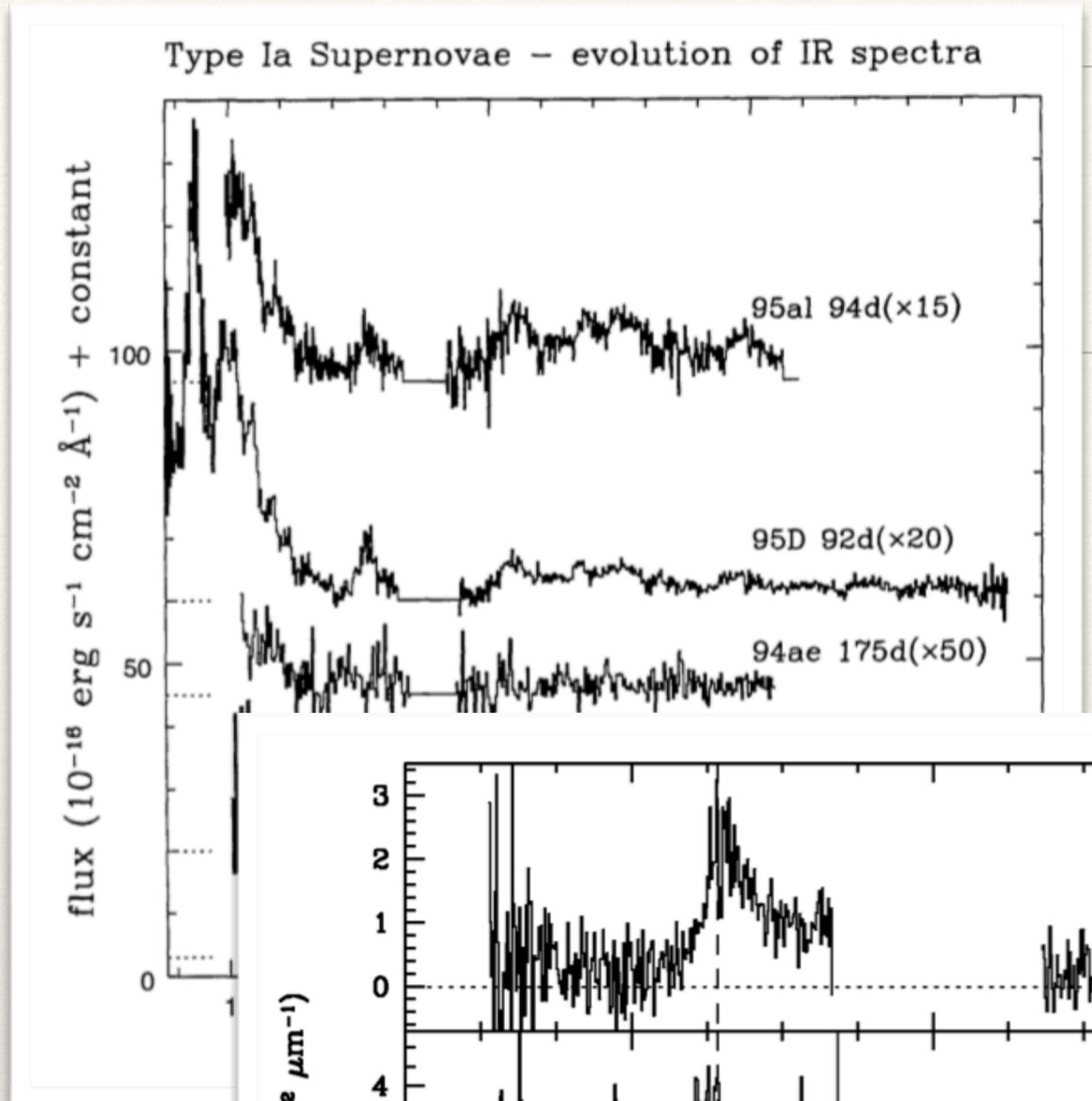
Tiara Diamond
NASA GSFC

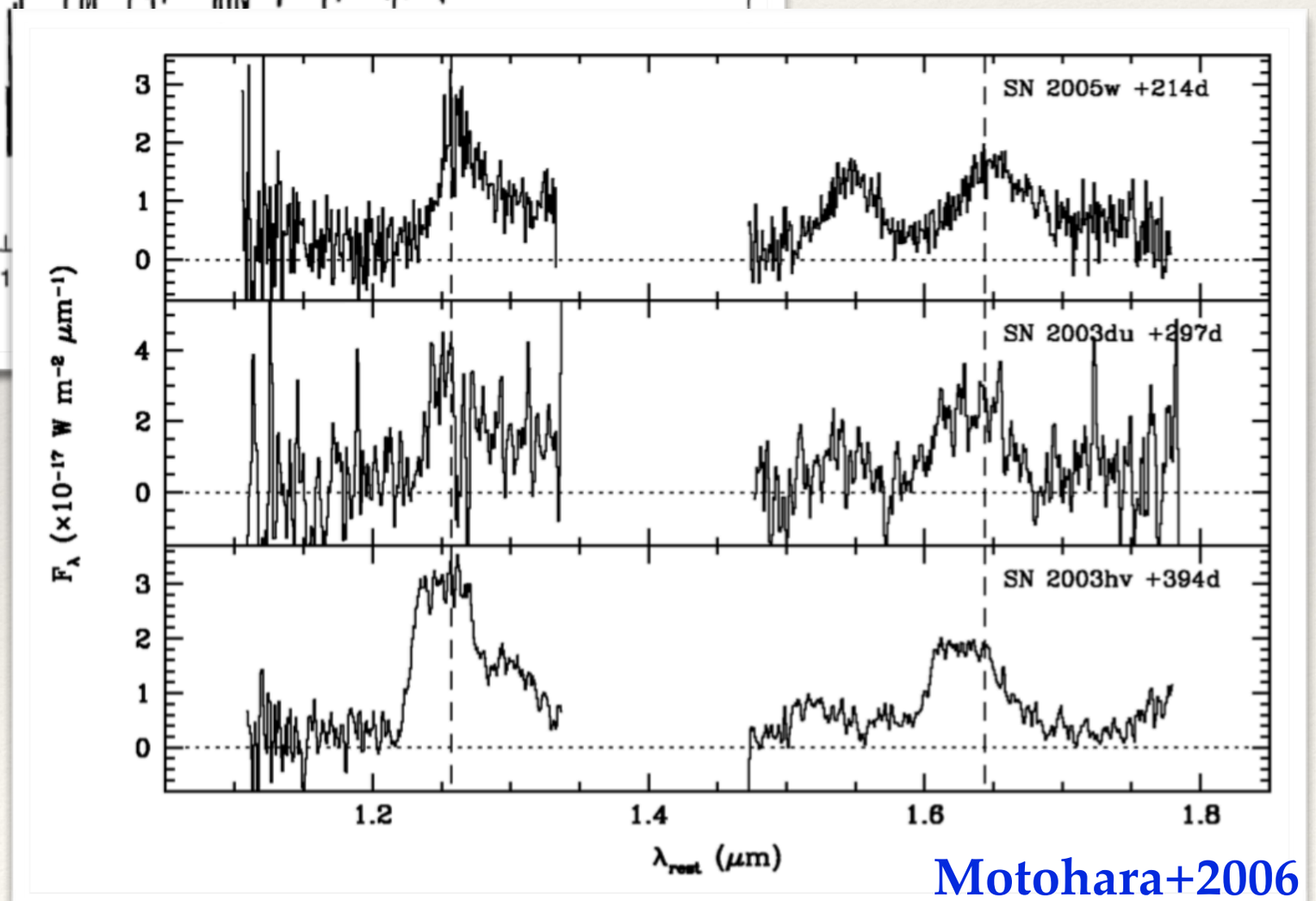
NIR late-time spectra in the literature



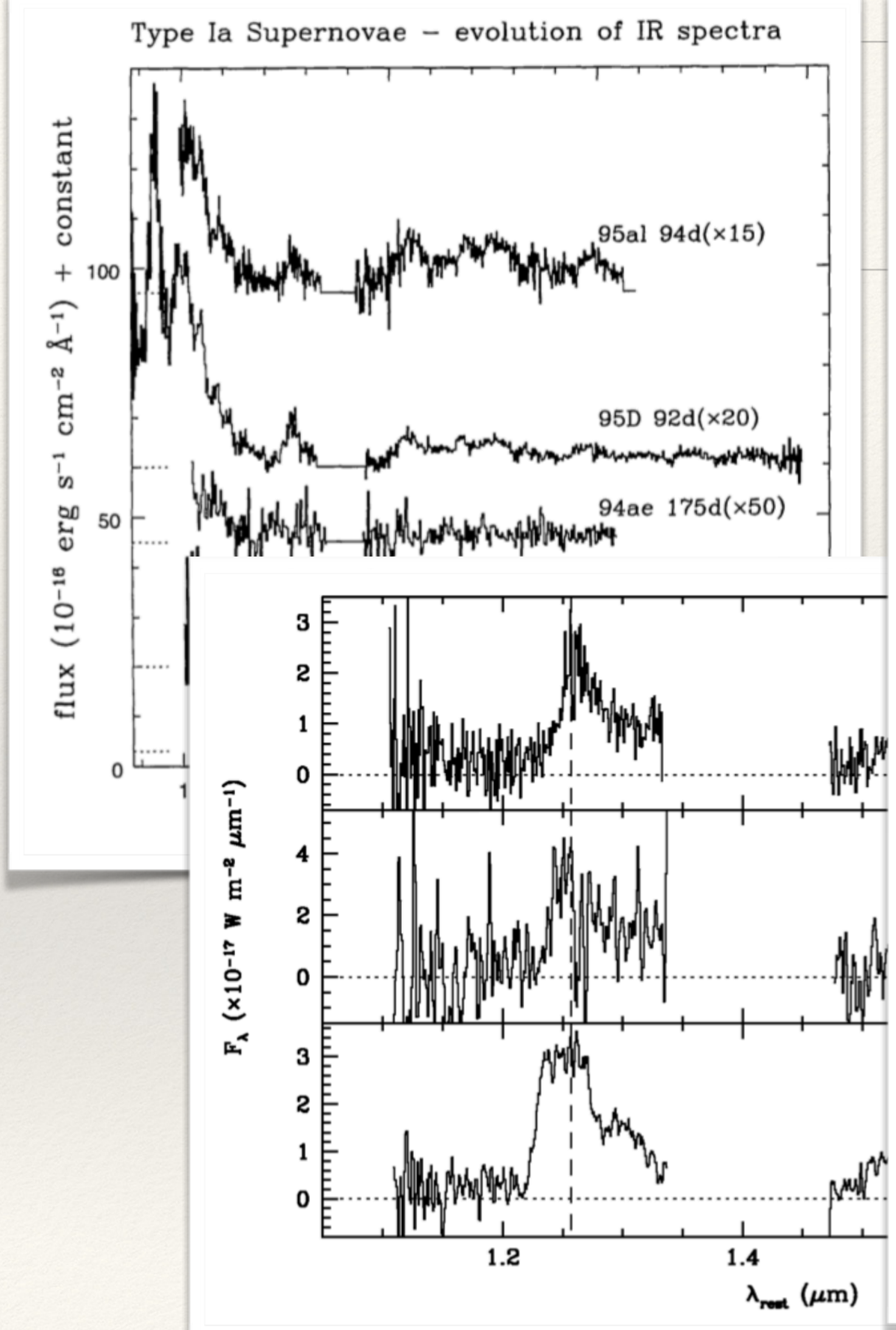
Bowers+1997

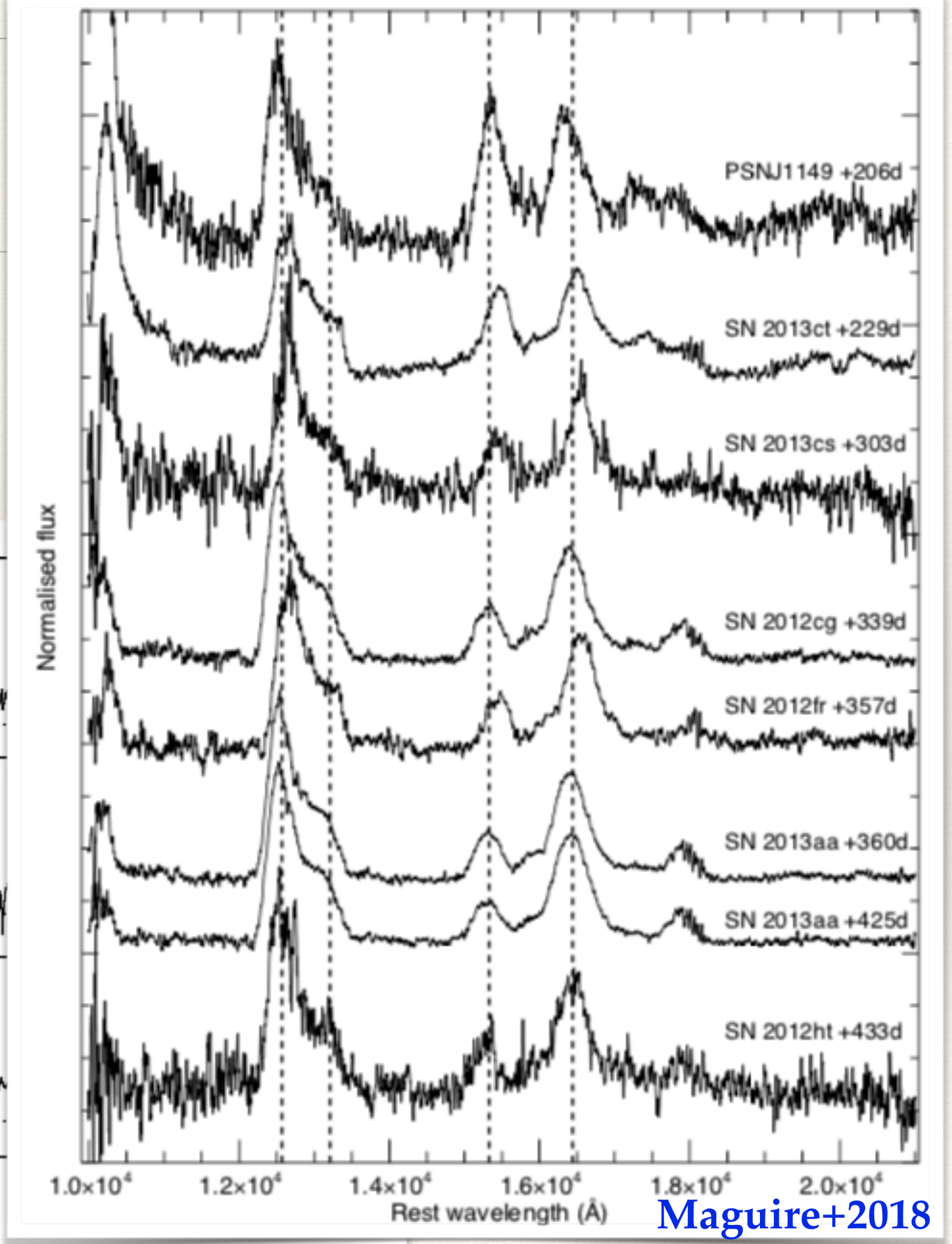
NIR late-time spectra in the literature





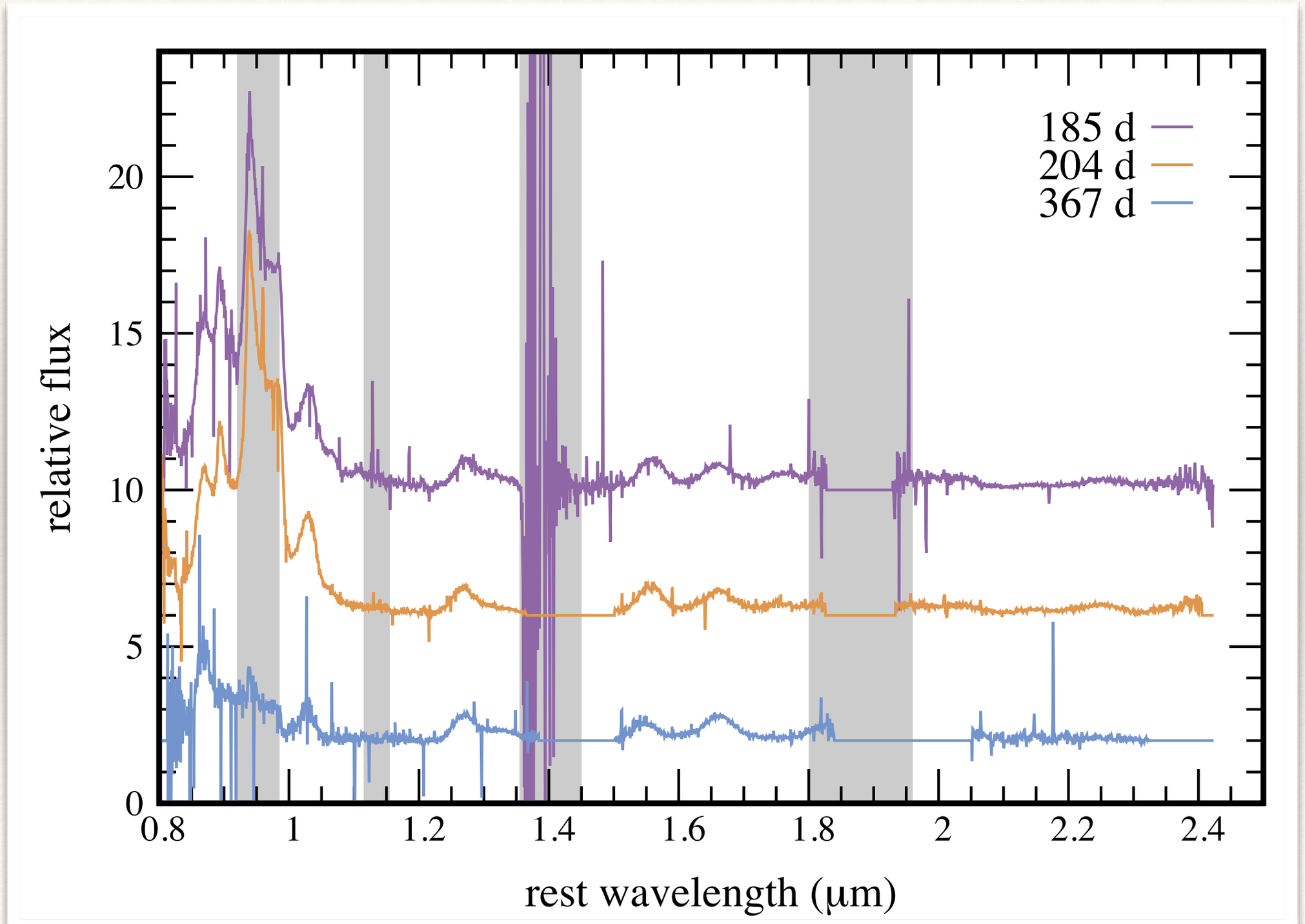
Motohara+2006





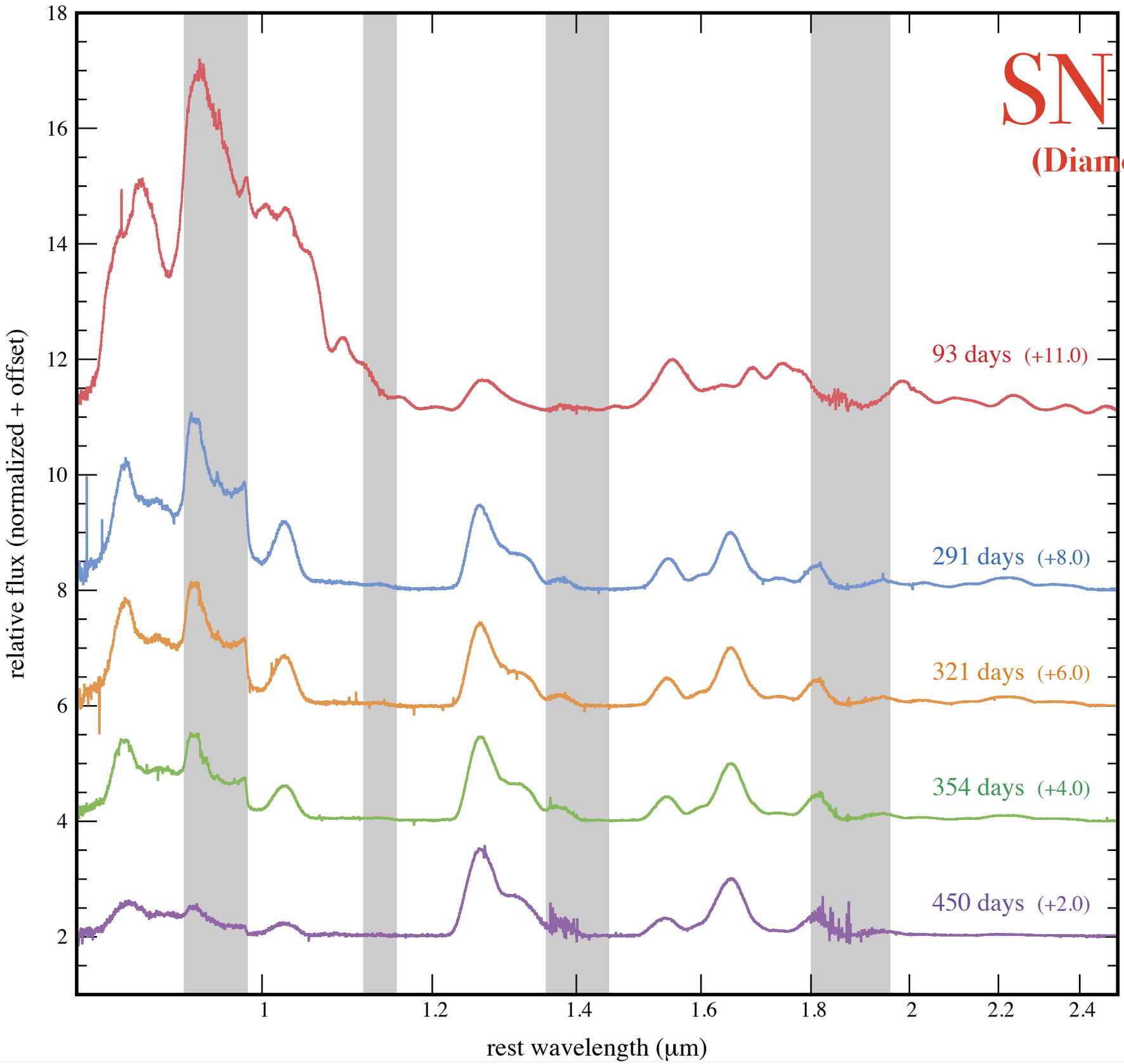
Maguire+2018

SN 2005df (modified from Diamond+2015)

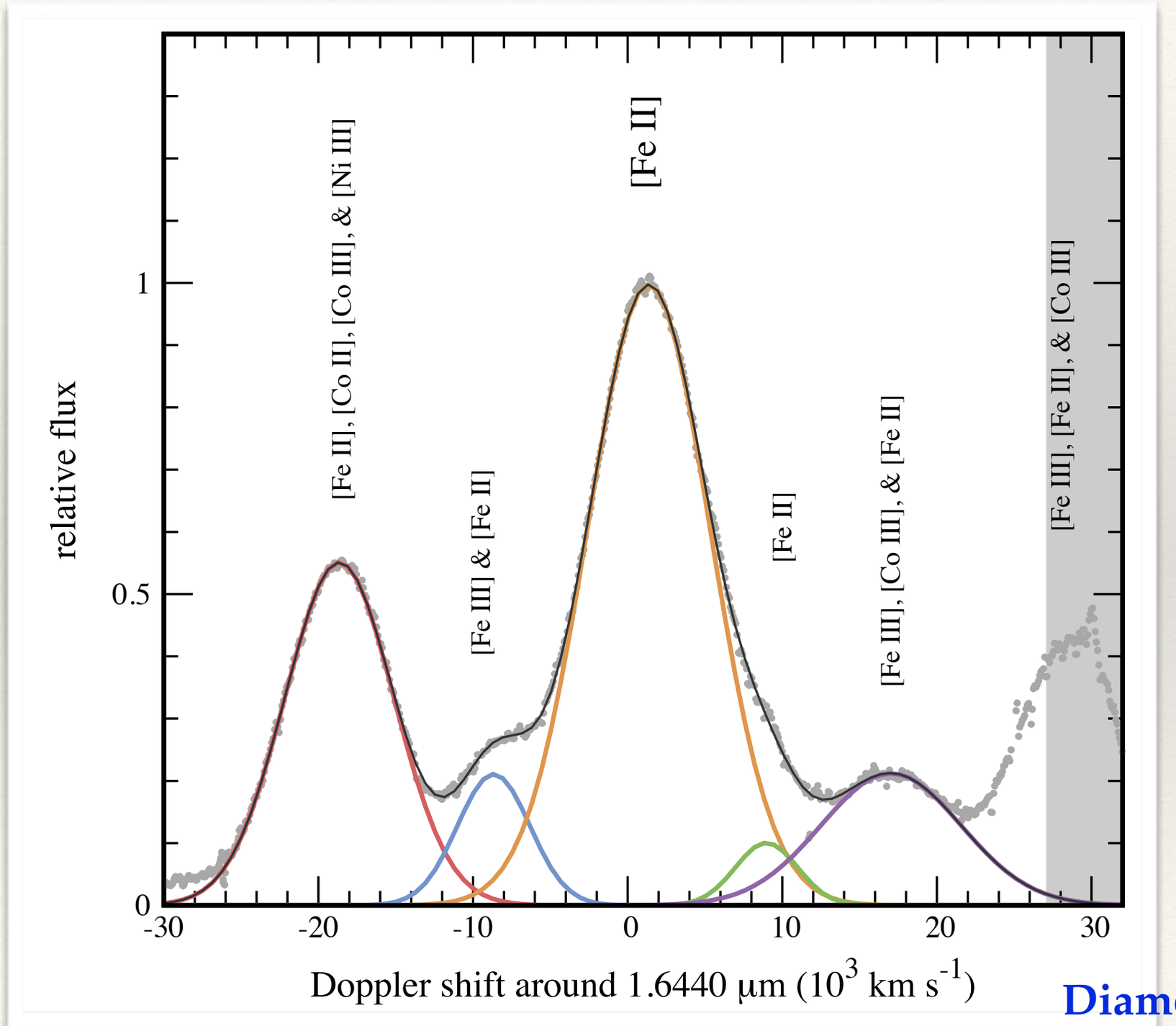


SN 2014J

(Diamond+submitted)



