

Proyeksi Perubahan Iklim Ekstrem Sampai Tahun 2100 di Indonesia Menggunakan Metode Downscaling Statistik Model CMIP5 = Projections of Extreme Climate Change Until 2100 in Indonesia Using Downscaling Statistics Method of CMIP5 Models

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Abstrak

ABSTRAK

Perubahan iklim telah menyebabkan kerugian jiwa dan ekonomi akibat fenomena iklim ekstrem seperti banjir, kekeringan, perubahan karakteristik hujan dan kenaikan suhu di Indonesia. Informasi tentang proyeksi iklim yaitu curah hujan dan tren suhu sangat penting untuk melakukan adaptasi, mitigasi serta perencanaan operasional untuk berbagai sektor yang terkena dampak. Dalam studi ini, peneliti menggunakan data observasi dan data model iklim global. Data observasi harian berasal dari 70 stasiun meteorologi di Indonesia selama 20 tahun dari 1986 hingga 2005. Selanjutnya 29 data model iklim global GCM (Global Circulation Model) dari CMIP5 (Coupled Model Intercomparison Project Phase 5) historical dianalisis berdasarkan kesamaan pola spasial dan pola temporal dengan pola pengamatan stasiun meteorologi di Indonesia menggunakan korelasi. Model proyeksi perubahan iklim masa depan hingga tahun 2100 untuk variabel curah hujan dan suhu udara dikoreksi biasanya untuk skenario RCP 4.5 dan RCP 8.5 dari model terbaik yang didapatkan dari korelasi tertinggi. Proyeksi masa depan dibuat dalam index iklim ekstrem berdasarkan ETCCDI (Expert Team on Climate Change Detection and Indices) menjadi index total curah hujan tahunan (Prcptot), hari kering berturut-turut (CDD), hari hujan berturut-turut (CWD), nilai suhu maksimum bulanan (TXx) dan nilai suhu minimum bulanan (TNn). Index iklim ekstrem berdasarkan ETCCDI proyeksi dibandingkan dengan periode historical (1981-2010) sehingga diperoleh seberapa besar persentase perubahan iklim ekstrem pada periode 2011-2040, 2041-2070 dan 2071-2100. Hasil proyeksi masa depan secara temporal dan spasial index iklim ekstrem meliputi Prcptot, CWD, TXx dan TNn kecuali index CDD relatif mengalami kenaikan terhadap periode historicalnya.

ABSTRACT

Climate change has caused life and economic losses due to extreme climate phenomena such as floods, droughts, changes in the characteristics of rain and rising temperatures in Indonesia. Information about climate projections, namely rainfall and temperature trends is very important for adaptation, mitigation and operational planning for the various sectors affected. In this study, researcher used observational data and global climate model data. Daily observational data obtained from 70 meteorological stations in Indonesia for 20 years from 1986 to 2005. Furthermore, 29 global model GCM (Global Circulation Model) from CMIP5 (Coupled Model Intercomparison Project Phase 5) historical were analyzed based on similarity of spatial patterns and temporal patterns with pattern of observation of meteorological stations in Indonesia using correlation. The projection model of future climate change until 2100 for rainfall variables and air temperature bias corrected for RCP 4.5 and RCP 8.5 scenarios of the best models obtained from the highest correlation. Future projections are made in the extreme climate index based on ETCCDI (Expert Team on Climate Change Detection and Indices) to be an index of total annual rainfall (Prcptot), consecutive dry days (CDD), consecutive wet days (CWD), maximum monthly temperature values (TXx) and minimum monthly temperature values (TNn). Extreme climate index based on ETCCDI projection compared with historical period (1981-2010) so that it can be obtained how large the percentage of extreme climate change in the period 2011-2040, 2041-2070 and 2071-2100. The results of the projection of the future climate index of extreme climate includes Prcptot, CWD, TXx and TNn except the index CDD relatively experienced an increase compared to its historical period.

minimum monthly temperature values (TN_n). Extreme climate index based on projection ETCCDI compared to historical period (1981-2010) so that the percentage of extreme climate change is obtained in the period 2011-2040, 2041-2070 and 2071-2100. The results of temporal and spatial predictions of extreme climate indices include Prcptot, CWD, TXx and TNN except that the CDD index has relatively increased over the historical period.