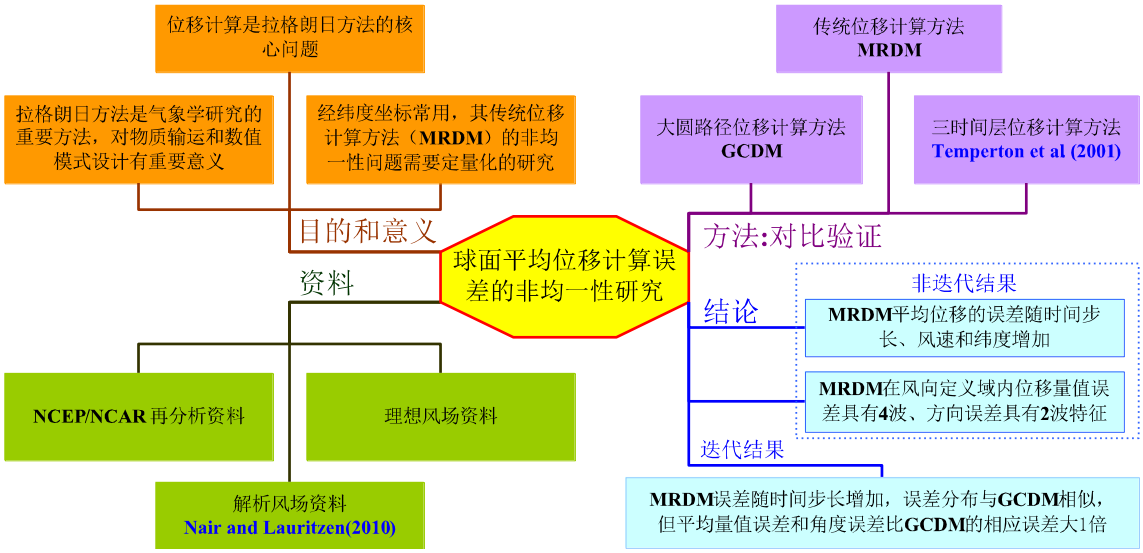
Citation: Wang, X. Z., B. H. Hu, H. Huang, et al., 2017: Error inhomogeneity in computation of spherical mean displacement. *J. Meteor. Res.*, **31**(6), XXX－XXX, doi: 10.1007/s13351-017-6048-z. (in press)

中文题目：球面平均位移计算误差的非均一性研究

作者：王学忠，胡邦辉*，黄泓，王举，等.

利用 NCEP/NCAR 气候平均资料和理想风场，以大圆位移方法（GCDM）和三时间层的位移计算方法为参考，以位移的量值差异和方向偏差为度量，研究了传统球面合成位移计算方法（MRDM）的非均一性和奇异性问题。结果表明：非迭代计算情况下，MRDM 计算的平均位移既有计算误差也有理论误差，位移误差与风速、风向及气块所在纬度有关：平均位移的误差随风速和纬度增加，在风向定义域内位移量值误差具有 4 波、位移方向误差具有 2 波特征；迭代计算情况下，MRDM 和 GCDM 相对于三时间层位移计算方法的误差都随位移时间步长的增加而增加，两种方法的误差分布具有相似性，平均 MRDM 的量值误差和角度误差比 GCDM 的相应误差大一倍。

思维导图（中文）



英文题目：Error Inhomogeneity in Computation of Spherical Mean Displacement

作者：WANG Xuezhong, HU Banghui*, HUANG Hong, WANG Ju, et al.

英文摘要：The traditional mean displacement computing method in latitude-longitude coordinates is a spherical meridional-zonal resultant displacement computing method (hereafter, MRDM) which regards the displacement as the vector resultant of the meridional and the zonal displacement components. There are inhomogeneity and singularity in computation error of MRDM, especially at high latitudes. Using NCEP/NCAR(National Centers for Environmental Prediction / The National Center for Atmospheric Research) long term monthly mean wind field and ideal wind fields, the inhomogeneity is accessed with a great circle displacement computing

method (hereafter, GCDM) of non-iterative cases. Taking the trajectories from a three-time-level reference method as real ones, MRDM and GCDM are compared in iteration cases. In horizontal direction, GCDM assumes that an air particle moves along its locating great circle of the earth, and the magnitude of the displacement equals to arc length of the great circle. The inhomogeneity of MRDM is evaluated in terms of the horizontal distance error from the product of wind speed and time lapse and angle difference from GCDM displacement orient. The non-iterative results show that the mean horizontal displacement computed through MRDM has both computational and analytical errors. The displacement error of MRDM depends on the wind speed, wind direction, and the departure latitude of the air particle. It increases with the wind speed and departure latitude. The displacement magnitude error has a 4-wave pattern and displacement direction error has a 2-wave feature in the definition range of wind direction. The iterative result shows that displacement magnitude error and angle error of MRDM and GCDM with respect to the reference method are increasing with time lapse, and have similar distribution pattern. Mean MRDM's magnitude error and angle error are nearly one time larger than those of GCDM.