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# New in situ aerosol hyperspectral optical measurements over 300–700 nm – Part 1: Spectral Aerosol Extinction (SpEx) instrument field validation during the KORUS-OC cruise

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**Figure S1.** *R/V Onnuri* (top photo); instruments housed in custom-built box sited along the starboard rail above the bridge (long box, left half of bottom left photo, with tall curved sampling mast just to its right); pumps housed in a separate box located a few meters away along the stern rail (bottom right photo).

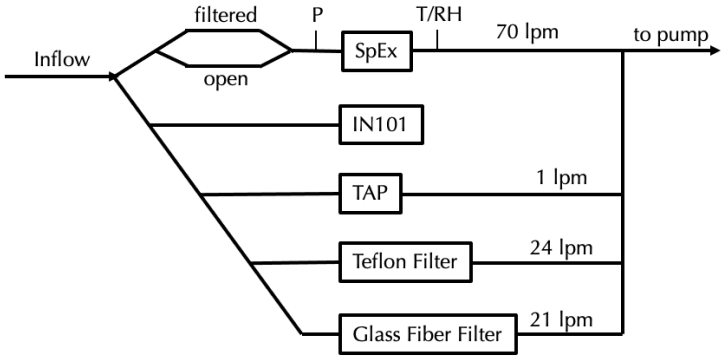


**Figure S2.** Schematic of the flow through the in situ aerosol instrument suite deployed aboard the *R/V Onnuri*. Note that the IN101 has an internal fan that controls its flow, hence, it is not connected to the pump as are the rest of the instruments.

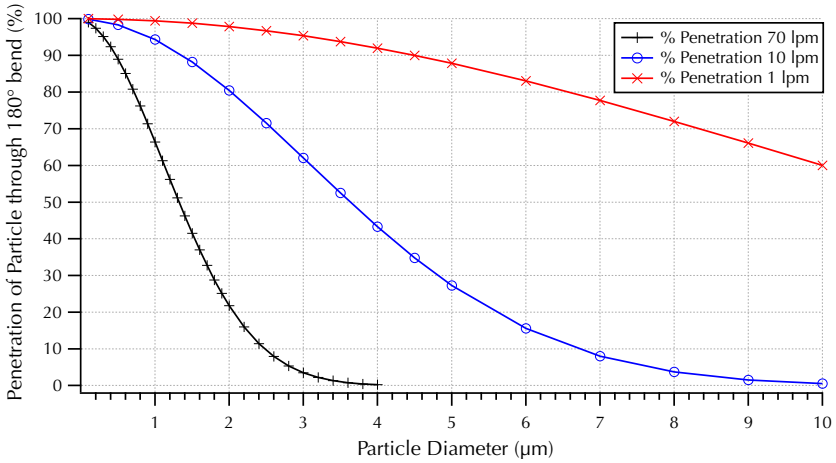


**Figure S3.** Illustration of the relationship between flow rate and size cut of the sampled aerosol particles based on theoretical calculations pertinent to the system deployed aboard the *R/V Onnuri*.

