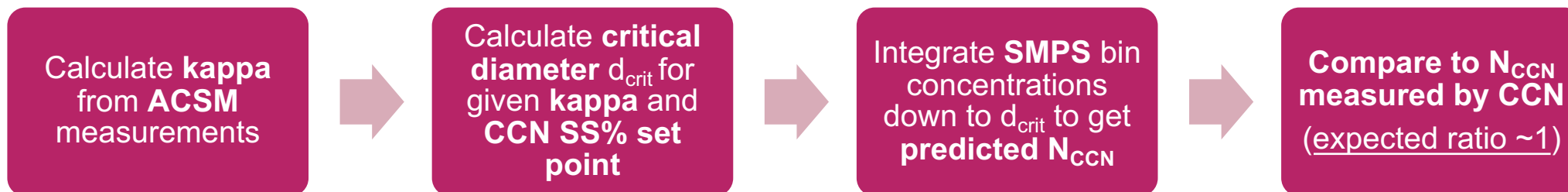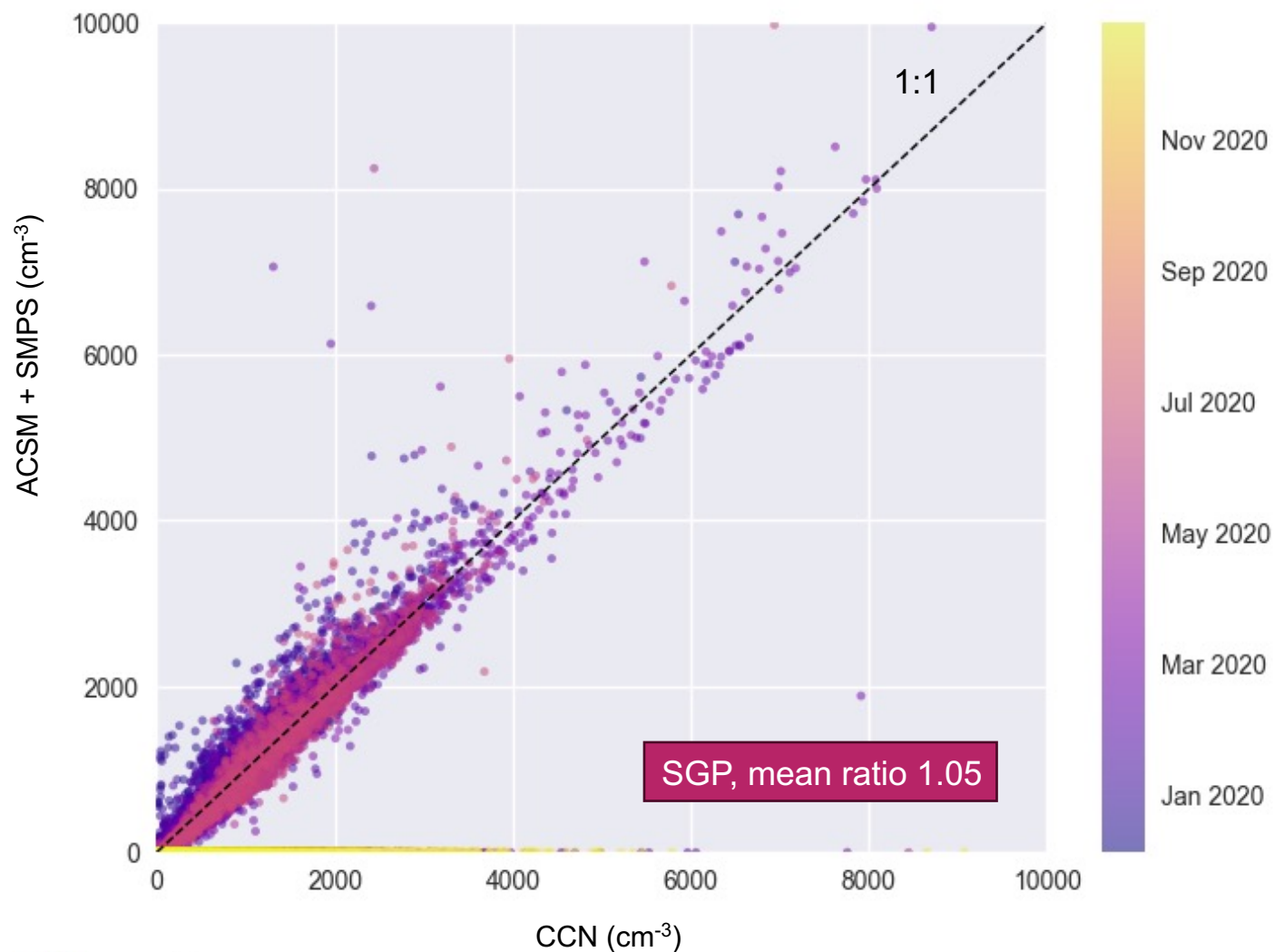# AOS hygroscopicity closure

- AOS has co-located particle size (SMPS), chemical composition (ACSM) and hygroscopicity (CCN) measurements

- Closure between the 3 measurements to assess the performance of:
  - Individual instruments
  - AOS sampling system

- Recent issues at TRACER and EPCAPE with the AOS sampling system identified by the closure

- **Comparison of N_{CCN} predicted from ACSM+SMPS data and N_{CCN} as measured directly by the CCN instrument**

- <u>Simplified procedure</u>:

| Calculate **kappa** from **ACSM** measurements | → | Calculate **critical diameter** d_{crit} for given **kappa** and **CCN SS%** set point | → | Integrate **SMPS** bin concentrations down to d_{crit} to get predicted **N_{CCN}** | → | **Compare to N_{CCN} measured by CCN** (<u>expected ratio ~1</u>) |

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Example results

- **Example from SGP site in 2020**

- Data from all CCN supersaturation set points from 0.1 to 1.0 (col. A only)

- Mean ratio of predicted and measured N_{CCN} was 1.05

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Next steps

- Closure code is being developed into an **autonomous routine** for:

  - **AOS real-time diagnostics** to expedite identification of data quality issues at the time of data collection
  - **ARM QC procedures** to flag data with potential issues

- Automated closure results potentially available as an AOS auxiliary **data product**

AOS instrument management software

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For later discussion

- Would the automated hygroscopicity closure results be useful beyond QC checks?

- If so, in what form e.g., an AOS data stream?

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