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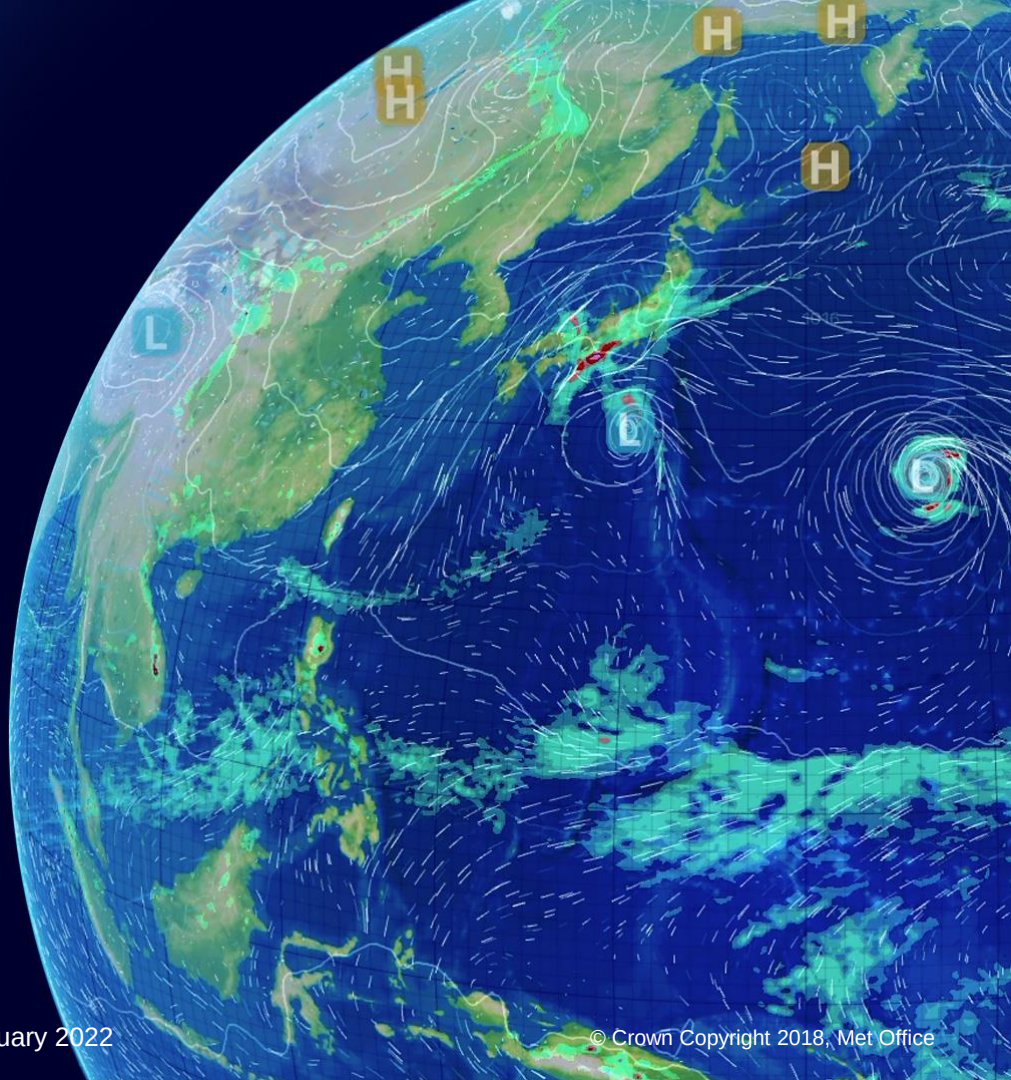
# COSP contributions to CMIP5&6