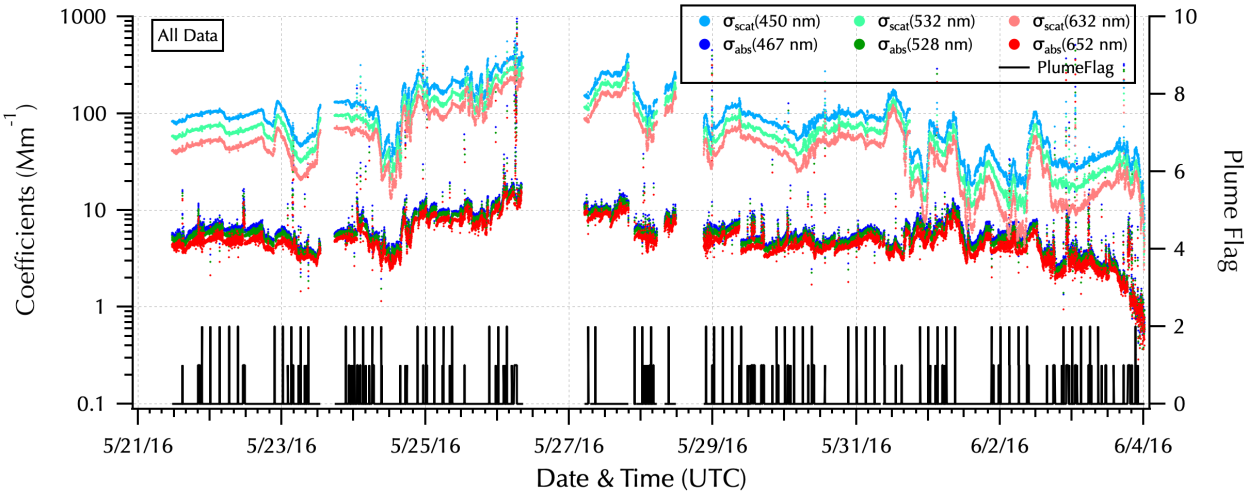


**Figure S4.** All measured scattering coefficients ($\sigma_{scat}$, light shades) and absorption coefficients ($\sigma_{abs}$, dark shades) averaged to 1 minute intervals during the cruise (left axis, units of $Mm^{-1}$), along with plume flags (right axis, = 0 ambient data, = 1 ship exhaust interception, and = 2 filter changes).

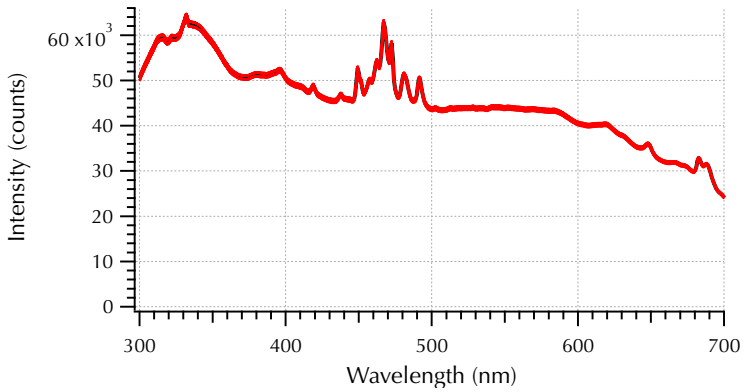


**Figure S5.** Example of a one hour set of intensity spectra that illustrate the two wavelengths (332 nm and 467 nm) that sometimes saturated due to drift in the lamp intensity. 30 individual spectra measured at 2 min intervals over the course of one hour are shown. Typically (as is the case here) there is little discernible difference in intensity between sample and reference spectra over the full range of counts in the 16 bit spectrometer (0-65,536 counts).