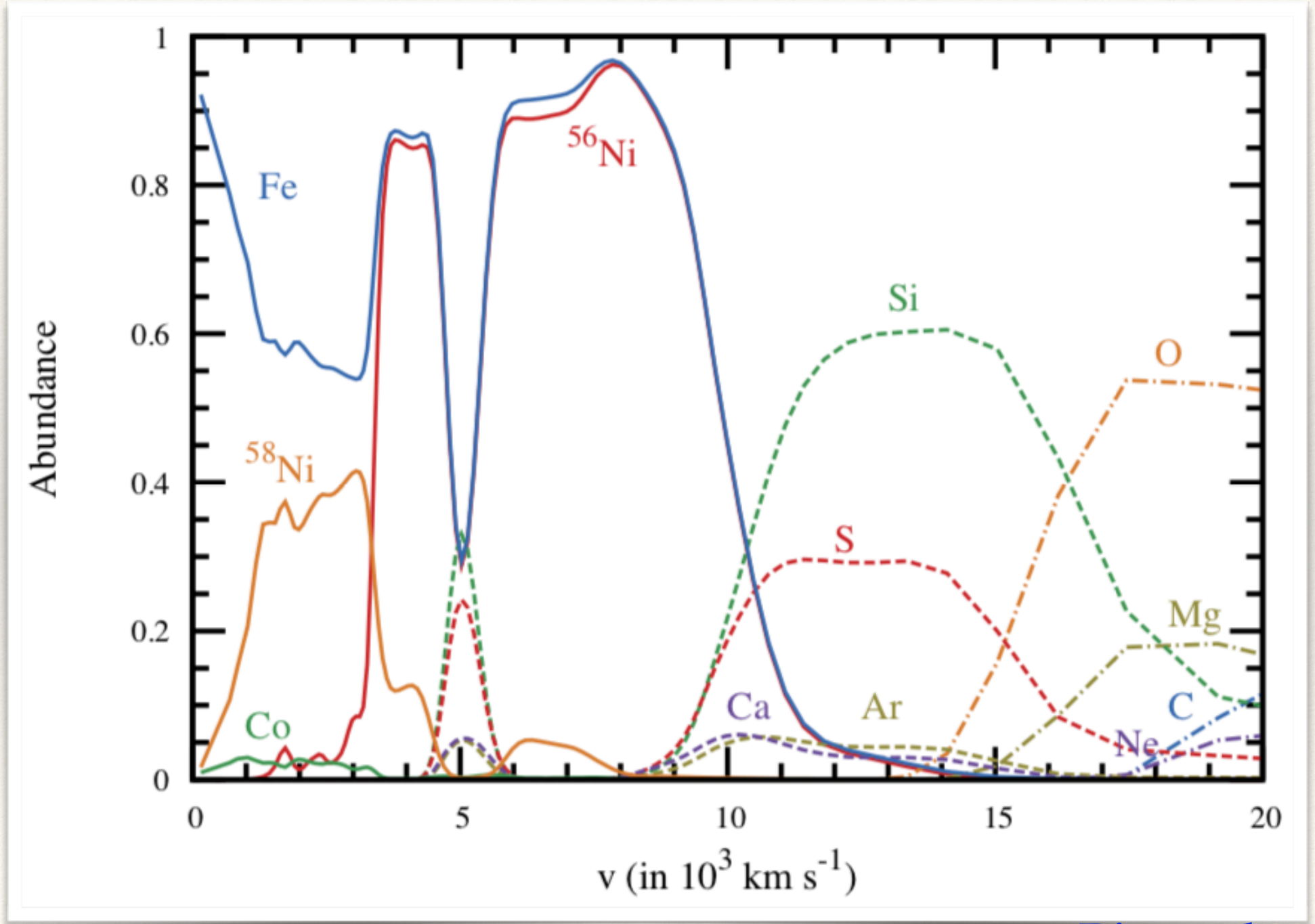
[Fe II] 1.6440 μm



Diamond+submitted

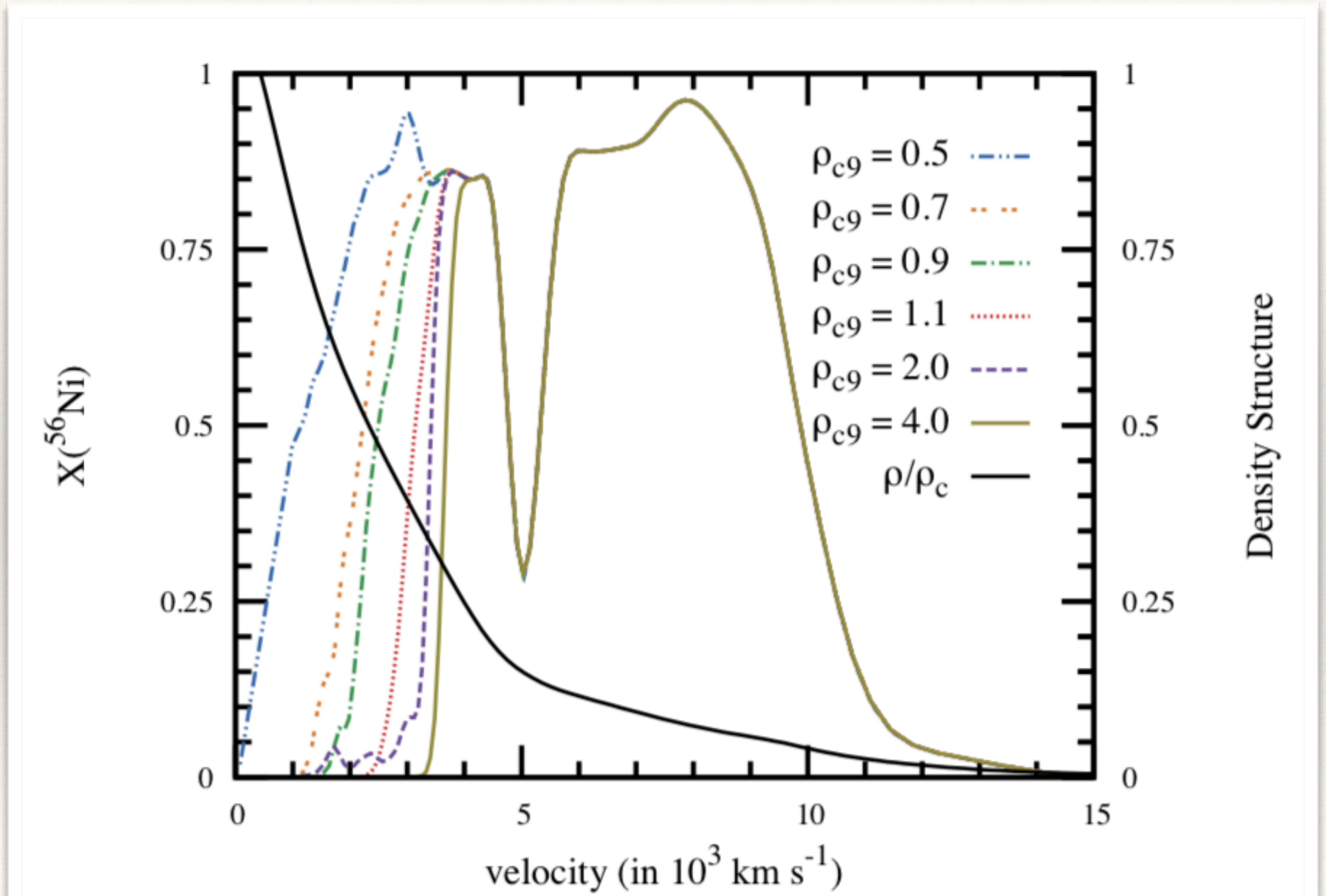
use NIR late-time spectra to differentiate central densities of the WD just prior to explosion

Models: spherical DDT models by Hoeflich



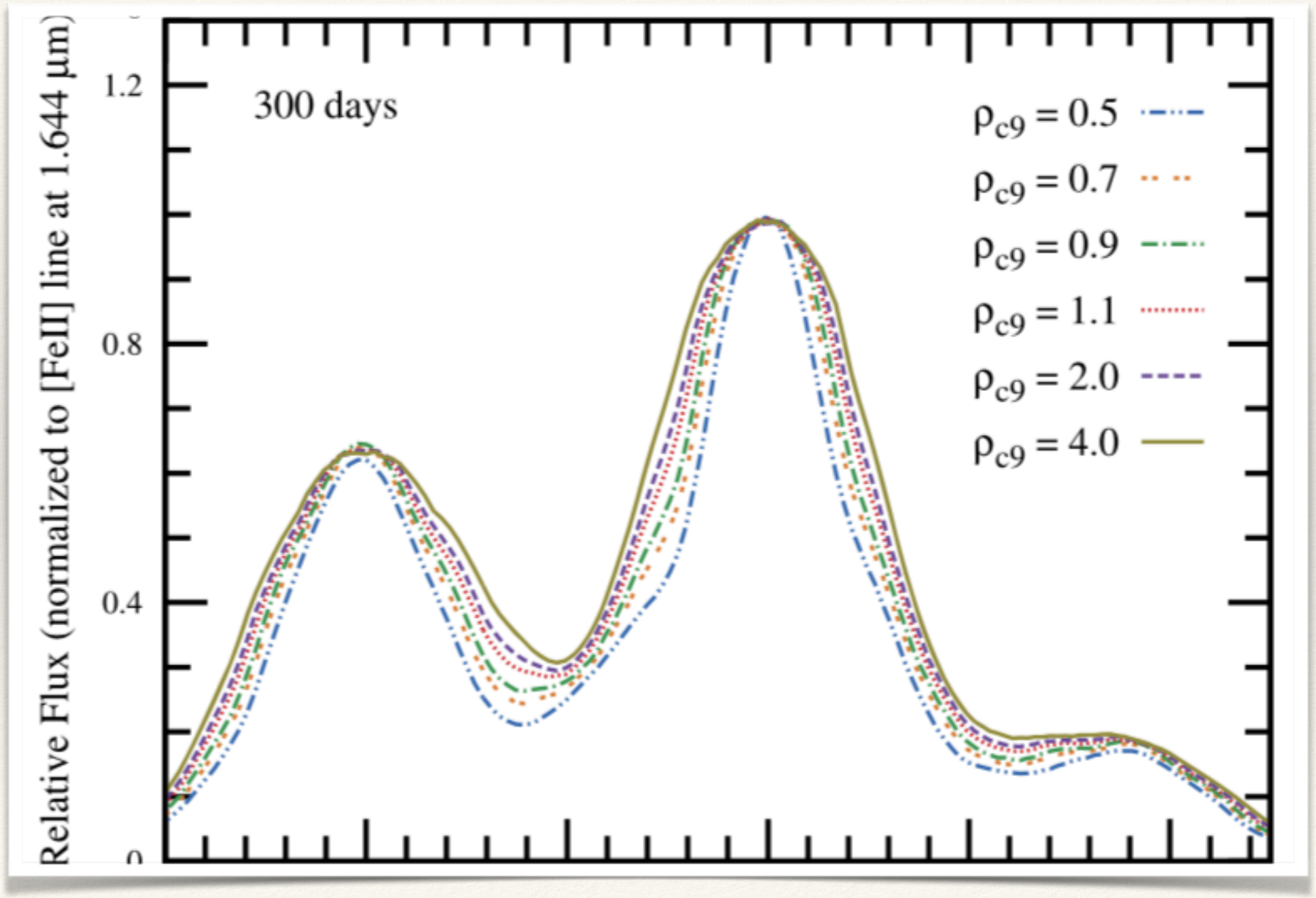
Diamond 2015 (thesis)

Models: spherical DDT models by Hoeflich



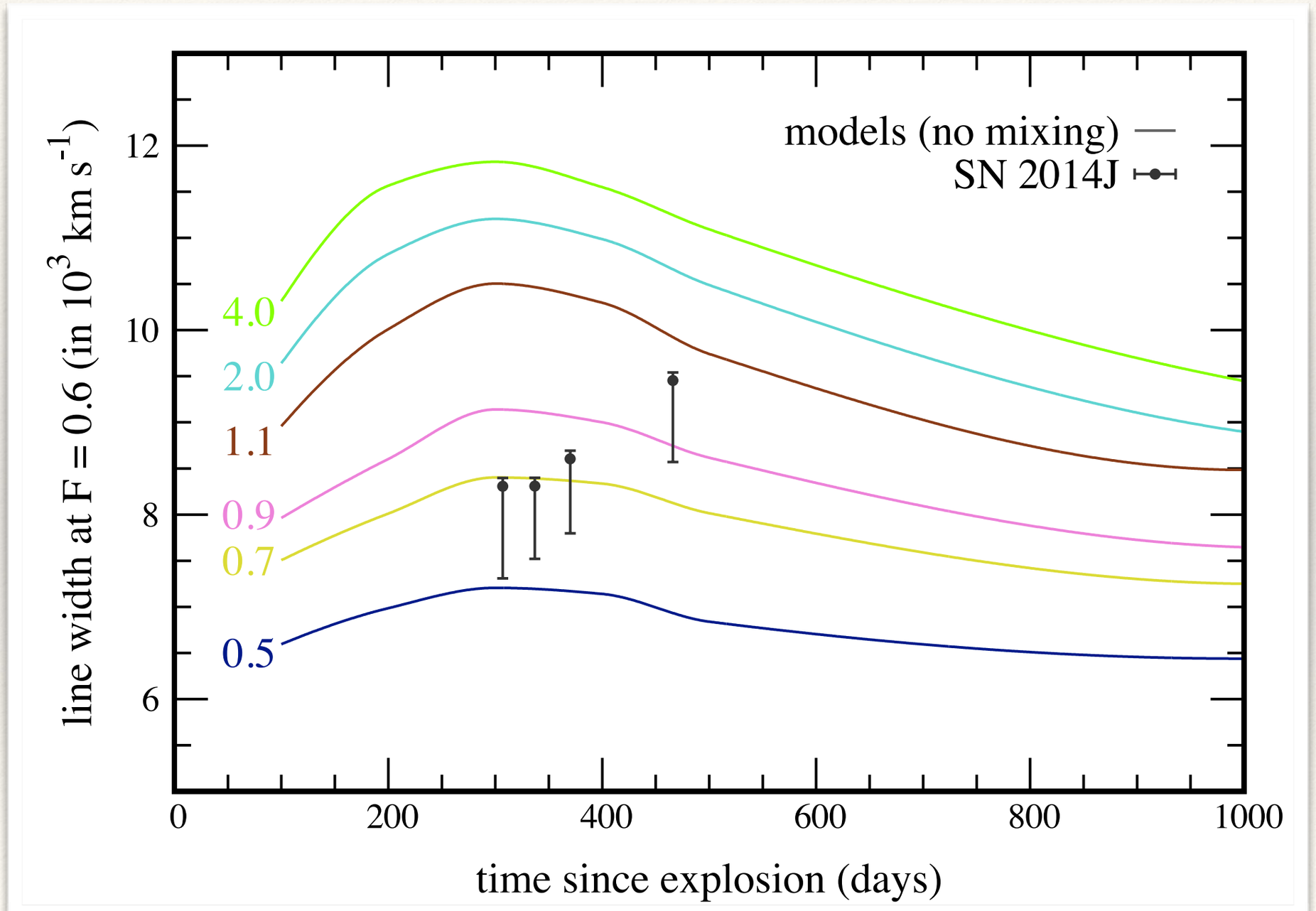
Diamond 2015 (thesis)

ϱ_c effect on line profiles



Diamond+2015

SN 2014J: comparing line widths to models ϱ_c



Diamond+submitted

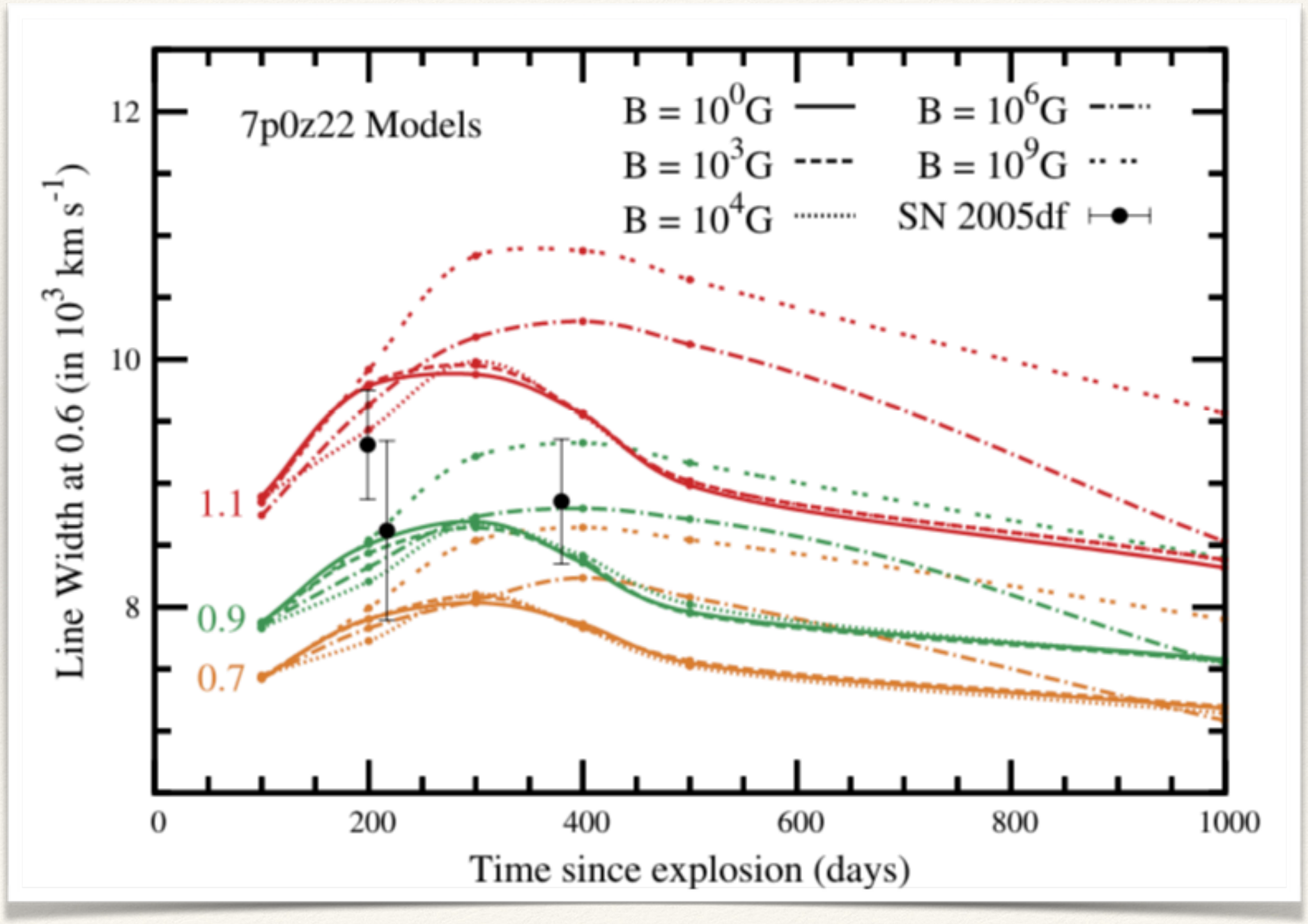
increasing accretion rate →

WD central density	accretion material
$\varrho_c \geq 10^9$ g/cm^3	H, He, C-O accretion
$\varrho_c \leq 10^9$ g/cm^3	He, C-O accretion
$\varrho_c \leq 0.5 \times 10^9$ g/cm^3	C-O accretion

