I've read the authors response, and most of the points were addressed reasonably well.
The manuscript seems appropriate to the NHESS journal and I do not have any particular objection or further inquiry for/before acceptance of the manuscript.

Second review of Kagkara et al. 2020

Thanks to the authors for the detailed answers. With the correction on aerosol populations, the paper now effectively demonstrates both that the bin scheme DESCAM is able to produce reasonable amounts of precipitation in a 3D, real-case simulation of a convective system, and that there is a sensitivity to the aerosol population, therefore pushing for the use of aerosol-aware cloud physics schemes. My remaining comments are :

General comments

- The vertical cross-sections are a welcome addition which provide a better view of the simulated clouds, but, I expected a bit more in terms of processes leading to the ground level rain characteristics. The presented results are interesting, and the authors state that the focus on rainfall simulation fits the NHESS journal well, but as a cloud physics scientist, I still miss some physical process understanding, which are briefly mentioned in the conclusion, such as :
    - how is the rain size distribution evolving with height and is this evolution depending on the number of aerosol (even if we have no observations to compare to) ?
    why are the lower precipitation amounts underestimated, is this only due to initial & coupling conditions or also linked to microphysics or other processes (turbulent mixing, entrainment, dynamics,...) and is this a usual feature of specific to this case ?

- The correction on aerosol populations answers the main issue with the paper, as the new Figure 2 shows that the three aerosol populations are in fact ordered from the high CCN concentrations (HymRef) to the low CCN concentration (Remote), (almost) consistently for all particle diameters. This still seems cumbersome (it would have been easier to, e.g., divide the real population concentration by 2 and 5, and keep the same size distribution shape), but there is no issue with that anymore. Regarding aerosols, I still have other questions :
    - Above 3km, the concentration is fixed at ~900/cm3, so the same value for all cases, so the studied aerosol impact is only linked to the aerosols at cloud base, and those transported inside the cloud by updrafts, and neglects the effect of aerosol entrainment from cloud sides/top during the cloud formation. This is stated in the authors' answers, is not a problem but should be mentioned in the manuscript.
    - Maybe the new Fig.2 could also include a second panel showing the aerosol number concentration (sum of the three modes) for each experiment along the vertical ?

minor comments
- p2 l15 : Tauf~~**f**~~our et al. (…) with ~~**a**~~ **the** two-moment scheme (…)
- p2 l29-30 : Although most studies using bin schemes are performed in 2D or idealized configurations, some bin schemes have already successfully been used for real cases of deep convection, (although not for HyMeX cases), even for aerosol-cloud interactions assessment (eg. Iguchi et al 2008, Fan et al. 2012). So, here and in the conclusion, maybe this could be modified : "test if the DESCAM bin scheme is able to ..." ?
- p2 l31: Although bulk models are indeed less precise than bin schemes, they usually perform well enough for convection and are able to produce high amounts of precipitation. Studies of HyMeX cases cited in this paper indeed prove that point (Hally 2014, Duffourg 2016, etc), especially for cases involving strong synoptic forcing of orographic lifting. Although some errors and/or uncertainty remain, they are not attributable to the microphysics only. The same can be said for this case using the DESCAM bin scheme (indeed, the conclusion states that some differences with observations may very well be due to the initial and lateral boundary conditions). "Often have

difficulties" is a bit overstated and mixes all uncertainty sources in simulations. Maybe change for something like "rely on much more assumptions and approximations to predict ..." ?
- p13 l14 : see comment above about other bin schemes used in 3D real case simulations
- p15 l.33 : See comment above about bulk schemes. The statement "better represented as they are generally in bulk models" is vague and not justified. Again, of course they can be improved and the bin scheme is valuable in this regard, but bulk schemes have been used successfully for high impact weather forecasts and warnings for quite some time, and generally produce reasonable amounts of rain for Mediterranean heavy precipitating cases.

Ref :

Fan, J., L. R. Leung, Z. Li, H. Morrison, H. Chen, Y. Zhou, Y. Qian, and Y. Wang (2012), Aerosol impacts on clouds and precipitation in eastern China: Results from bin and bulk microphysics, *J. Geophys. Res. Atmos.*, *117*(D16), n/a–n/a, doi:10.1029/2011JD016537.

Iguchi, T., Nakajima, T., Khain, A. P., Saito, K., Takemura, T., and Suzuki, K. (2008), Modeling the influence of aerosols on cloud microphysical properties in the east Asia region using a mesoscale model coupled with a bin-based cloud microphysics scheme, *J. Geophys. Res.*, 113, D14215, doi:10.1029/2007JD009774.