A Cyclone Damage Potential Index

Greg Holland and James Done
NCAR Earth System Laboratory, Boulder CO, US

Approach: Indices have long been used to aid communication of complex meteorological information. Examples include the Saffir-Simpson hurricane categories, the Fujita tornado F-scale and a range of existing hurricane damage indices. Our goal is to develop this concept further to provide independent impact assessments for a wide range of applications. A new Cyclone Damage Potential (CDP) index evolved from the Willis Hurricane Index (WHI). Whereas the WHI was specific to the transfer of offshore-energy related property re-/insurance risk and settlement of related losses, the CDP is being developed for more general societal applications and is formulated as:

\[
CDP = 4 \frac{\left( \frac{v_m}{65} \right)^3 + 5 \left( \frac{R_h}{50} \right)}{v_t},
\]

For \( v_m > 65 \); if \( v_t < 5 \), set \( v_t = 5 \); if \( CDP > 10 \) set \( CDP = 10 \).

where \( v_m \) is the maximum surface wind speed (kts), \( R_h \) is the radius of hurricane force winds (nm) and \( v_t \) is the translation speed (kts). Note that the damage depends on the duration of destructive winds, not just their value in terms of hurricane intensity.

Applications to Re-/insurance:

1) Independent assessment of impacts, their correlations, clustering and trends.
2) Impact assessments in data sparse regions.
3) Improved understanding of climate variability and change impacts.
4) Real-time impact assessment before and immediately following a hurricane strike.

Example: Geographic spread of historical Cyclone Damage Potential. The arrows indicate pathways of higher destructive potential.

Timeline for extensions:

Summer 2012: Global impact assessments using historical data.

Autumn 2012: Future change in global impacts using downscaled global climate model data.