increasing accretion rate →

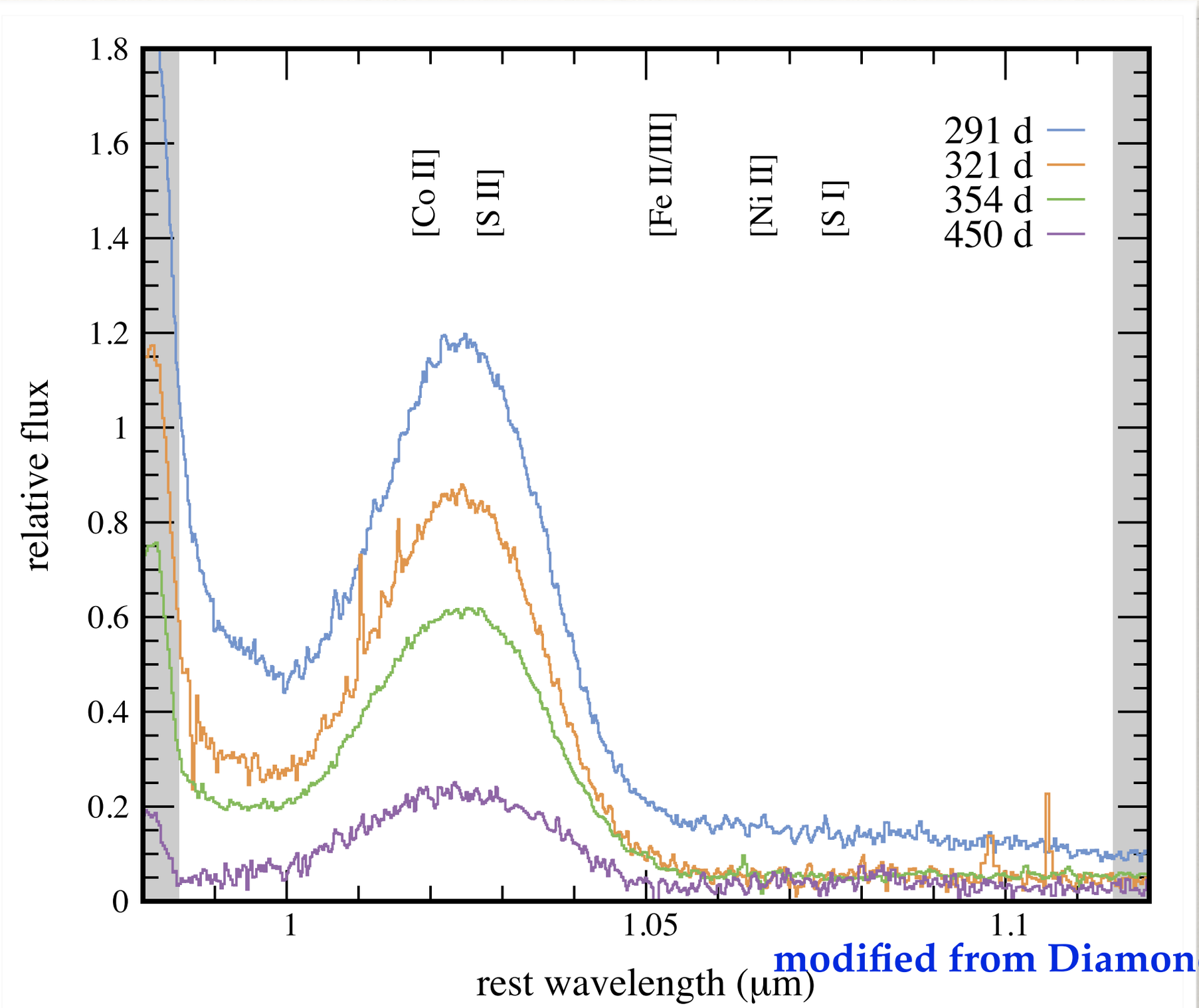
and presence of magnetic fields embedded in the expanding ejecta

