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| WORLD METEOROLOGICAL ORGANIZATION  COMMISSION FOR BASIC SYSTEMS  -----------------------------  FOURTH MEETING OF  INTER-PROGRAMME EXPERT TEAM ON DATA REPRESENTATION MAINTENANCE AND MONITORING  GENEVA, SWITZERLAND, 30 MAY - 3 JUNE 2016 |  | IPET-DRMM-IV / Doc. 2.2 (1)  (23. 3. 2016)  -------------------------  ITEM 2.2  ENGLISH ONLY |

GRIB2

**New parameter for tropical cyclone forecasts**

*Submitted by* *Jeff Ator (U.S.A.)*

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**Summary and Purpose of Document**

This document proposes a new parameter in GRIB2 Code Table 4.2 for use with tropical cyclone forecasts.

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**ACTION PROPOSED**

The meeting is requested to review the proposal and recommend the contents for fast-track approval in November 2016 (FT2016-2).

**DISCUSSIONS**

The U.S. Hurricane Weather Research and Forecasting (HWRF) model is used to track and forecast tropical cyclone activity in the Northern Atlantic and Eastern Pacific basins, and it is collaboratively maintained between NOAA and other parts of the U.S. meteorological community including several universities. The heat exchange coefficient, which is a unitless indicator of the interaction between the ocean and the atmosphere, is a significant factor in the determination of the strength and development of tropical cyclones. The U.S. NCEP (which manages the operational runs of the HWRF model) would like to begin outputting this heat exchange coefficient in GRIB2, in order to assist members of the research community who are continually working to help improve the model.

The proposed new parameter is shown below, and we would be happy to provide sample data for validation if desired by other members of the IPET-DRMM. In the meantime, the following links may be useful as background references for folks with knowledge of thermodynamics and fluid dynamics:

http://www.ecmwf.int/sites/default/files/elibrary/2009/9260-review-air-sea-transfer-processes.pdf

https://usclivar.org/sites/default/files/meetings/2015/presentations/9-Edson\_new.pdf

and here also are some published papers for additional detail:

DeCosmo, J., K. B. Katsaros, S. D. Smith, R. J. Anderson, W. A. Oost, K. Bumke, and H. Chadwick, 1996: Air-Sea Exchange of Water Vapor and Sensible Heat: The Humidity Exchange over the Sea (HEXOS) Results. J. Geophys. Res., 101, 12001-12016.

Edson, J. B., C. J. Zappa, J. A. Ware, W. R. McGillis, and J. E. Hare, 2004: Scalar flux profile relationships over the open ocean. J. Geophys. Res., 109.

Fairall, C. W., E. F. Bradley, J. E. Hare, A. A. Grachev, and J. B. Edson, 2003: Bulk Parameterization of Air-Sea Fluxes: Updates and Verification for the COARE Algorithm. Journal of Climate, 16, 571-591.

Large, W. G. and S. Pond, 1982: Sensible and Latent Heat Flux Measurements over the Ocean. J. Phys. Oceanogr., 12, 464-482.

Smith, S. D., 1980: Wind stress and heat flux over the ocean in gale force winds. J. Phys. Oceanogr., 10, 709-726.

——, 1988: Coefficients for sea surface wind stress, heat flux, and wind profiles as a function of wind speed and temperature. J. Geophys. Res., 93, 15467-15472.

Haus, B. K., D. Jeong, M. A. Donelan, J. A. Zhang, and I. Savelyev (2010), Relative rates of sea-air heat transfer and frictional drag in very high winds, Geophys. Res. Lett., 37, L07802, doi:10.1029/2009GL042206.

**PROPOSAL**

***New parameter in Code Table 4.2:***

**Discipline 10 (Oceanographic products)**

**Category 3 (Surface properties)**

**Number Parameter Units**

2 Heat exchange coefficient -