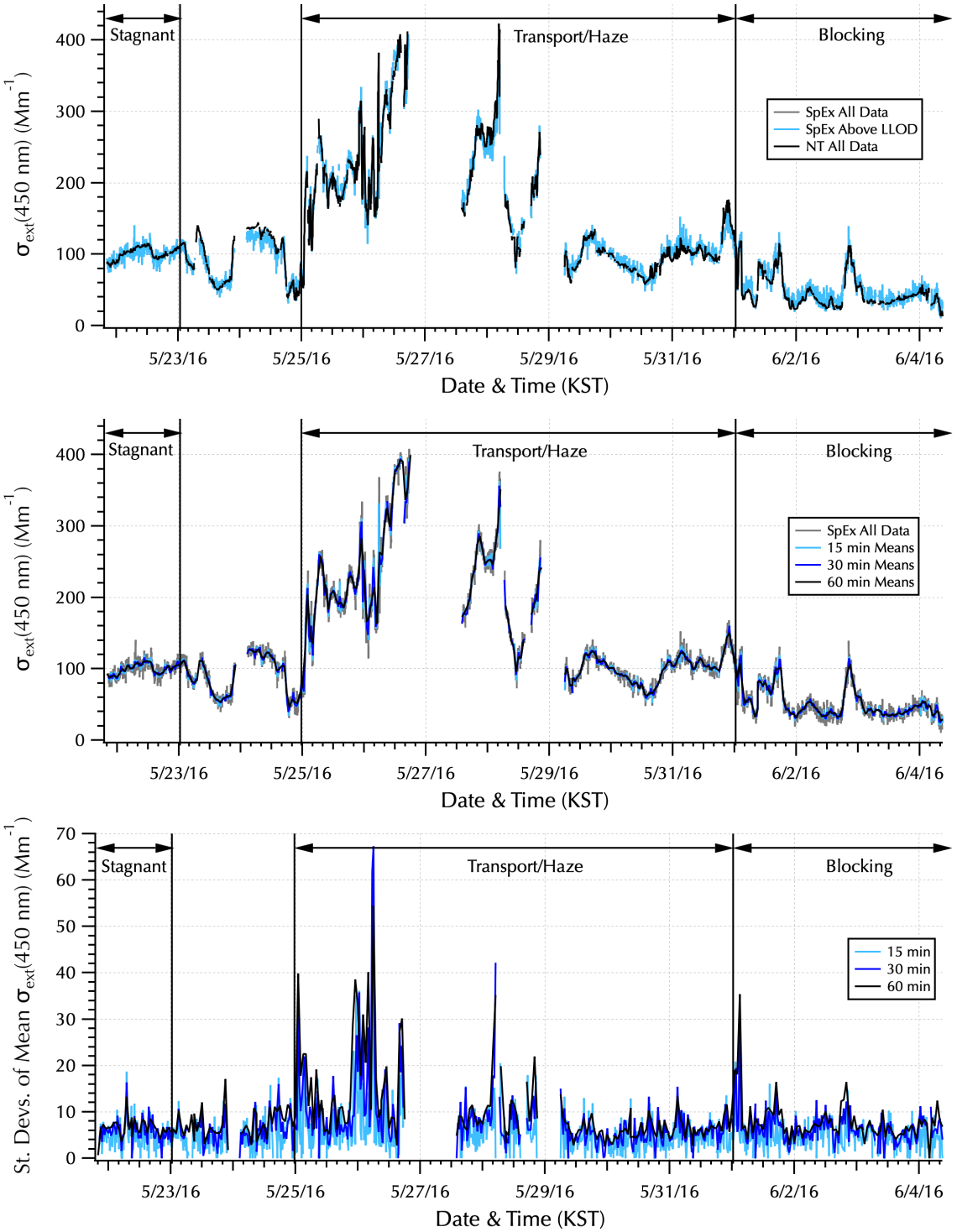


**Figure S6.** Time series of 450 nm $\sigma_{ext}$ ($Mm^{-1}$) throughout the cruise. Top panel: SpEx (all data, gray; above LLOD, blue; these curves are entirely coincident as there were no below detection values at this wavelength) with NT $\sigma_{ext}$ (black). Middle panel: SpEx (all data, gray) with 15 min (light blue), 30 min (dark blue), and 60 min (black) means. Bottom panel: SpEx standard deviations of the 15 min (light blue), 30 min (dark blue), and 60 min (black) means. Meteorological periods shown as in Fig. 2.