SN 2005df: comparing line widths to models ϱ_c and B



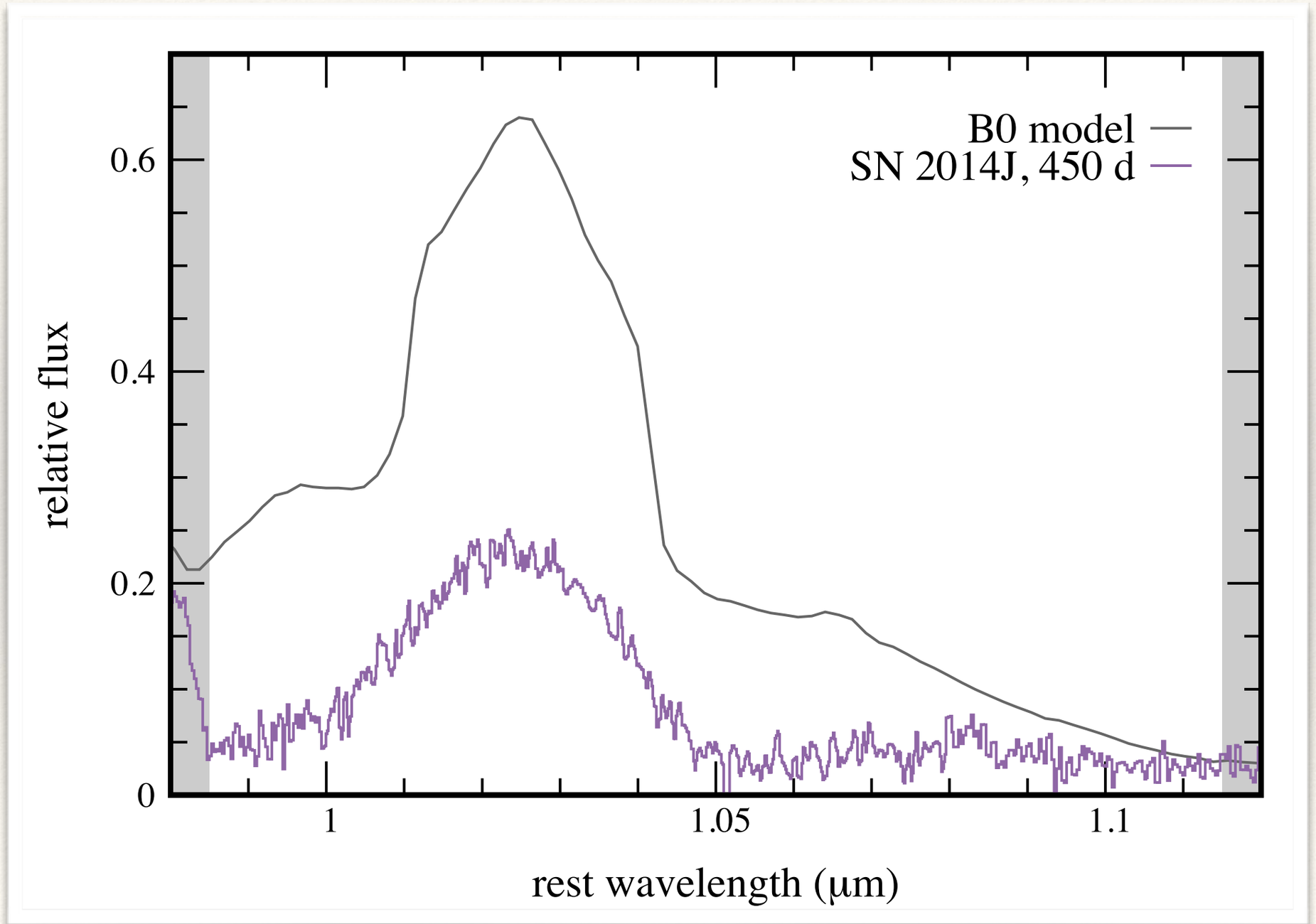
Diamond+2015

2014J 1.03 μm feature evolution



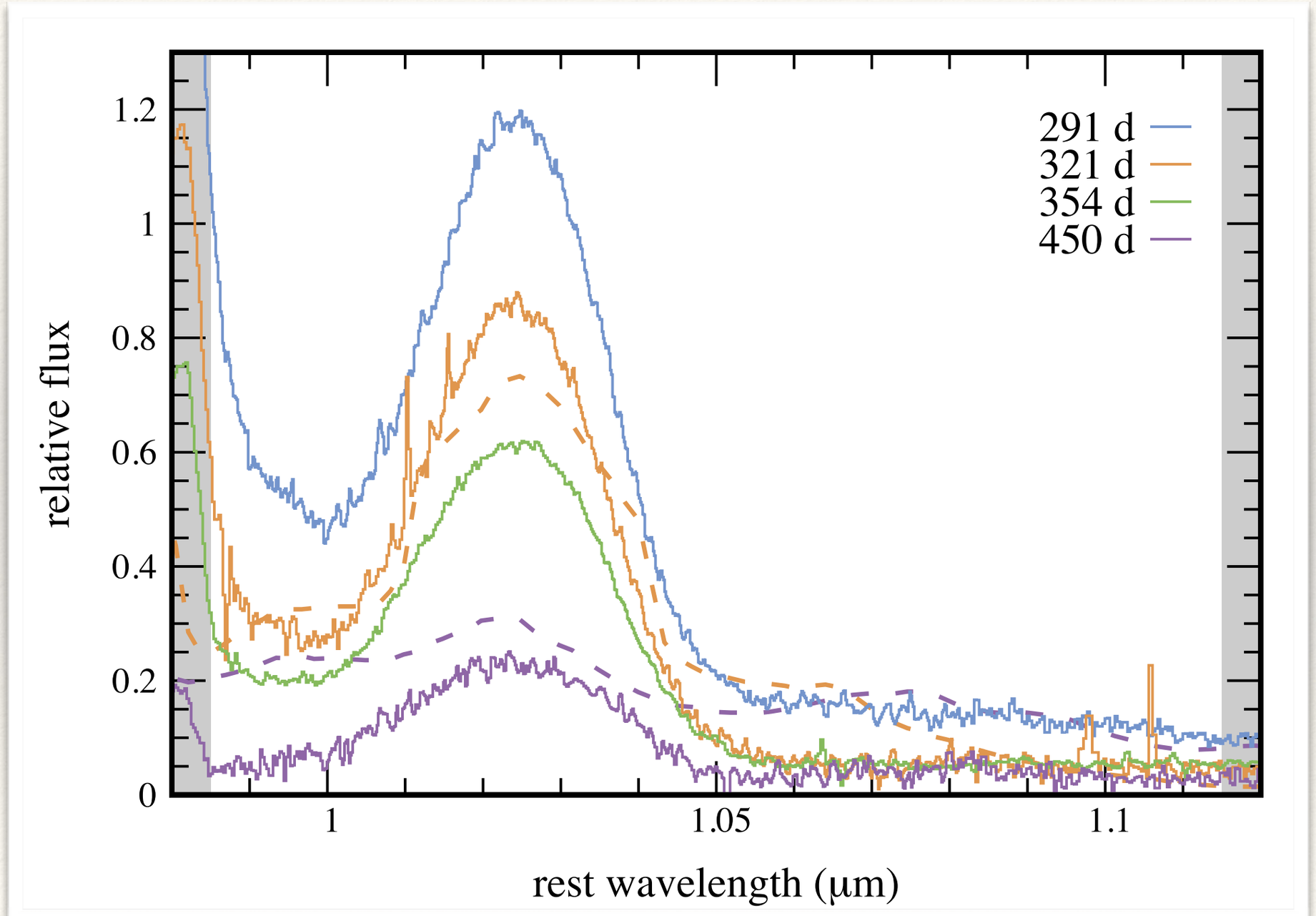
modified from Diamond+submitted

model with **B=0 G** produces too much flux



modified from Diamond+submitted

model with $B=10^6$ G

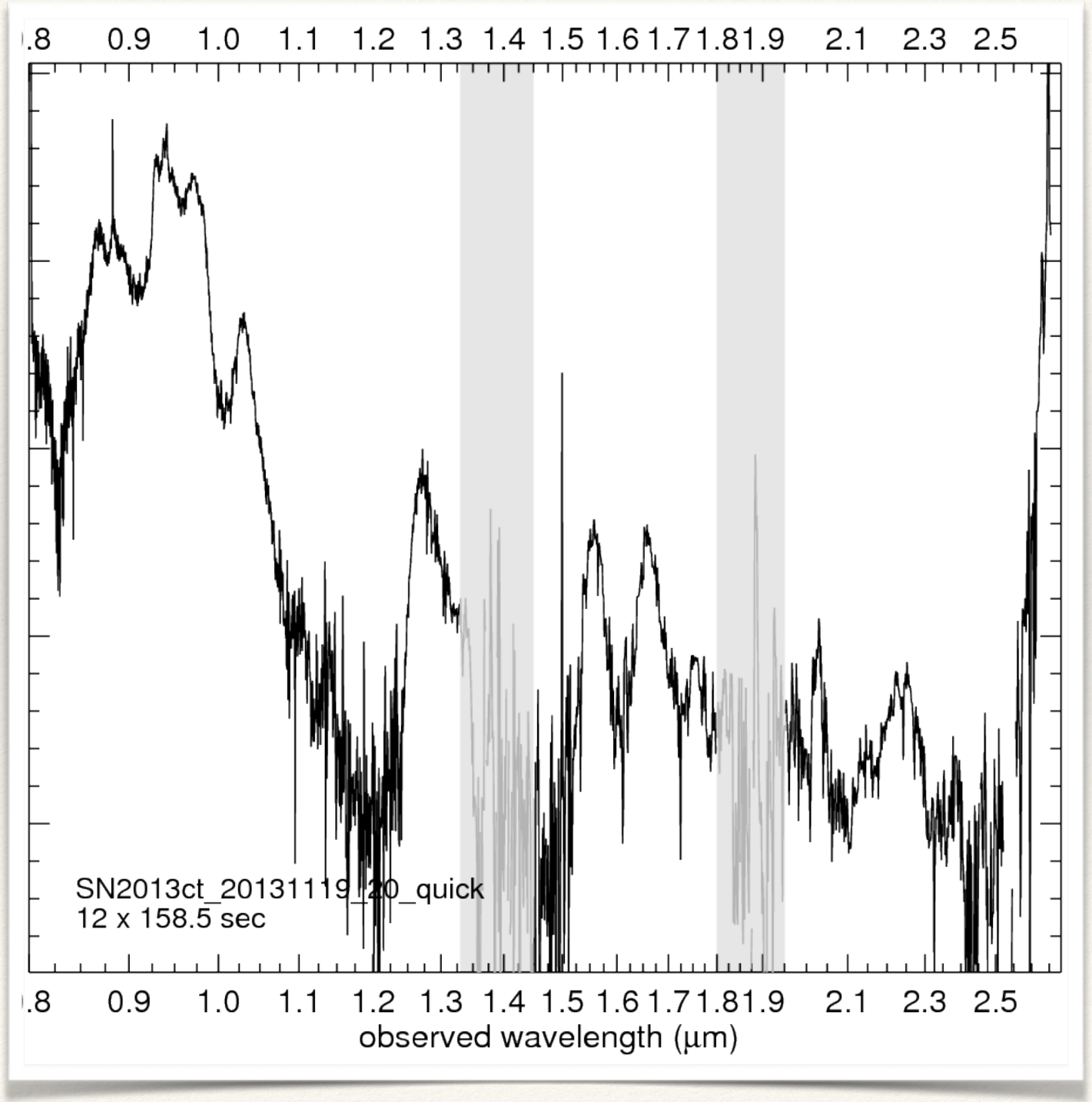


modified from Diamond+submitted