Alejandro Bodas-Salcedo



# COSP

- **ISCCP**: pseudo-retrievals of cloud top pressure (CTP) and cloud optical thickness (tau) (Klein and Jakob, 1999; Webb et al., 2001).
- **CloudSat**: a forward model for radar reflectivity as a function of height (Haynes et al., 2007).
- **CALIPSO** (Chepfer et al., 2008; Cesana and Chepfer, 2013): forward model for the lidar scattering ratio as a function of height and cloud-phase retrieval.
- **MODIS**: pseudo-retrievals of CTP, effective particle size and tau as a function of phase (Pincus et al., 2012).
- **MISR**: pseudo-retrievals of cloud top height (CTH) and tau (Marchand and Ackerman, 2010).
- **PARASOL**: simple forward model of mono-directional reflectance (Konsta et al., 2015).
- **CLARA:** under development (Eliasson et al., 2020)

Documentation papers: Bodas-Salcedo et al., BAMS, 2011; Swales et al., GMD, 2018.

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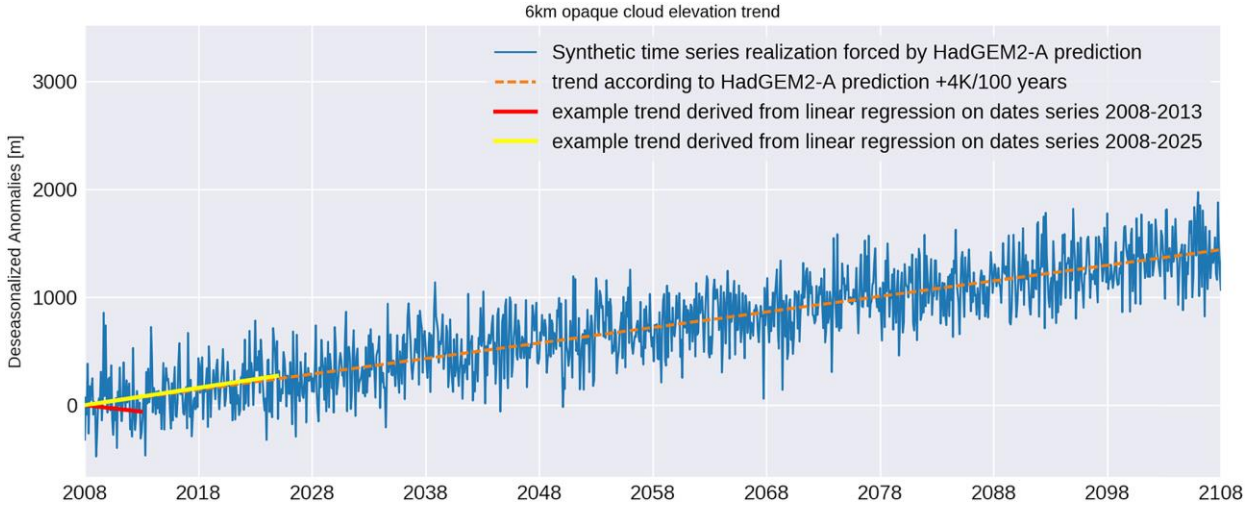
- 100s of papers published using COSP
- Single-model and multi-model
- Evaluation, cloud feedbacks, detection, etc

| | I CA | I CA | I CA | CA CL MI MO PA | CA MO PA | CA CL MO PA |
|---|---|---|---|---|---|---|
| | **cfMon-sim** | **cfDay-2d** | **cfDay-3d** | **CFMIP-cfMonExtra** | **CFMIP-cfDayExtra** | **Cf3hr-sim-new** |
| **amip** | 1979- | 1979- | 1979- | 1979- | 1979- | 2008 |
| **piControl** | 140 years | 140 years | | | | |
| **1pctCO2** | 140 years | 140 years | | | | |
| **abrupt4xCO2** | 140 years | 140 years | | | | |
| **historical (+CFMIP3)** | All years | All years | | | | |