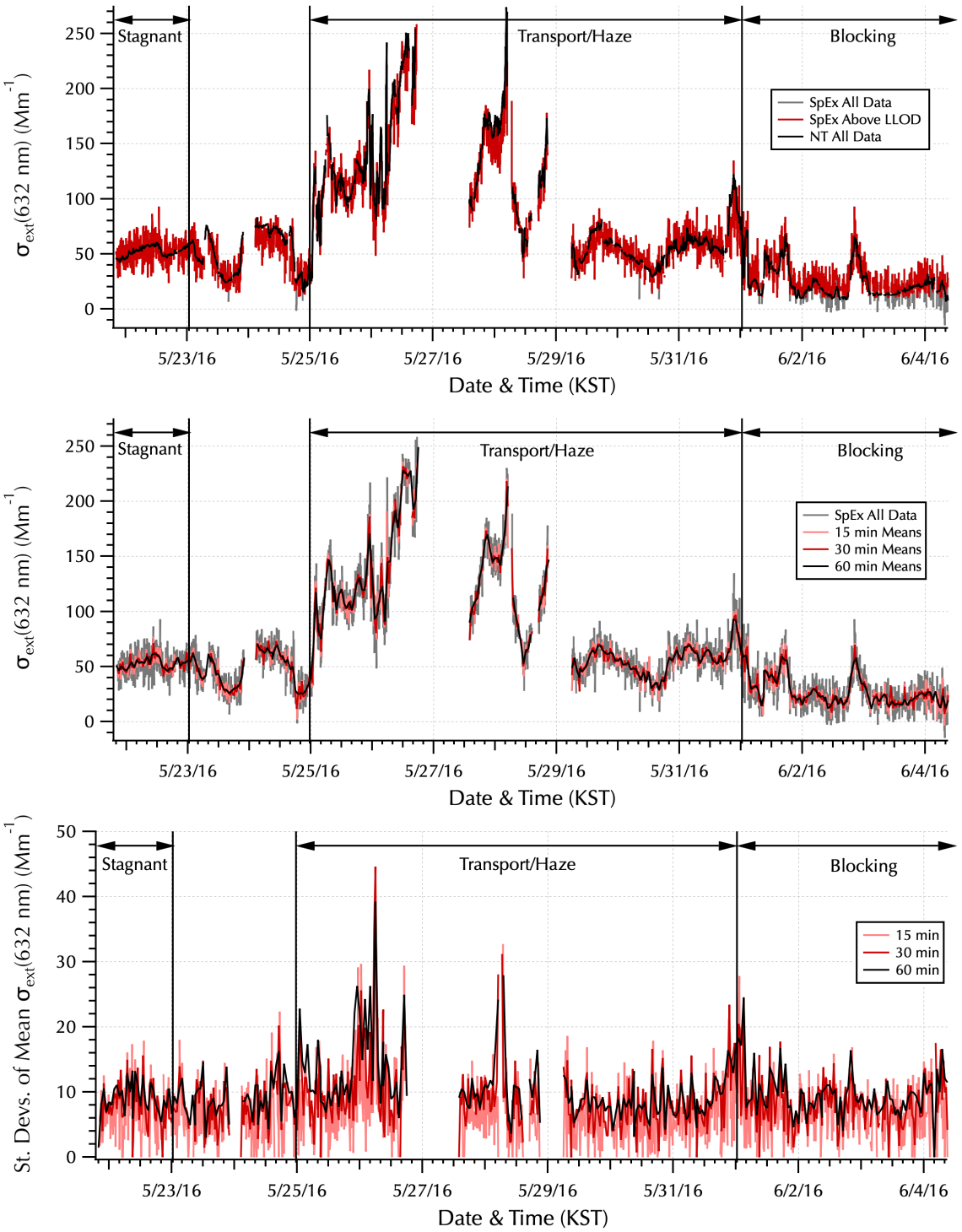


**Figure S7.** Time series of 632 nm $\sigma_{ext}$ ($Mm^{-1}$) throughout the cruise. Top panel: SpEx (all data, gray; above LLOD, red; these curves are coincident except for when the lowest values are below detection and hence, appear gray) with NT $\sigma_{ext}$ (black). Middle panel: SpEx (all data, gray) with 15 min (light red), 30 min (dark red), and 60 min (black) means. Bottom panel: SpEx standard deviations of the 15 min (light red), 30 min (dark red), and 60 min (black) means. Meteorological periods shown as in Fig. 2.

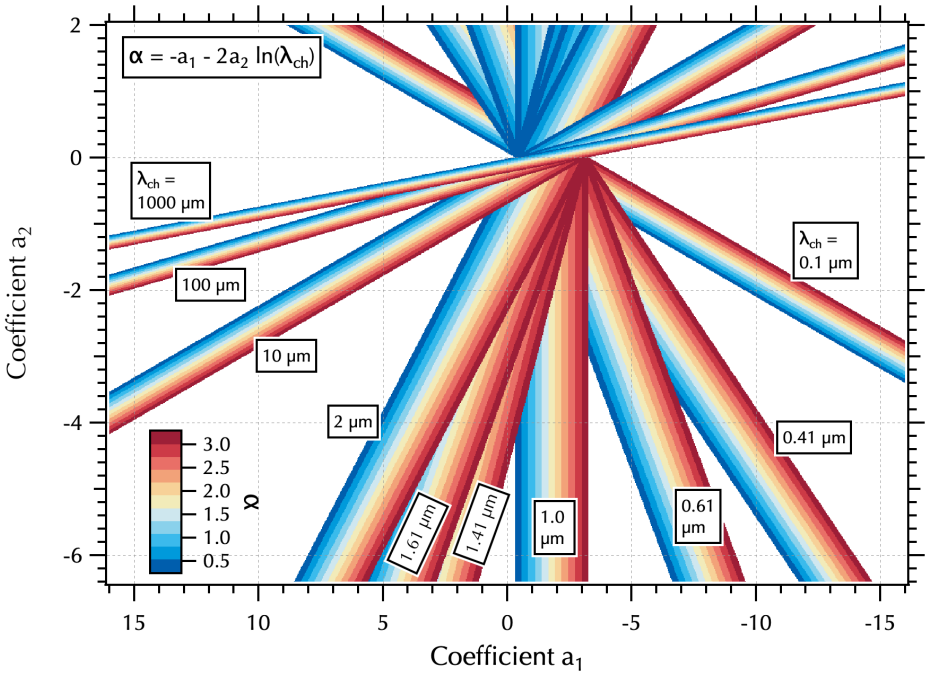


**Figure S8.** Illustration of the rotation of the mapping of $\alpha$ in ($a_1$,$a_2$) space as a function of $\lambda_{ch}$ for long wavelengths. This illustration includes the extreme values of $\lambda_{ch}$ of 100 and 1000 µm to stand in for the mapping that arises from using nm units instead of µm of wavelength.