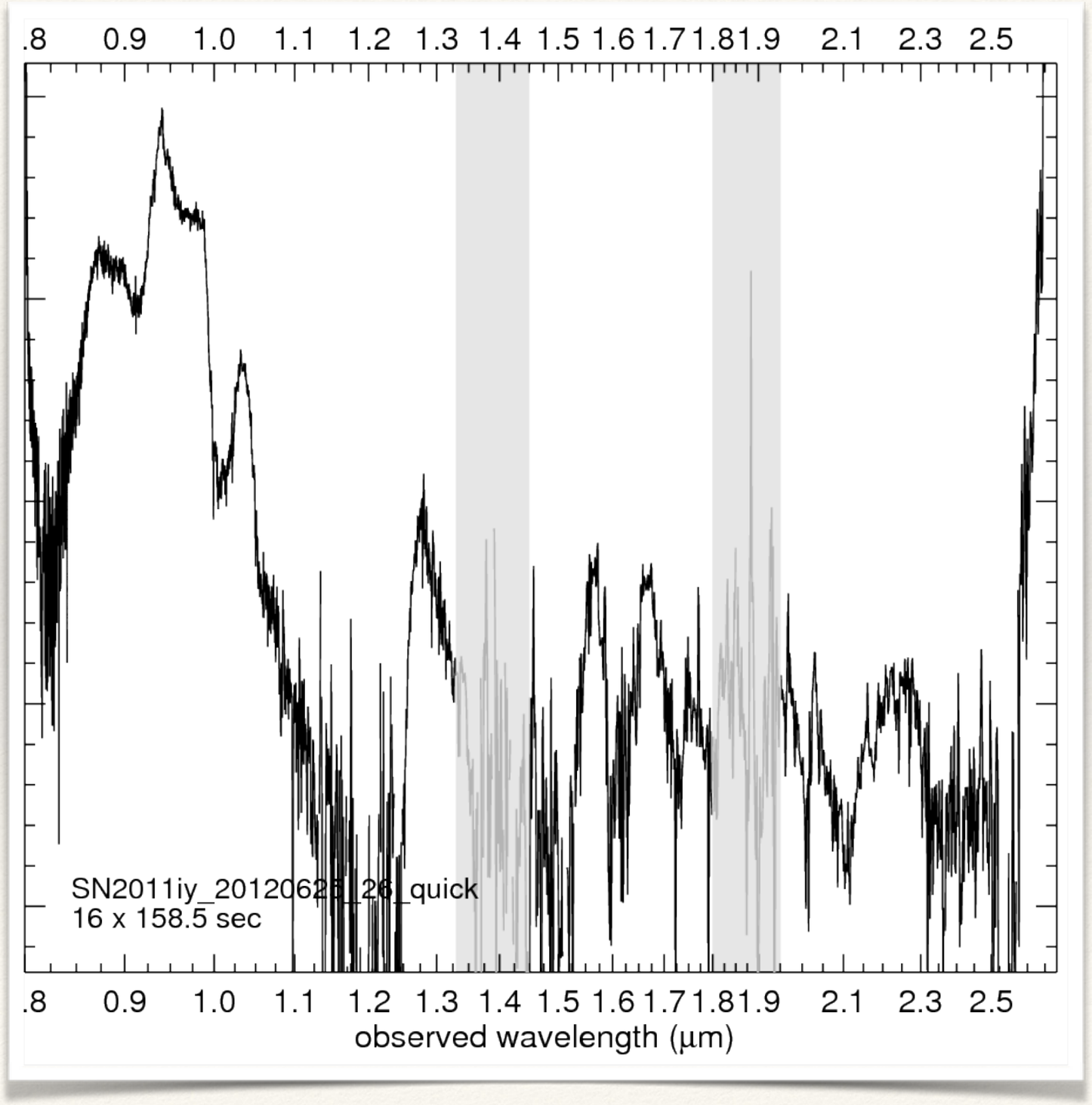
sample from CSP2 with several multi-epoch late-time observations

upcoming work by Hsiao, Kumar, Diamond+

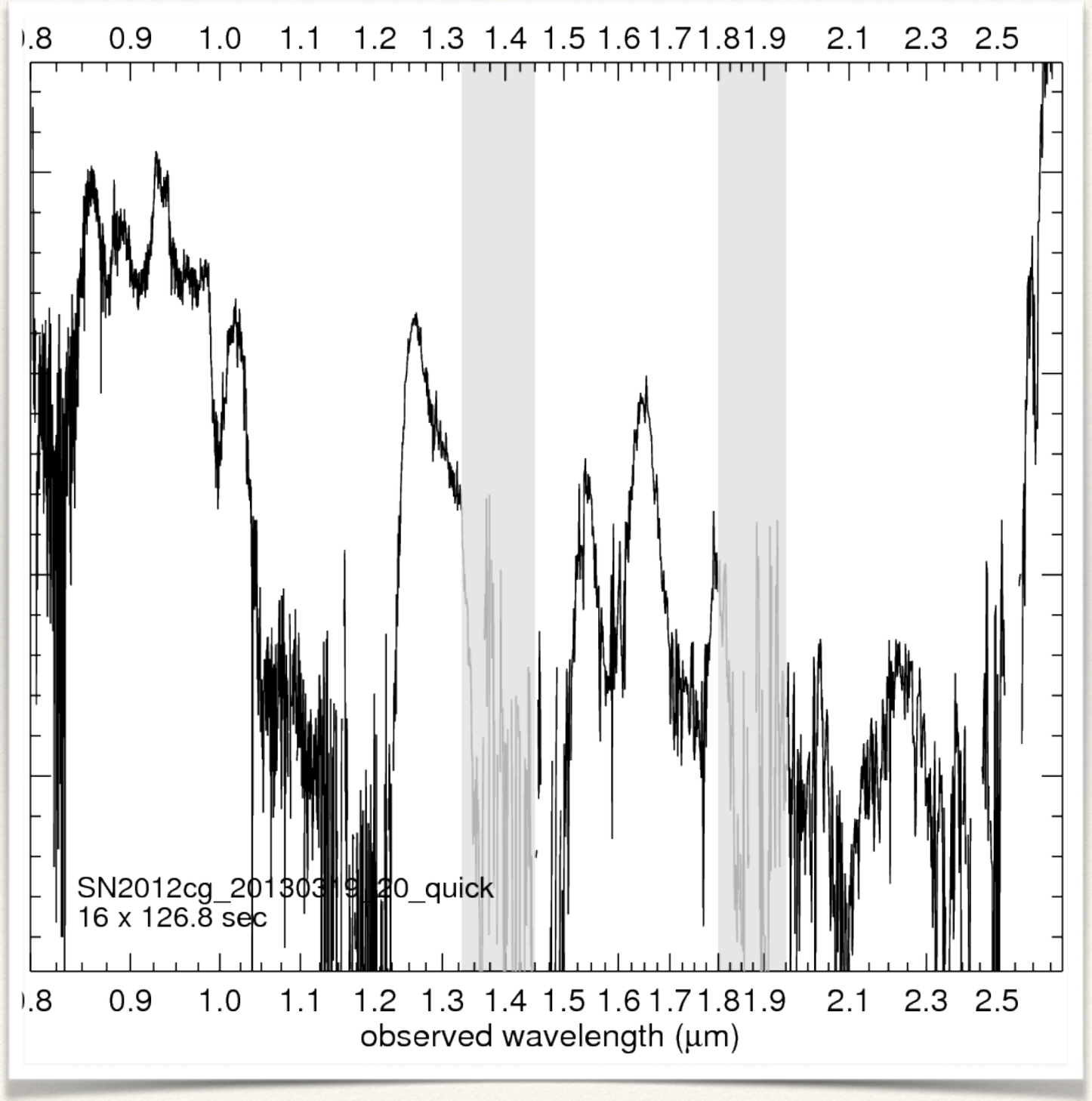
CSP2 Partial Reduction: SN 2013ct 199 days



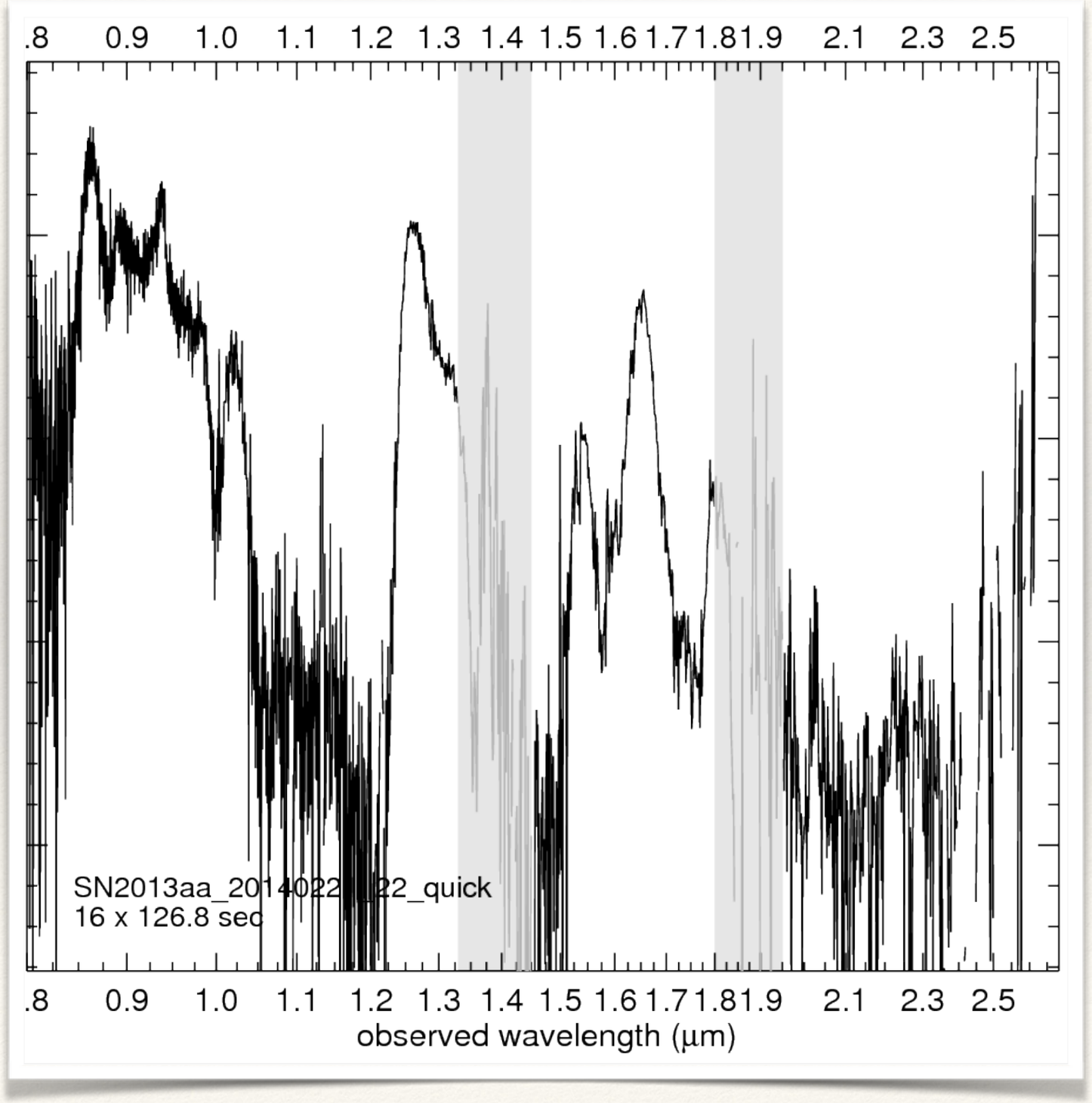
CSP2 Partial Reduction: SN 2011iy 208 days



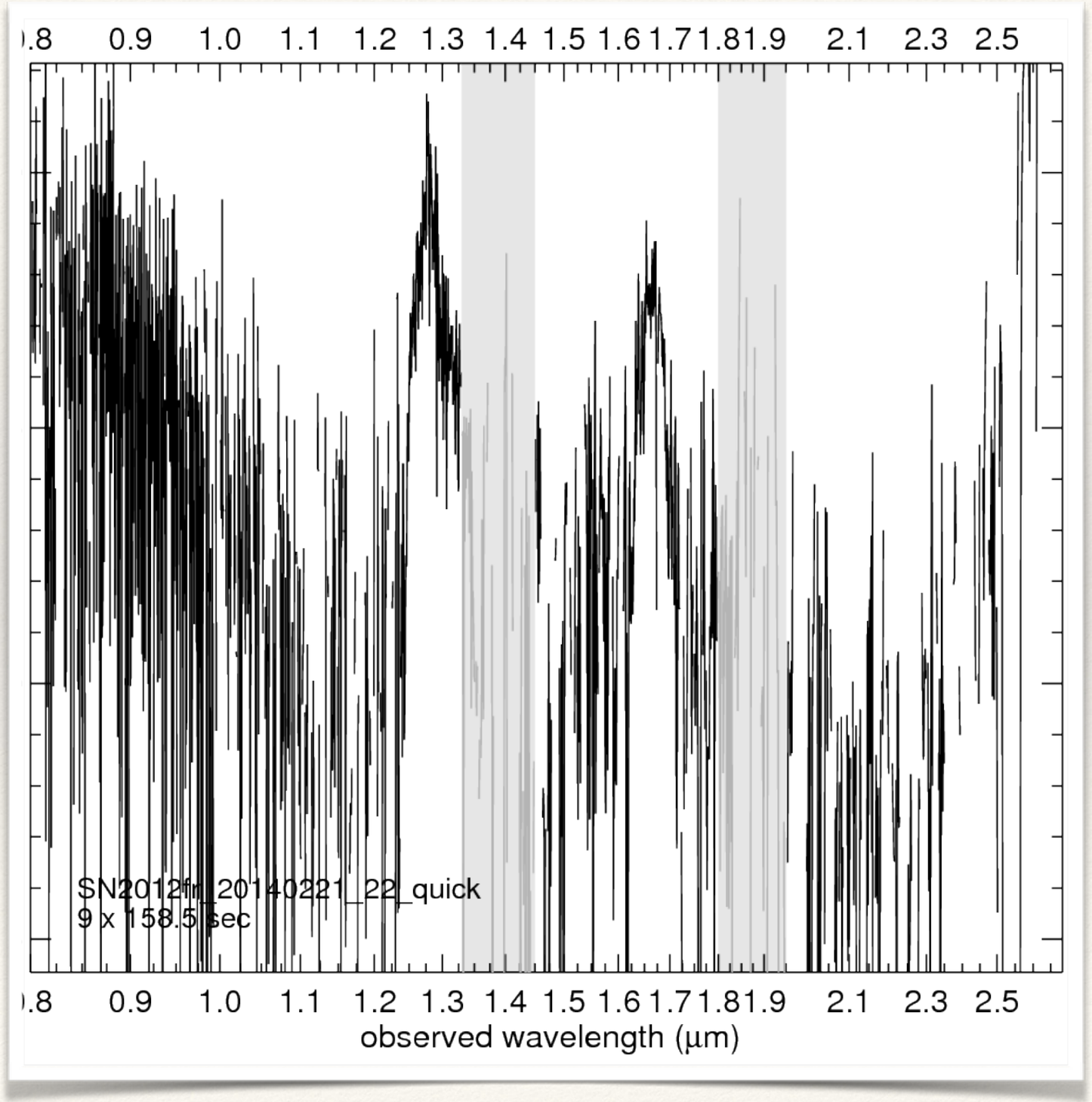
CSP2 Partial Reduction: SN 2012cg 289 days