| | |
|---|---|
| **cfMon-sim** | cltisccp, albisccp, pctisccp, clisccp, cltcalipso, cllcalipso, clmcalipso, clhcalipso, clcalipso |
| **cfDay-2d** | cltisccp, albisccp, pctisccp, cltcalipso, cllcalipso, clmcalipso, clhcalipso |
| **cfDay-3d** | clisccp, clcalipso |
| **CFMIP-cfMonExtra** | clcalipsoliq, clcalipsoice, cfadLidarsr532, cfadDbze94, clmisr, jpdftaureliqmodis, jpdftaureicemodis, clwmodis, climodis, cltmodis, parasolRefl |
| **CFMIP-cfDayExtra** | jpdftaureliqmodis, jpdftaureicemodis, parasolRefl |
| **cf3hr-sim-new** | clisccp, clcalipso, clcalipso2, cltcalipso, cllcalipso, clmcalipso, clhcalipso, cfadLidarsr532, cfadDbze94, clmisr, jpdftaureliqmodis, jpdftaureicemodis, parasolRefl |

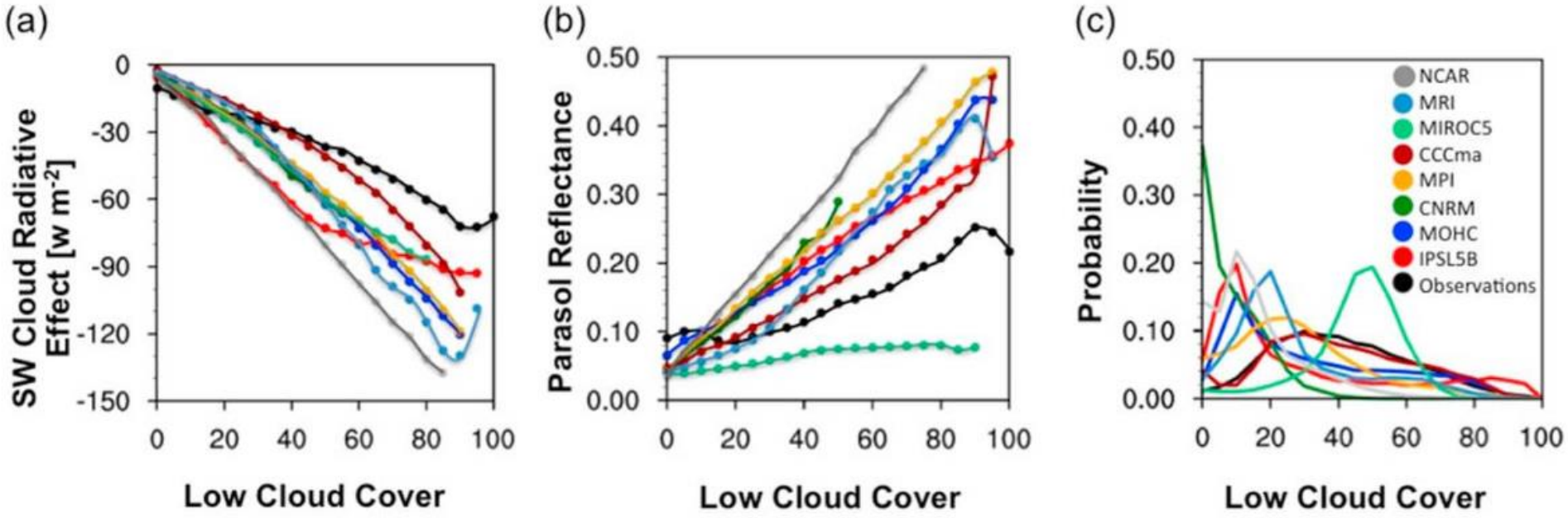
I CA CL MI MO PA

*(Webb et al., GMD, 2017)*

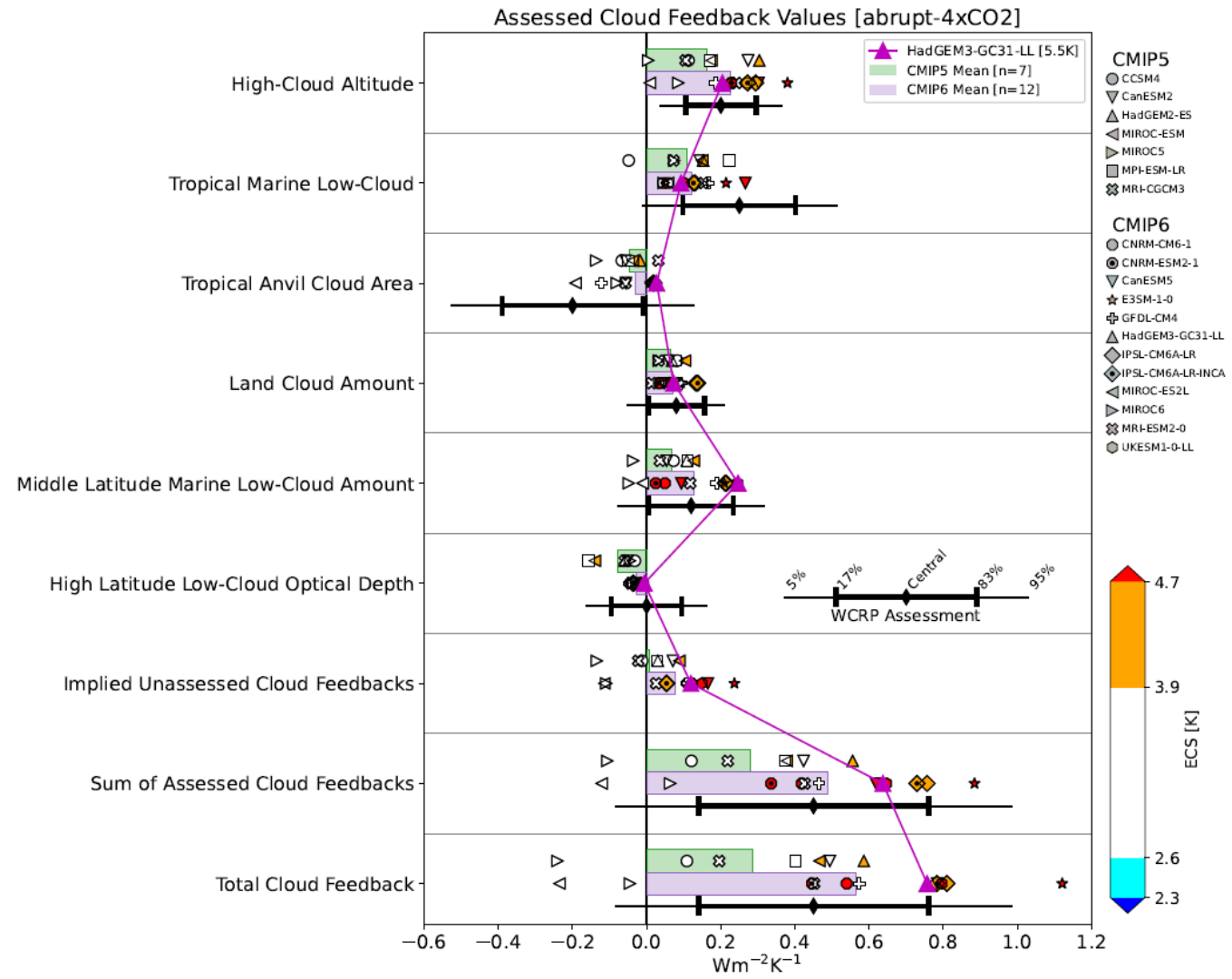




Chepfer et al., JGR, 2018: The Potential of a Multidecade Spaceborne Lidar Record to Constrain Cloud Feedback




Nam et al., GRL, 2012: The ‘too few, too bright’ tropical low-cloud problem in CMIP5 models




*Zelinka et al., JGR, 2022:* Evaluating Climate Models' Cloud Feedbacks Against Expert Judgment

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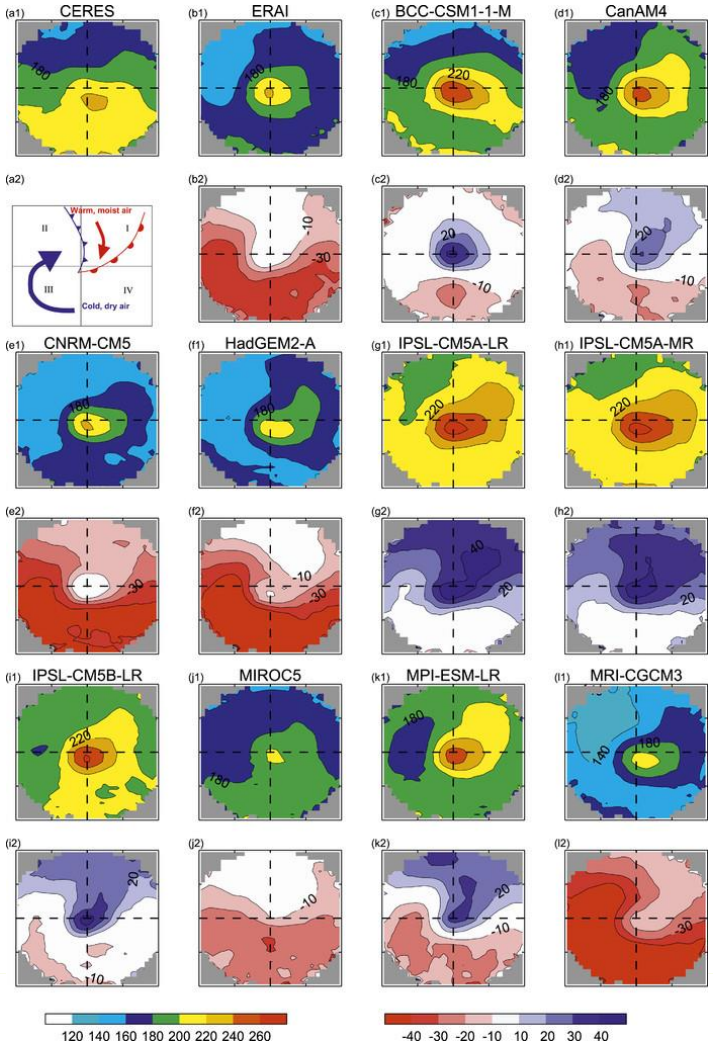
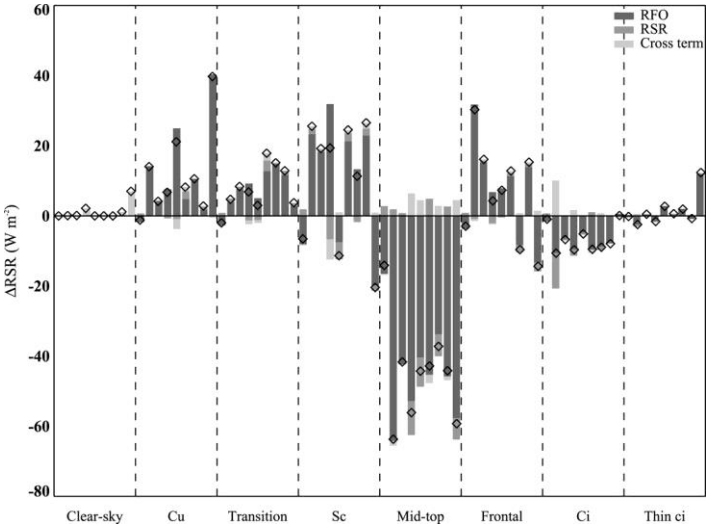
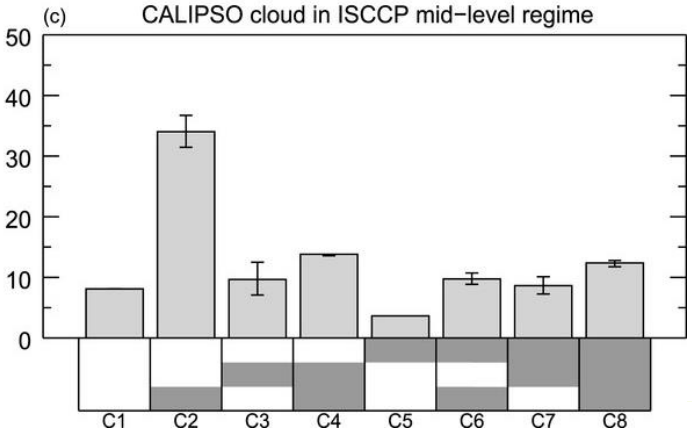
Bodas-Salcedo et al., JClim, 2014: Origins of the Solar Radiation Biases over the Southern Ocean in CFMIP2 Models