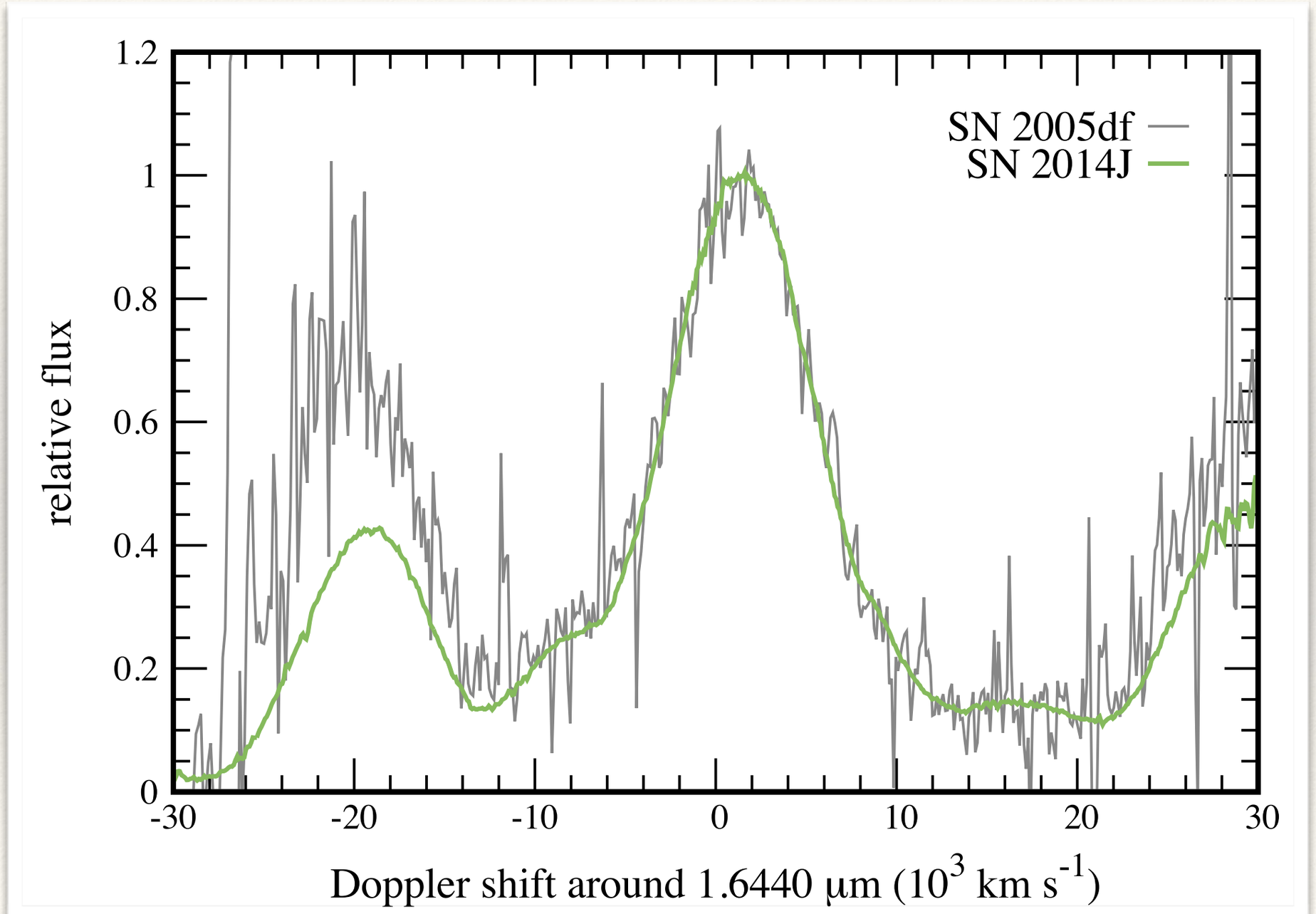
CSP2 Partial Reduction: SN 2013aa 367 days