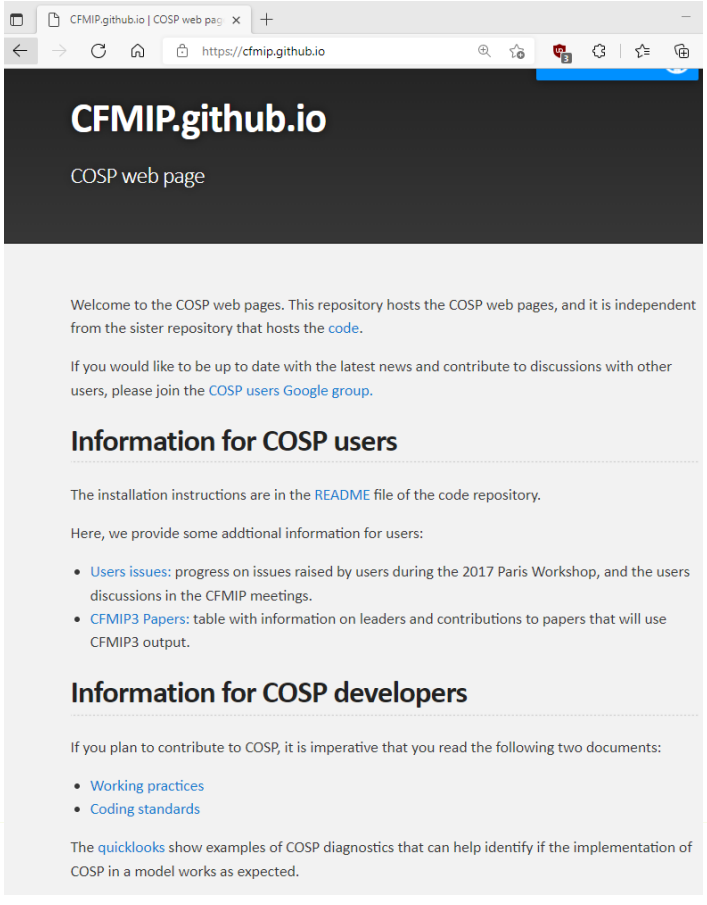



# EarthCARE in COSP

Developments by H. Chepfer's team and collaborators:

- UV wavelength for the lidar in COSP.
- Doppler component not implemented yet, need to study data first. Not completely sure if would be worth to create a Level 1 simulator for velocity.
- Aerosol lidar has been implemented in a research version of COSP. Large change that has not been made publicly available.

# Contributing to COSP




https://cfmip.github.io

- Links to code and **working practices**.
- **CI** tests developed over the last 2 years have lowered the bar for contributions.