CSP2 Partial Reduction: SN 2012fr 468 days

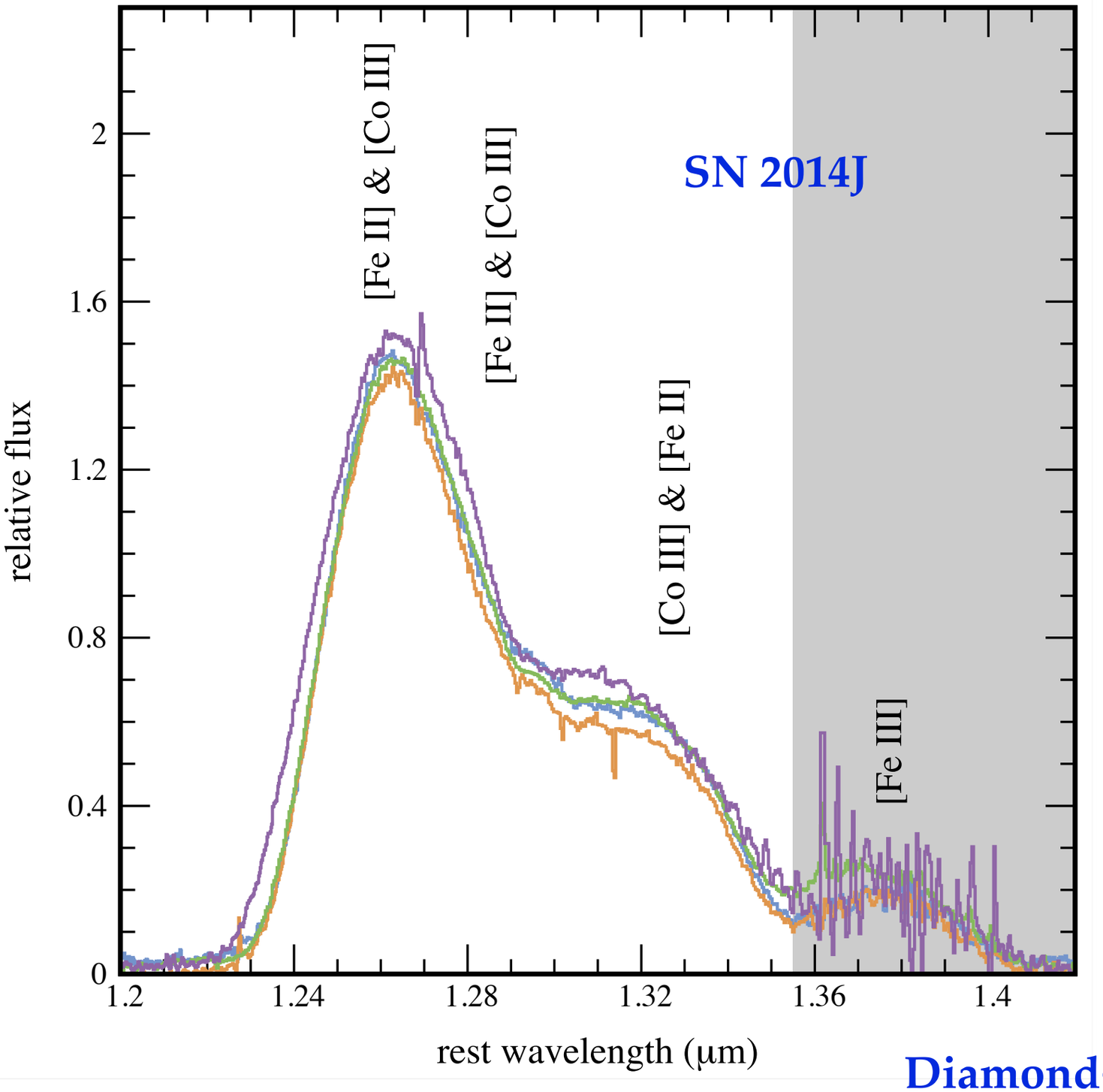


comparison of SNe 2005df and 2014J

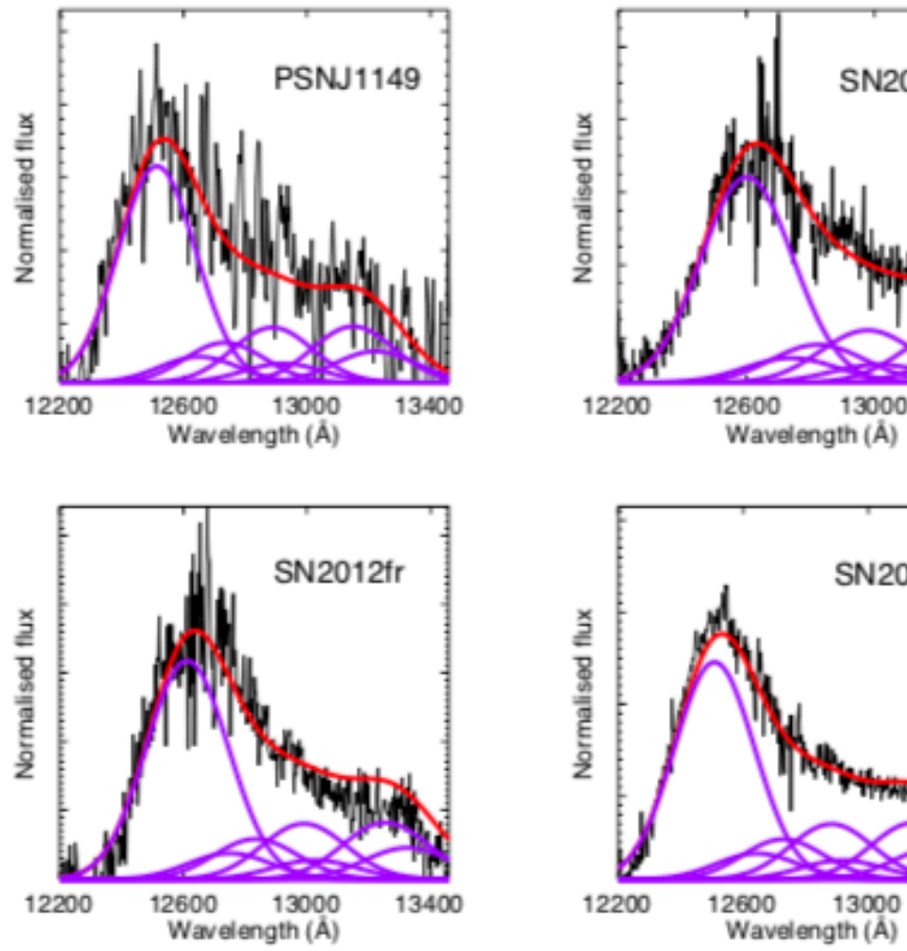


Diamond+submitted

J-band region

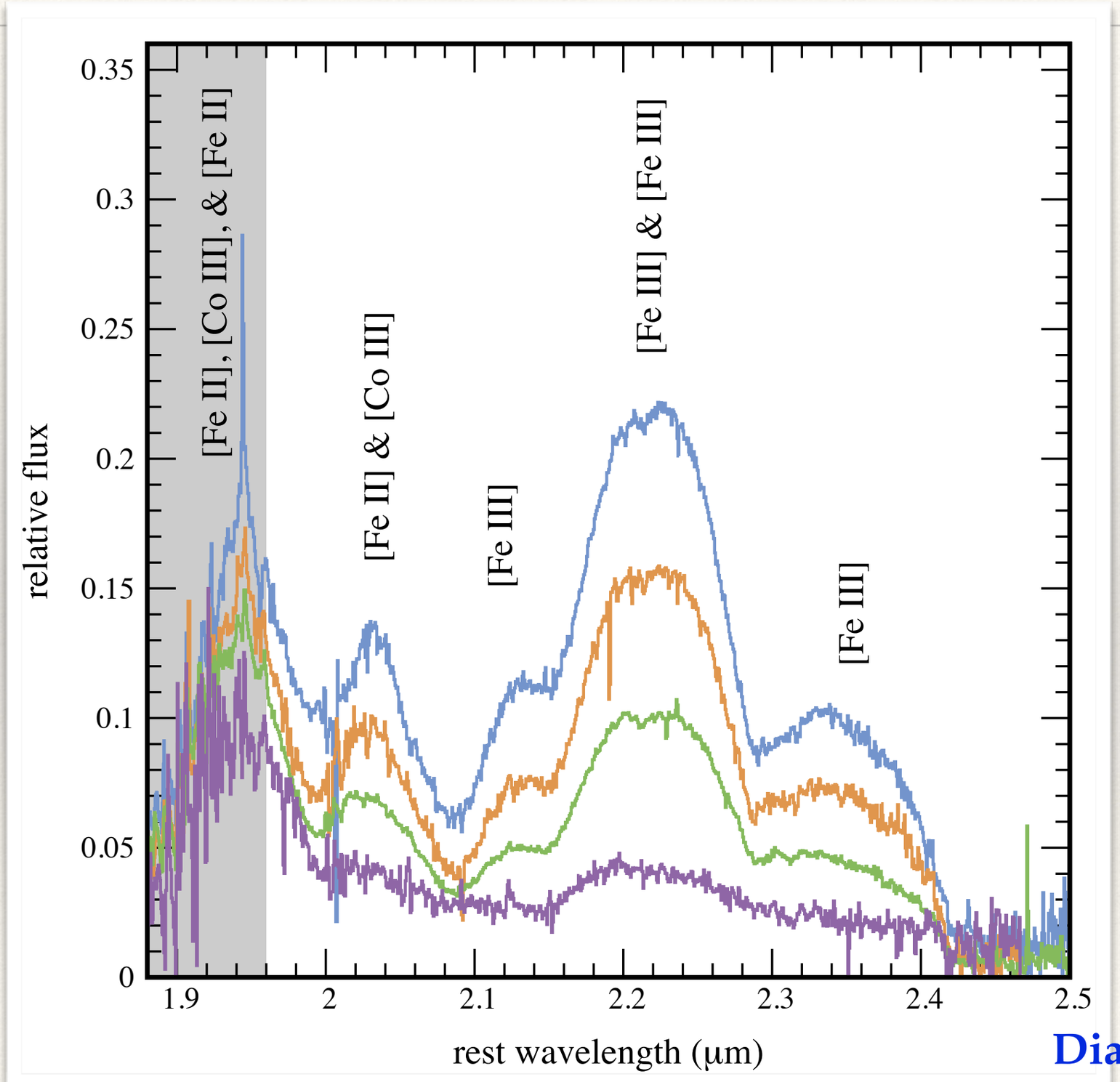


Diamond+submitted



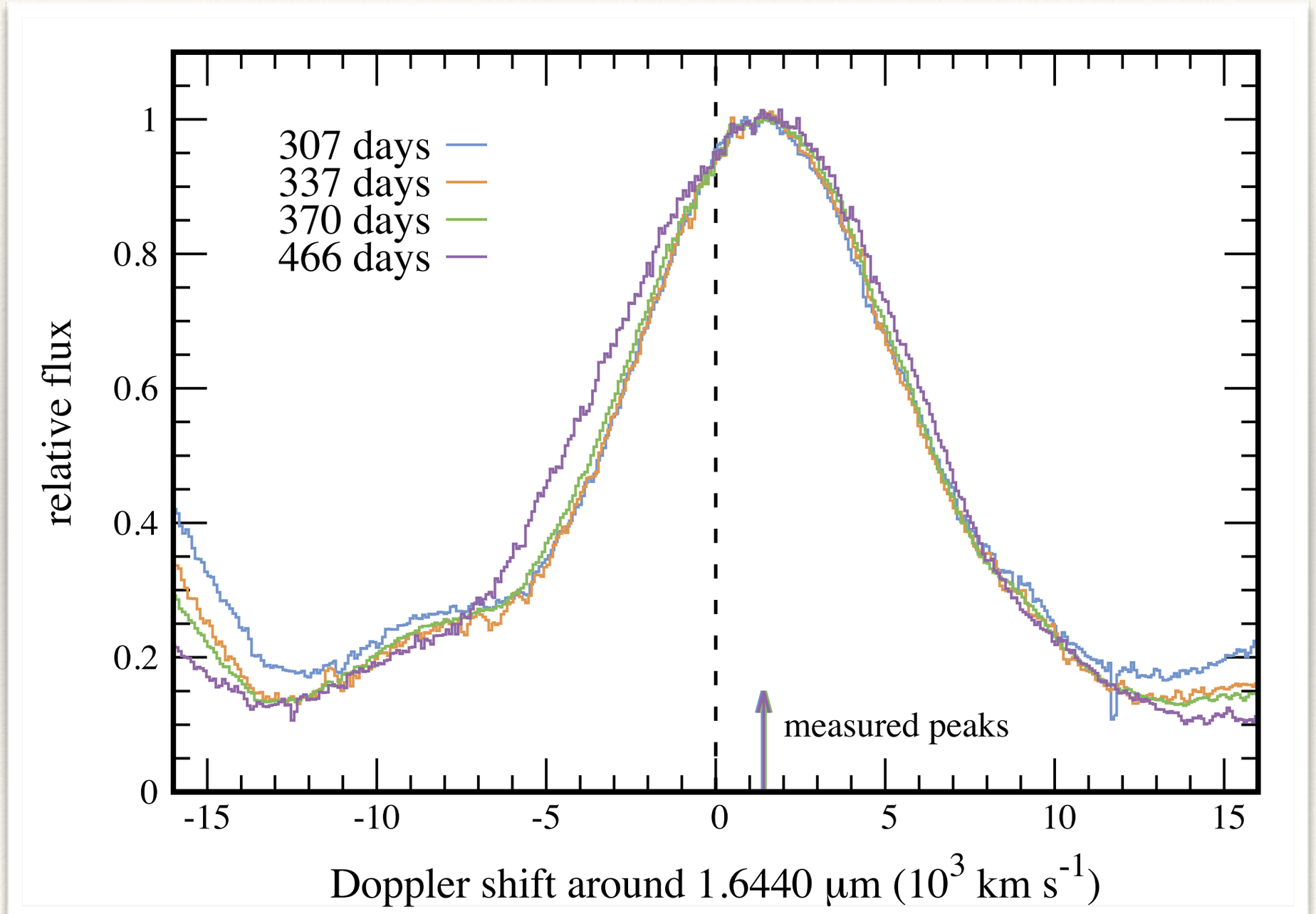
Maguire+2018

K-band region



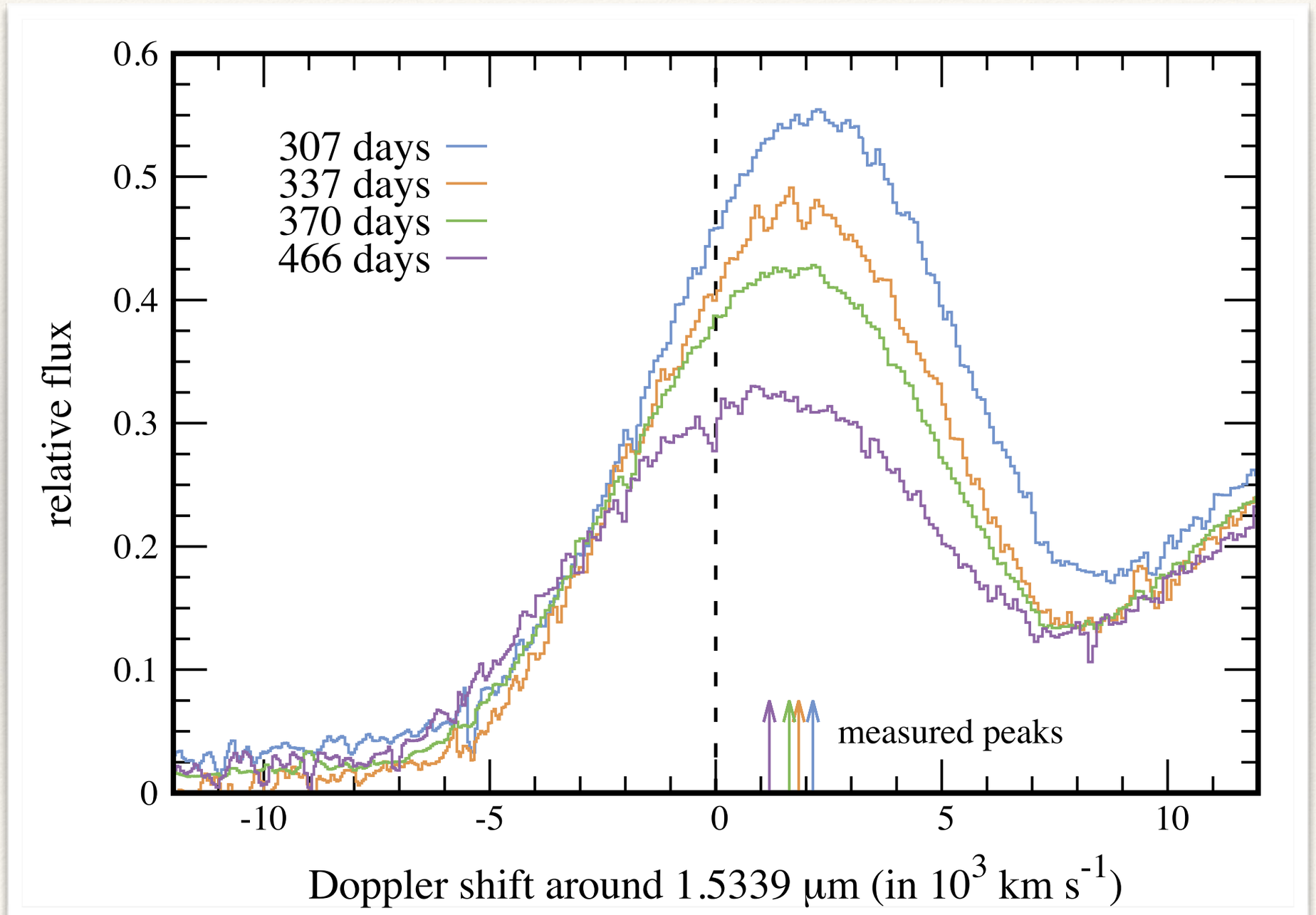
Diamond+submitted

2014J 1.65 μm feature evolution

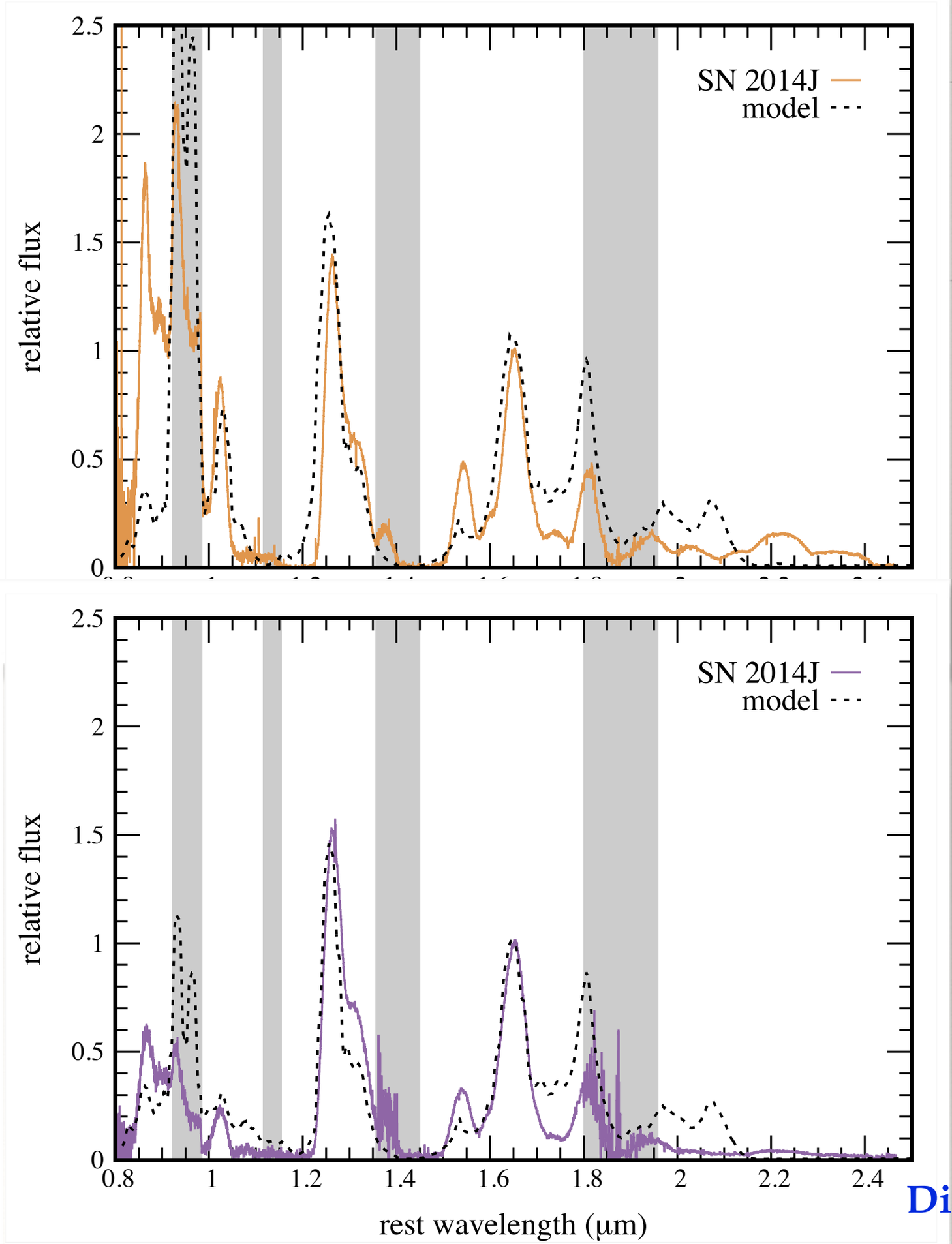


Diamond+submitted

2014J 1.54 μm feature evolution

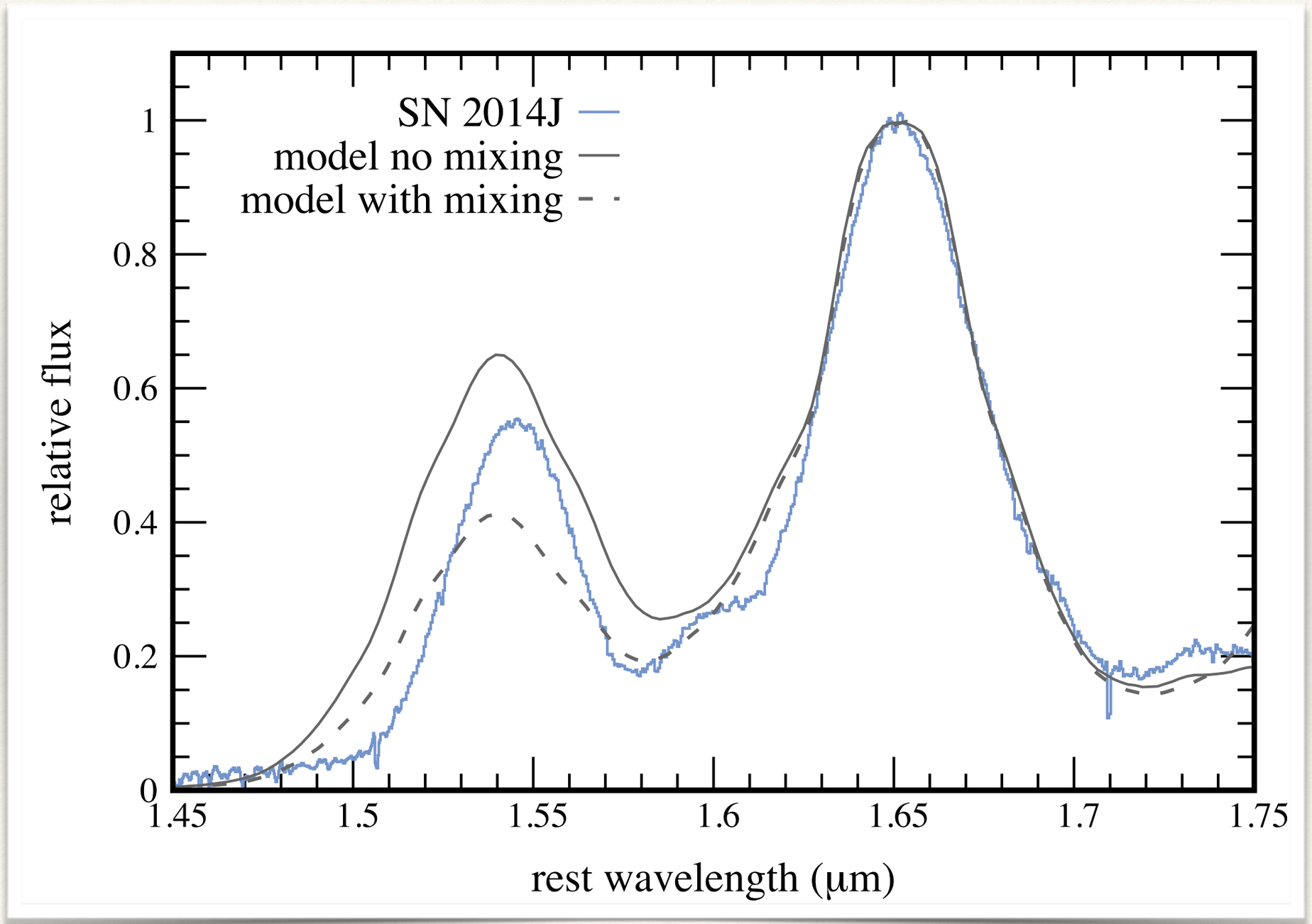


Diamond+submitted



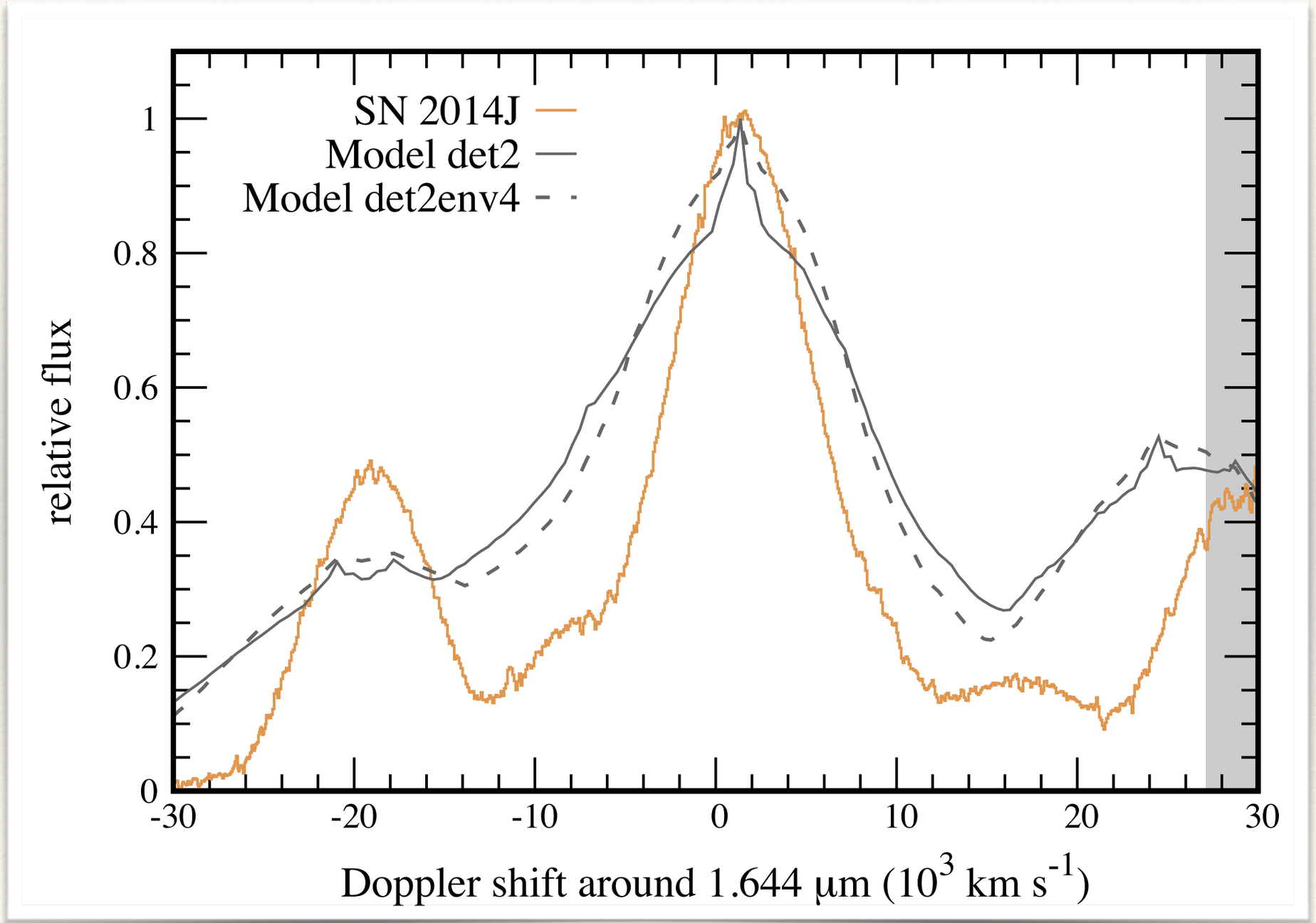
Diamond+submitted

comparison with models w/ and w/o mixing



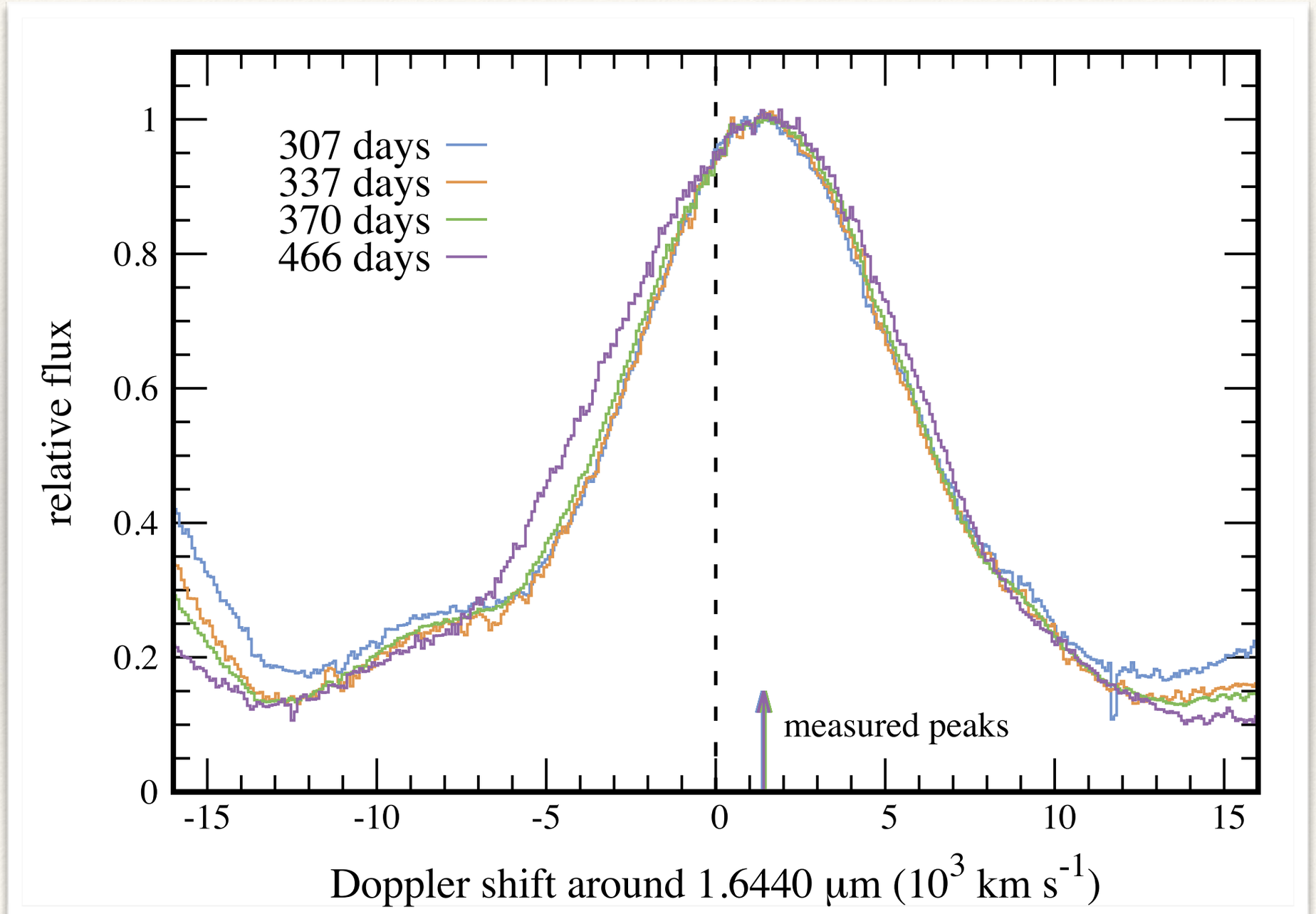
Diamond+submitted

comparison with non-M_{ch} models



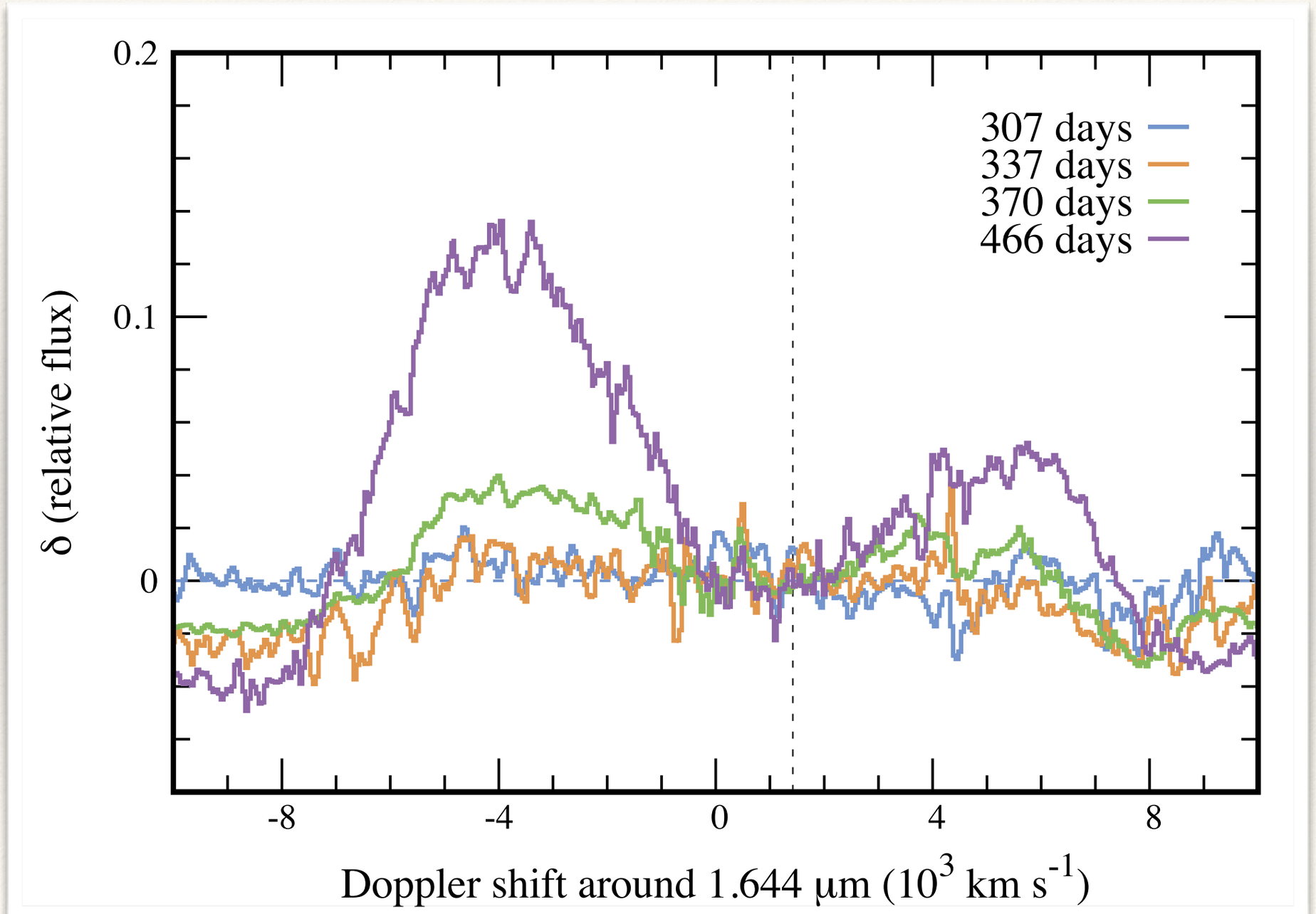
Diamond+submitted

2014J 1.65 μm feature evolution

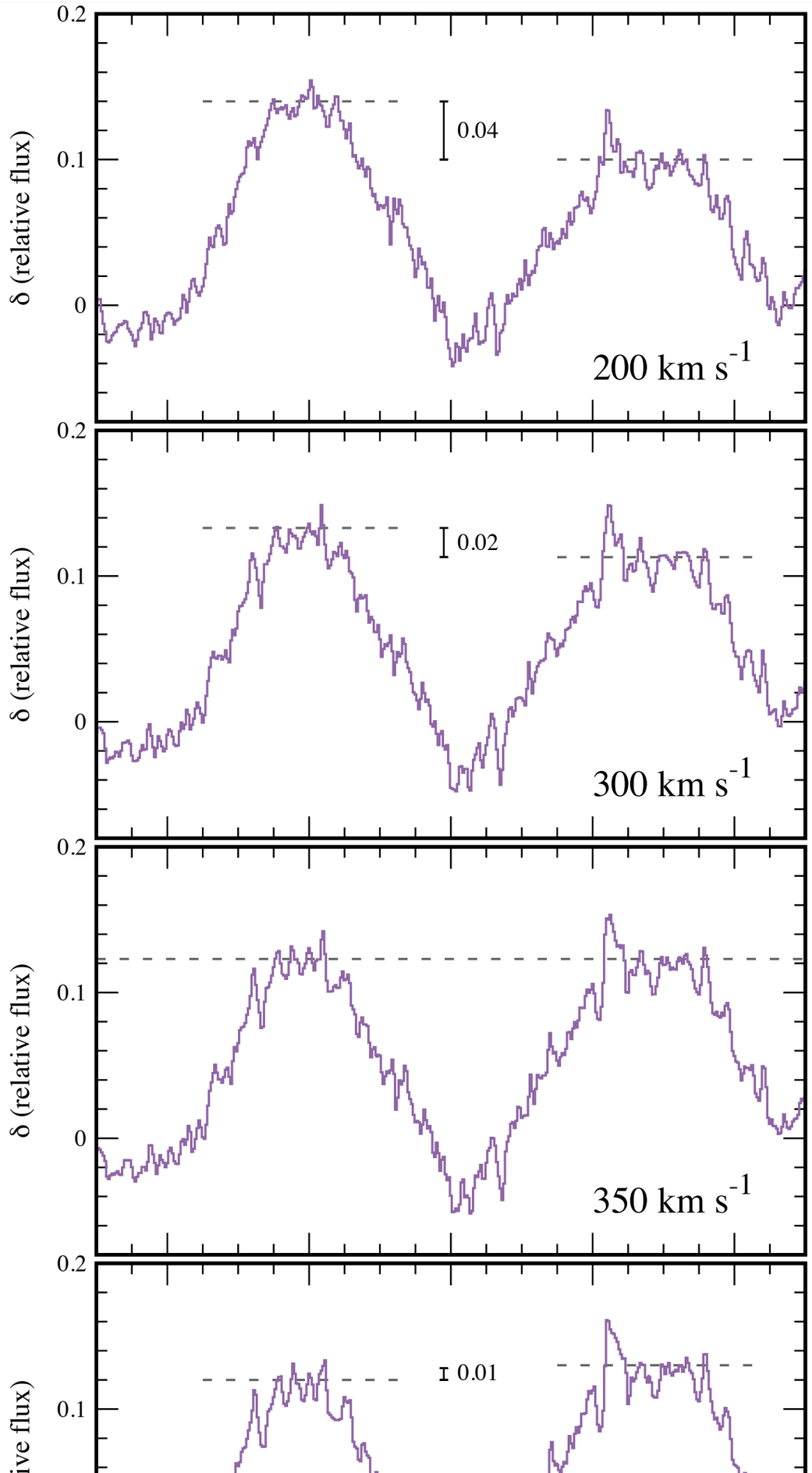


Diamond+submitted

asymmetry in the evolution of the [Fe II] 1.6440 μm line



Diamond+submitted



asymmetry in the evolution of the [Fe II] 1.6440 μm line

Diamond+submitted